Manitoba Hydro Bipole III Transmission Project

Review of Project Information Filed by Manitoba Hydro on Agriculture

Prepared for the Bipole III Coalition by

Bertrand de Rocquigny

Ferme de Rocquigny Farm

St. Claude, Manitoba

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Introduction

In this report, I will discuss a number of ways in which Manitoba Hydro's Bipole III transmission line may impact the operations of Ferme de Rocquigny Farm Ltd. In doing so, I believe that farmers operating livestock / hog farms and applying liquid manure will encounter the same issues as we are facing with the construction of the Bipole III line. My two brothers, Lionel and Laurent operate Dufayel HoIsteins and milk 120 dairy cows. I operate Dufayel Cattle Ltd. running a 280-head cow/calf beef cattle operation. Our farm also consists of 1300 hectares (3300 acres) of crop land. I will focus mainly on the following issues: manure management, biological effects, safety and liability.

Manure Management

Manure is a valuable, organic, natural source of fertilizer to many of Manitoba's farms. It is not waste. Applying manure as a fertilizer, growing a grain crop and feeding the grain back to livestock is common practice in the livestock production areas of Manitoba. *The Environment Act* in Manitoba regulates the application of livestock manure to crop land on the basis of both nitrogen and phosphorus through the Livestock Manure and Mortalities Management Regulation.

Ferme de Rocquigny Farm Ltd and all other livestock farms are required by Manitoba Conservation and Water Stewardship (the Government) to meet all of the regulatory requirements for manure management. We comply willingly because we understand that we need to do our part to ensure that the nutrients produced by our operation do not cause problems in the environment.

The method required by the Government for disposing of the liquid manure produced by our dairy operation is injection into cropped land at safe rates where it serves as a fertilizer for the crops. Because applying manure on frozen ground in the winter is quite reasonably not permitted, we are required by the Government to have a steel storage tank which we use to store the manure between applications that occur in the non-winter months. The capacity of the tank is 1.6 million gallons.

To give you an idea of the physical dimensions of this tank, it is about six metres (20 feet) in height by 43 metres (141 feet) in diameter. It meets all of the Government standards and we purchased and installed it under Government supervision. The new Bipole III line will be about 150 to 200 metres (500 to 700 feet) from our tank. An earlier plan would have put the line 350 to 400 metres (1100 to 1300 feet) from our tank in a fence line where it would not have been a serious problem. But that plan was changed to accommodate some concerned neighbors. The planned route is now about 200 metres (660 feet) right into the middle of our fields.

Injection of dairy cattle manure involves running a pump plumbed to the storage tank. The pump discharges from the storage tank into a long flexible hose which is connected at the remote end to injection equipment; basically a deep tillage implement with shanks that are appropriately spaced that are fitted with narrow injectors, which deposit the liquid manure at a depth of about 100 mm (four inches) below the soil surface. In the business, the hose is called an “umbilical hose” or simply a “drag hose”. The implement is either drawbar-connected or mounted on a three-point hitch to a high-horsepower tractor.

Because it is important that the hose not plug up, we run four or more pto-driven pumps in the tank to agitate the liquid manure; which makes the manure more consistent and prevents plugging of the hose. It also ensures a better consistency of the manure so that the nutrient application is more uniform, thus complying with regulatory requirements. The reason for elaborating on how our system works is so that it can be appreciated that we have made a major investment in order to meet environmental standards for handling the manure from our dairy operation.

Towers in a Manitoba Hydro Bipole III transmission line will present an obstruction in the field near the tank that we use to receive the manure. It is radically different from the situation with other crop production equipment which has no trailed hose. It will be extremely difficult to farm around or even alongside towers with manure application equipment utilizing drag hose technology.

Manure injection is typically done on the diagonal of the field for a number of agronomic reasons. As the application progresses across the field, when the part of the field that has been covered reaches the tower, we do not have the option of running the return pass on the other side of the tower because this would “snare” the tower. Considering the high horsepower of the tractor that we use, snaring the tower would almost certainly bring it down.

Even with careful operation, there is another serious risk of damaging, even bringing down, a tower with the drag hose. A simple calculation reveals that the weight of the liquid manure in a half mile of 8-inch-diameter hose is greater than 28 tons. When you consider that this 28-ton-plus hose is being dragged by a 500 hp tractor, it is easy to see that even with a 30-degree minimum deflection of the hose at base of the tower, the lateral force on the tower would be enormous. All that has to happen is for the hose to ride up a short distance on the leg of the tower where its capacity to withstand any lateral force is minimal-- and inevitably--the tower goes down and you have a catastrophic accident!

Because the tank is so large and because it is permanent, it is not possible to move the tank to serve another field. This system represents a major investment on our farm. The location of the tank needs to be in close proximity to our dairy operation and the land it sits on needed to be available for receiving the manure. It was a decision that was made in order for us to comply with the strict handling of livestock manure by the Government. It was a decision that was made for long-term planning purposes to meet all regulations into the future. It is not a plan that can now be abandoned due to problems caused by Bipole III towers that will be located in the field.

A large portion of the proposed route for Bipole III in the southern section of the province will traverse the most heavily populated hog, poultry and dairy belt in Manitoba. All of these livestock farms utilize the manure that is produced by the livestock either on their own farms or on other farms in the area.

To demonstrate this point, I would like to draw your attention to the first table in Appendix A which shows the extent to which hog manure is used on-farm as valuable fertilizer. The second table demonstrates that injecting liquid hog manure into crop land is a prevalent practice in the province. Our farm does the same with manure from our dairy operation.

I would also like to have you look at Appendix B which shows the very heavy density of registered manure storage facilities in the southern portion of the province. Manure storage facilities are a good proxy for large-scale livestock enterprises because manure must be stored over winter when spreading is not permitted. Note the especially heavy concentration of manure storage facilities and, therefore, large-scale livestock operations in the southeast corner of the province where the proposed route for Bipole III would pass on its way to the Riel Converter Station. (The green line drawn on Appendix B is a rough approximation of the Final Preferred Route for Bipole III) This particular area of the province has 50% of its total acres dedicated to manure management plans and available for regular manure application.

Biological Effects

We are concerned about the biological effects of having a high-voltage line near our cattle. We have experienced past serious negative consequences on our dairy herd which we milk twice a day (5:00 am and 4:30 pm) in a parlour located near a HVac distribution line. Stress on our cows and heifers caused by the line has affected their immune system, leaving them vulnerable to a number of viruses. A good indicator of this condition is the elevated levels of somatic cell count that we have observed in the milk. Feed intake is reduced, lactation performance drops and productivity is lowered. Or dairy cows have exhibited serious physical signs of stress in this environment. I

have seen some cows go down on their knees, all the while shaking violently, when forced to enter the parlour. We have lost some animals and others have become so anemic that we have had to put them down. We calculate that we have suffered losses totaling $250,000 from this phenomenon.

There never has been any certainty as to whether the cause of the stress in our dairy herd is stray voltages, even though our system meets and exceeds grounding standards, or an EMF effect. Manitoba Hydro is aware of these very real problems that have occurred on our farm in the past. Hydro personnel have assured us that our experience with the HVac line will not be repeated with an HVdc line. But we do not trust that advice because it is the same Manitoba Hydro which had assured us for years, and until very recently, that the problems with our herd were not being caused by the HVac line. The personnel giving the assurances simply did not understand animal agriculture.

We are also concerned about EMF effects on our beef herd, especially when, on a hot day, the line sags to its lowest level and the cattle will be travelling back and forth under it many times each day.

Silage harvester unloading into a waiting farm truck

I understand that Manitoba Hydro has presented evidence that there is no scientific proof that HVdc lines can cause harm to humans or animals. However, the studies presented do not give us comfort. Once the line is built, it is there virtually forever and our anxiety will be constant, in wondering, if at some point, it is discovered that such a line causes health risks to humans and/or animals.

Safety and Liability

We feed silage to our cattle. The silage is stored in an open pit which must be sealed when the harvesting operation is complete. We harvest the silage in the field with a silage harvester featuring an open tank which accumulates the silage before it is emptied periodically into waiting farm trucks that haul it to the pit storage near the farm yard. In the elevated position (see the photo on the preceding page), the highest point of the tank is quite high, perhaps in the order of six metres (20 feet). We are concerned that, on a hot day (which is a typical silaging day) when the sag of the line is the greatest, we may be within a risk zone if a flashover occurs when we dump the harvester under the line. We recognize that the HVdc line is much higher than the line shown in the photo.

However, as our farm grows in the years ahead, so may the size of the equipment we will be using. If we are concerned about working around the line with today's equipment on our farm, what about tomorrow's much larger equipment? We also wonder if insurance companies will avoid taking on the liability just as they are doing with hog barns. We should not be subjected to that risk because of a line that we do not want on our farm in the first place.

Concluding Statement

Routing Bipole III through our province's most productive agricultural zone needs to be reconsidered. With the high concentration of livestock operations along the southern portion of the route, there are far too many application, safety and liability issues that have not been properly analyzed. Routing through an area of Manitoba's best soils is also completely unacceptable. These soils have a high percentage of special crops; often they are row-cropped and some of them are irrigated. There are far too many unknowns about the long-term effects that a major transmission line will have on our livestock operations and on our farming practices in general.

It is impossible to understand how a decision could have been made to route this transmission line through Manitoba's most populated farm belt. It is completely unacceptable and cannot be properly mitigated by any means. I urge the Clean Environment Commission Panel to recommend that Manitoba Hydro and the Minister of

Conservation and Water Stewardship not proceed with the route for Bipole III as proposed. A route that will not have such a huge negative impact on Manitoba's most productive agricultural belt needs to be considered.

APPENDIX A

Manitoba Manure Management

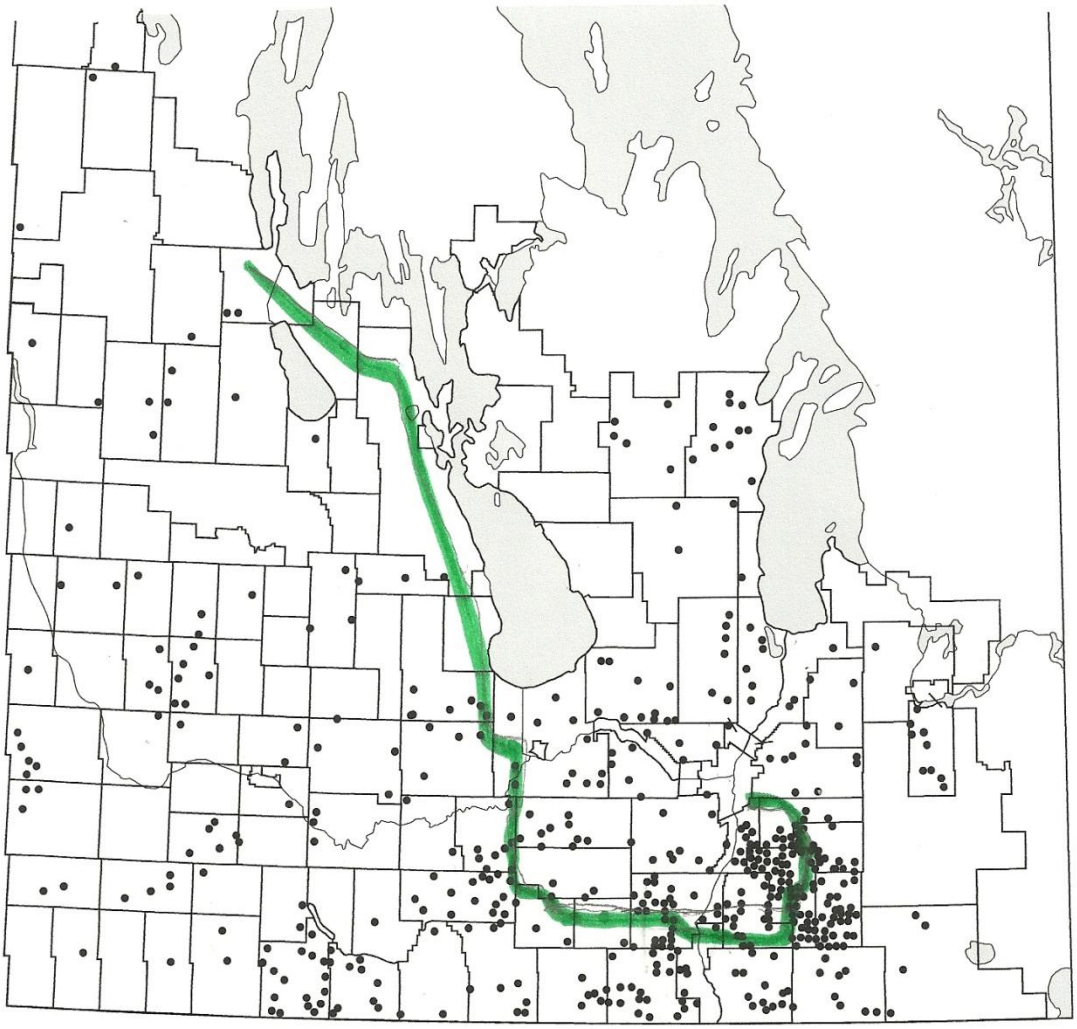
Manure	Manitoba – Predominant Hog Operations
Farms reporting manure produced or used	719
Manure application on the operation	550
Manure sold or given to others	218
Manure bought or received from others	18
Other manure (composted, dried, processed, stored, etc.)	62

Manure Type	Manitoba - Predominant Hog Operations		
	Application Method		
	Incorporated or Injected (in the case of liquid manure)	Not Incorporated	Applied by Irrigation
Farms reporting composted manure	82	19	n/a
Acres	10,425	894	
Farms reporting solid manure	84	33	n/a
Acres	7,809	2,150	
Farms reporting liquid manure	336	135	17
Acres	103,648	17,761	2,852

Source (Statistics Canada, 2007)

APPENDIX B

Location of Permitted Manure Storage Facilities April 2006



Source: Manitoba Conservation

Bio for Bertrand de Rocquigny

Name: Bertrand de Rocquigny

Farm Affiliation: de Rocquigny Farms

Description of Farm Operation: 120 milking cows, 280 cow/calf pairs (beef operation), 2500-acre grain operation, 800-acre haying operation. 2200 acres of pastures

Family Involvement: Fourth generation farm. I have been farming since 1980 with my father. Then, later on, my brothers joined as they graduated from high school. I have a 17-year-old son showing lots of interest in the farm and wanting to join our operations after taking a two-year agriculture diploma course at the University of Manitoba.

Formal Education: I graduated from Grade 12 at the St. Claude School Complex in 1979. I am a Level II Co-op Director, enrolled in teaching seminars to better qualify myself as a Director.

Previous Experience or Employment: None. Farming is what I have always done.

Community and Industry Involvement: Ten years as a Director for Pembina Co-op (90 million dollars in sales in 2011). Twenty years on the Board of the local snowmobile club (ten years as President and ten years as Secretary). President for the Parents Graduating Committee for both my daughters.

15 September 2012

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Rick Nychuk

Grain and Oilseed Farmer

Domain, Manitoba

November 12, 2012

LINE ROUTING

For any transmission line that traverses prime agricultural land, routing the line on the half-mile line (splitting each section into equal halves) results in arguably the best tower placement. Half-mile property line routing is generally better than road allowance property line routing because it does not carry the risks associated with road traffic and, if two different landowners are involved, there is a better chance that the fields on either side of the line are farmed as two separate management units and the need to cross under the line is reduced. And it is certainly better than routing within the field. This is true whether it be parallel to a property line either offset a limited distance from the property line, as Hydro proposes to do (42 metres) in many stretches of the line, or in the middle of the quarter section. And it is definitely better than diagonal routing.

However, even placement of the towers on the half-mile line has its problems. Among them are:

- The landowner and/or the renter (the farmer) loses the productivity of the land in that part of the tower footprint that is on the property;
- The farmer loses the productivity of the land on either side of the tower in the direction of field travel; the compromise is even greater if different farmers are involved on each side of the line because it is not possible to farm around the tower;
- Overlapping occurs in the area beside the tower and for about three tower widths in both directions from the tower; this is the situation for every operation in that field which, in our area, can be as many as 10 times each season. There is the double cost of seed, fertilizer, fungicides, herbicides, insecticides and any other chemicals required. There is also the increased cost of farming the entire field because fields simply take longer to cover when towers are involved. Farming around towers is even more complicated when the crop is a row crop.
- The elimination of the possibility of using aerial spraying triggers additional trampling of valuable crop with ground-based equipment because aerial spraying has been taken away. The financial problem will be addressed later.

✱ The ideal situation is to have no towers at all. Towers, wherever they are placed, compromise the situation.

TOWER ADVERSE EFFECTS

In the areas that are outside the cropped area (under the tower and in the unworked area in each direction from the tower), noxious weeds become a problem. We have a

double-pole HVac distribution line going through land that we farm with a tower footprint much smaller than the Bipole III HVdc line will have. To avoid crop damage from an ATV, my 70-year-old mother-in-law who owns the property has to walk through the crop carrying a gas-driven weed eater several times each season to cut the weeds around each of these double-pole structures (Fig. 1). We are already working with HVac structures on our farm. If the route for Bipole III proceeds as proposed, our family farm could have nine quarter sections of land traversed by the Bipole III transmission line.

So, in addition to the problem with providing a source for these noxious weeds to multiply and to spread throughout the field, there will be the increased labour cost if the weed control is done by paid employees. Even if it is done by a family member, labour should not be regarded as free. If this extra time-consuming labor-intensive operation is not carried out every year and the weeds are allowed to spread into other parts of the field, there will be the compounding (cumulative) effects of extra herbicide and application costs, extra labour costs and the resulting yield loss in future years and other parts of the field.

(Fig. 1)

There is also the loss of income in the area that cannot be seeded. With farm machinery continuing to get larger, the overlapping problem continues to grow, and so does the economic loss to the farmer. It is not just the extra cost of the inputs to the farmer; it is also crop loss due to excess fertilization, and herbicide, pesticide, and fungicide overload. The problems caused by these unneeded inputs hurt this area year after year, making the footprint a lot larger than Manitoba Hydro understands.

If the actual rate of fertilizer in these overlap areas takes the nutrient levels sufficiently beyond the optimum rates for the crop, there can actually be a yield depression. The extra inputs lead to crop lodging and, because of the extra herbicide it also delays crop maturity which also lowers yields substantially. Compaction from the extra passes around the towers contributes to the loss of crop yield and quality. The extra passes compact the soil making it very difficult for the water to penetrate; thus ponding occurs around the towers, impairing germination and delaying the maturity of crop. The same phenomena, occurring in the overlap areas with herbicides, insecticides, and field-applied fungicides, compound over time and from year to year.

I understand that Manitoba Hydro believes that compensating for this impact is all that is needed. What Manitoba Hydro fails to understand is the nature of today's farming operations and the magnitude of the loss of income that will result from working around towers. This loss may vary from year to year, depending on factors beyond our control such as weather. It can go much beyond the simple inconvenience and cost of working around the footprint of a tower. Significant as the losses in the immediate vicinity of the tower are, the real losses are orders of magnitude larger than the relatively minor losses which Manitoba Hydro has identified and for which it intends to compensate. The real losses will be discussed later.

ENVIRONMENTAL ISSUES

It is worth mentioning that the areas of overlap contribute to environmental issues. Fertilizer applied in the overlapped areas results in nutrient levels above what the crop can consume. This over-application can contribute to runoff to places where the excess nutrients contribute to algae formation and to the production of the toxic compounds that are the product of algae decomposition. Excess inputs in the areas of overlap will have a huge impact on the environment, because of transport of these inputs through leaching or overland flooding, as they make it to the waterways and eventually to Lake Winnipeg. The least environmental impact would occur if the line is situated on the property line or on the road allowance. If the structure is located 42 metres in the field, it will leave a considerably larger negative environmental footprint.

FINANCIAL LOSSES

Yield Depression

I want to turn for the balance of my report to thoughts of how one can put a value on the impact of a transmission line on grain farming. The financial losses are hard to measure. The simplistic approach is to calculate the extra cost of working around the towers. But that is only a small part of the added cost. These minor considerations include the value of the lost production in the wedge-shaped buffer zone around the tower that cannot be cropped. Also small but worth mentioning is the cost of any yield depression and reduced crop quality that occur in areas of overlap around the tower. We have seen this effect on our own farm with the existing hydro line we are working around. While Manitoba Hydro suggests yield depression caused during construction is a one-time event, in reality this simply is not the case. Soil damage from compaction can extend to five years, resulting in an annual crop yield loss over that five-year period.

Construction Damage

I understand Manitoba Hydro wants to do construction during the summer. If you know this area, this is the worst possible time. The Red River Valley is a very wet area, In some conditions, damage from driving and operating heavy equipment over these soils during tower placement would be almost irreversible because vehicles would have to travel quite a few times over the same area to build the structures. We have experience in this problem because, a few years ago Manitoba Hydro put in a fiber optic line adjacent to the HVac line on our property, and the tracks from the Cat are still there.

Impact of No Aerial Spraying

Probably the greatest financial impact will result if the line prevents the use of the aerial application of a fungicide or a pesticide. If an aerial application is not possible, the production loss can easily be 25% for many fungal infections and pest attacks. Note the difference between the healthy fully-flowered crop on the right in Appendix A compared to the weaker crop on the left. In the extreme, there could be 100% crop loss. Fungicide is used not only for maintaining crop yield but also for improving crop quality. For example, control of fusarium head blight in cereal grains makes it easier to market the grain and results in less dockage.

To illustrate by using a different crop, assume a typical 25% loss from a sclerotinia infestation because it is impossible to spray aerially a canola crop with a potential of 40 bushels per acre. At a bushel price of $14, this loss represents $140 per acre, or $22400 per quarter section (160 acres) in a single year. In some cases, if may be

possible to spray with a ground rig. But even if it is, the loss due to trampling of the canola by the wheels of the ground rig offsets to a degree the significant advantage that aerial application offers.

The difference in cost from air to ground is nominal, so many farmers choose to use aerial application because there are no losses due to the wheel tracks, as there are with ground rigs, and the crop matures more evenly because there are no wheel tracks to delay maturity. Fungal problems occur in hot humid weather which often accompanies wet field conditions and that makes the use of ground sprayers impossible. Wet fields favor fungal attacks and work against control using ground rigs. Our farm is located in the Red River Valley which is Manitoba's most productive land. However, it is also in a flood zone. Airplane use for the application of crop protectants is a regular and often necessary practice. When it is very wet there have been instances when some farmers use airplanes to broadcast canola as a means of seeding their crop. Desperate times trigger desperate measures.

Crop Insurance

As I have pointed out, the out-of-pocket losses that will be caused by the towers are very large and very real but there are still other very important impacts. Crop losses attributable to the towers will have huge implication on crop insurance coverage by the Manitoba Agricultural Services Corporation (MASC). A farmer's long-term average (LTA) yield is a 10-year running average. It is the LTA which determines the amount of insurance coverage available. So, with a few wet years and uncontrolled disease problems because fungicides or pesticides could not be applied, there could be a profound depression of the LTA and, therefore, the amount of crop insurance that can be purchased. The farmer takes on the additional risk.

In 1997, after the Flood of the Century, seeding was very late. The crop had great germination and looked great. But in early July we got over four inches of rain. Yields were terrible. Those low yields had a negative effect on my LTA for many years after. Towers that prevent aerial application can have the same effect on crop insurance coverage as the Flood of the Century.

Government Programs

On another front, the provincial and federal governments offer two voluntary programs called AgriStability and AgriInvest. The purpose of these programs is to stabilize farm income, more or less to smooth out the boom and bust years. The better the crop yields, the better the coverage you receive, and the more money you are able to put into your AgriInvest account. When your income drops, you can obtain replacement

revenue to keep your farm going by drawing down your AgriInvest account. Likewise, the AgriStability program pays a dividend in the low-income years. These programs employ a five-year average from which a three-year Olympic average is calculated by dropping the highest-income year and the lowest-income year from the five-year average. Anything which depresses income impacts eligibility for benefits under these programs. So it is very important that good farming practices are maintained. Bipole III with its various negative impacts on crop yields and quality will reduce benefits under these two programs.

VALUE OF LAND

Manitoba Hydro asserts that there will be no loss in land value as a result of the placement of Bipole III on agricultural property. However, in conversing with farmers on a regular basis, the consensus is just the opposite. How much less? There is no way of knowing in advance. Only time will tell. Nevertheless, I would say that, given today's prices for crops; the present escalation in land prices will continue. It is now becoming more profitable to grow crops such as corn and soybeans. The prices of corn and soybeans have tripled over the past few years.(Appendix C). Although, there is volatility in prices, the outlook is for even higher prices, given climate change (more droughts) and significant changes like the demand for corn for fuel purposes. The point is that the price discovery point under these new conditions has not yet been found. Land prices in our area have doubled in the last five years. You just have to look across the border (USA) and see the increase in land value due to increasing demand for corn and soybeans. Corn breeders have produced new varieties needing less heat units to reach maturity. Corn is becoming an excellent cropping option with huge potential in the Red River Valley.

Every single acre in the Valley has the capability of being row-cropped whether it is corn, soybeans, canola or sunflowers. Appendices B and C clearly show the huge increase in acres to these special crops in recent years. This trend is expected to continue. The potential is huge here. If the gentleman were still alive who owned the land we farm today and who signed a 1968 agreement for $60 dollars per structure, he would likely say he made a huge mistake. Farmers will not make the same mistake in 2013. We learned from the few bad financial decisions our forefathers made. Years ago, you could make the argument that soil type played a big part in pricing of agricultural land but, with today's technologies, the advancement in crop varieties and changing farming practices, marginal land can produce very well. Supply and demand for productive farm land will always play a huge role as it is a limited resource.

The same argument can be made when Manitoba Hydro speaks about compensation for ongoing crop damage. Pegging losses at today's price seriously undermines the real losses farmers will experience over the life of the line.

IRRIGATION

Although the Red River Valley is clay-based and, therefore, less conducive to the need for irrigation; the fact is that irrigation is already practiced in some areas. Irrigation in the future in the Red River Valley will depend on the climate (drier conditions) and the price that the various crops will fetch. However, I expect the trend to greater use of irrigation systems to be the future. Manitoba Hydro cannot say with any assurance that the Red River Valley could not be tile-drained and irrigated. We have a supply of water with the Red, the Pembina, the Morris, the Boyne, the LaSalle and the Assiniboine Rivers. There is capacity to conserve spring runoff in reservoirs. There is high quality groundwater east of the Red River. Farmers will construct retention ponds if they think it is profitable. Consequently, the lack of planning for this opportunity is a serious deficiency in Manitoba Hydro's assessment.

Appendix B tabulates seeded acreages by crop over the past seven years since 2005. What is significant in this table is that farmers are switching from low-valued crops like wheat, oats, barley, flax and sunflowers to high-valued crops like corn and soybeans. Canola, an intermediate-valued crop, seems to be holding its own. Appendix C reveals that the acreage of grain corn (for animal feed and fuel) has almost quadrupled since 2001 and soybean acreages have soared to more than 12 times what they were 12 years ago. These new crops are driving up the price of land and they are providing an incentive for more expensive practices like irrigation and drainage that could not be considered until only recently.

LIABILITY

Finally, there is the whole matter of liability if farm equipment should damage a transmission line structure. Farmers seed around the clock using wide equipment pulled by tractors equipped with GPS and auto steer. But the GPS does not tell them where the towers are and, at night, it becomes a matter of judgment where the end of the seeder or other wide implement is in relation to the tower. As careful as we try to be, I have noticed that one of my operators must have clipped a wooden pole in one of the double-pole structures supporting the HVac line that runs across one of my fields because there is huge gouge taken out of the pole. If this were to happen with a steel lattice tower in the Bipole III transmission line, the issue of liability is still a matter of uncertainty and no guarantee is given that the farmer will not be held liable. We all recognize that the machines are getting larger to improve the efficiency of the farm. Every farmer relies on help, whether it is hired or young family members. These structures cause great concern especially with novice equipment operators. It is very hard to hire experienced help in today's labour environment and so operators with less experience than one would like are often operating these huge machines. Farmers will

have to carry more insurance so they can mitigate the losses if their machines damage one of these structures.

FUTURE GENERATIONS

We run a family farm as most of the farmers along the proposed Bipole III route do. One of the main concerns we have is for the future of our home and our children who very well may become farmers. Decisions made today will have long-lasting effects on future generations on our farm. These decisions are not ones we are making. They are being forced upon us by others who have little stake in the impact they will have upon us. They will pose safety risks, loss of income risks and farm management risks to our families forever. Compensation cannot and will not even come close to making the affected landowner whole. Because no one can tell what farming will look like even 10 years into the future, it is an impossibility to predict what the impacts will be of a transmission line that is expected to be in service at least 50 years and possibly 100. That is why Manitoba Hydro's one-time-only landowner compensation plan based on current land values is flawed and inadequate by at least two orders of magnitude.

RECOMMENDATIONS

Bipole III should not be routed through prime agricultural land. There are other options. The extra length of the line will be a huge burden to the ratepayers and taxpayers of Manitoba for many generations. We (farmers and our farm land) are not for sale. I can safely say that farmers want, even need, to increase the size of their operations in order to remain efficient in today's and tomorrow's farming economies. They have no interest in compromising the productivity of the land that they already farm today. Farming has a bright future. It puts a lot of money into Manitoba's economy. If allowed to proceed, the proposed Bipole III transmission line will have a profound depressing effect on agriculture forever.

Appendix A

Sclerotinia in Canola

Sclerotinia stem rot is a serious disease problem in canola. As recently as 2010, some 91% of canola crops in Saskatchewan, 88% in Manitoba and 64% in Alberta had sclerotinia. The cost to growers that year was approximately $600 million.

(http://www2.dupont.com/Prod_Agriculture/en-ca/content/article/vertisan-sclerotinia.html)

APPENDIX B

MANITOBA GRAIN AND OILSEED STATISTICS

	2005	2006	2007	2008	2009	2010[R]	2011[P]
NO. OF CROP FARMS:	9,160	8,605	9,225	8,860	8,685	8,570	
(51+% of income from grains/oilseeds):	7,865	7,315	7,860	7,665	7,605	7,610	
SEEDED AREA (million acres):							
Wheat	2.92	3.28	2.93	3.22	3.08	3.04	2.17
Oats	0.72	0.95	1.05	0.86	0.60	0.56	0.50
Barley	0.90	0.84	1.02	0.82	0.70	0.48	0.34
Rye	0.05	0.09	0.06	0.08	0.08	0.055	0.045
Grain corn	0.11	0.15	0.20	0.20	0.20	0.185	0.18
Canola	2.50	2.48	3.06	3.10	3.20	3.37	2.725
Flax	0.38	0.38	0.20	0.27	0.30	0.175	0.095
Soybeans	0.11	0.35	0.23	0.28	0.42	0.52	0.575
Total major grains/oilseeds	**7.69**	**8.52**	**8.75**	**8.83**	**8.58**	**8.385**	**6.63**
Sunflowers	0.20	0.19	0.19	0.17	0.16	0.135	0.035
CROP PRODUCTION (million bushels):							
Wheat	89.71	139.44	118.00	157.30	152.30	119.83	80.50
Oats	28.58	62.73	78.10	72.40	50.00	42.50	27.00
Barley	31.30	47.55	54.90	51.50	44.00	22.40	12.00
Rye	1.50	3.40	2.12	3.30	3.90	2.30	1.74
Grain corn	8.33	14.95	19.43	18.65	14.30	18.90	16.30
Canola	55.60	80.50	86.00	113.60	124.70	97.70	73.00
Flaxseed	5.80	7.60	4.15	6.35	7.60	3.20	1.50
Soybeans	2.26	9.27	7.80	8.90	11.80	16.00	16.20
Total major grains/oilseeds:	**223.10**	**365.45**	**370.50**	**432.00**	**408.60**	**314.83**	**228.24**
Sunflower seed (million lb)	171.00	346.80	264.10	247.30	224.70	149.90	43.60
TOTAL FARM CASH RECEIPTS[R]							
(grains and oilseeds) ($ million):	914	963	1,865	2,414	2,289	1,722	N/A
% of Canada	*13.8*	*12.3*	*16.2*	*15.6*	*15.9*	*15.2*	
AVERAGE PRICES (crop year) ($/bu):							
Wheat	2.74	3.05	3.47	5.42	3.9	5.5	N/A
Barley	1.74	2.41	2.91	3.73	3.15	3.8	N/A
Canola	5.94	7.56	8.41	11.27	10.2	13.3	N/A
Flaxseed	6.68	6.04	8.92	15.62	12.5	15.6	N/A
TRADE ($ million):							
Selected bulk grain/oilseed exports:	**932**	**801**	**1,564**	**2,371**	**2,109**	**2,012**	**2,363**
Wheat	408.3	397.8	696.0	1,121	986.6	896.9	1,000
Oats	90.1	71.3	153.7	204.8	116.9	111.9	135
Barley	31.6	24.0	59.9	103.1	51.9	45.8	34
Canola	311.0	237.4	480.7	846.0	733.1	732.2	965
Flaxseed	67.5	31.3	50.9	90.1	58.6	66.8	46
Soybeans	6.2	10.5	55.9	76.2	100.8	126.3	150
Sunflower seed	17.6	28.7	70.8	72.6	61.2	32.3	33
Selected product exports:	**246.3**	**283.9**	**445.0**	**697.9**	**527.1**	**459.0**	**597.5**
Wheat flour, meal and bran	1.4	0.4	2.7	5.3	5.8	4.0	3.8
Oat groats, meal and flakes	58.4	50.4	75.7	100.3	90.6	77.4	92
Canola oil, meal , oilcake	163.5	201.7	322.4	573.0	399.6	351.7	480
Linseed oil, meal, oilcake, fibre	21.5	21.4	17.7	17.8	20.6	12.8	16.5
Barley rolled, hulled, etc., malt	1.5	10.0	26.5	1.5	10.5	13.1	5.2
Selected grain and oilseed imports:							
Corn and corn products	44.2	48.1	66.5	157.4	70.7	73.4	56
Soybeans/products	92.5	86.7	99.6	114.0	91.7	78.1	91

APPENDIX C

Historic Grain Corn and Soybean Acres in the RM of Macdonald

Years	Crop Acres/Year	
	Grain Corn	Soybeans
2001	1226	3358
2002	1867	9770
2003	2784	17767
2004	2403	5030
2005	1860	6291
2006	3403	25469
2007	3169	11728
2008	3277	18122
2009	3339	36348
2010	4030	40825
2011	4519	42951

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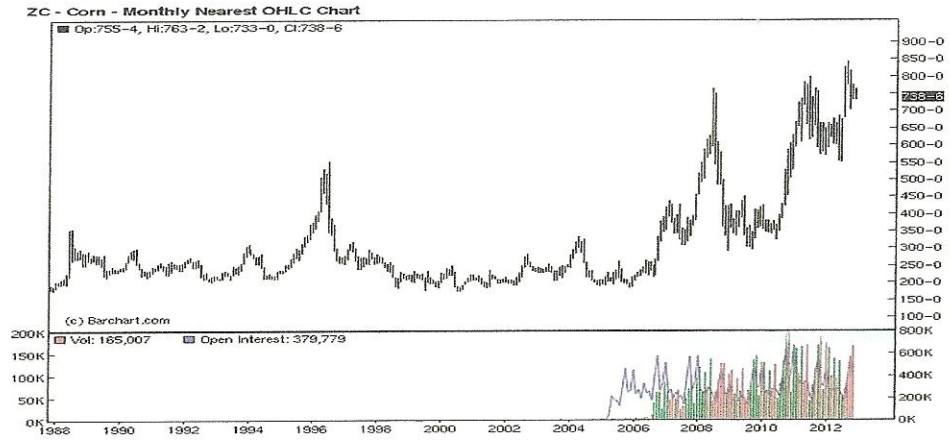
Corn December 2012 (ZCZ12)

738-6s -2-4 (-0.34%) 7:57P CST (CBOT)

Technical Chart as of Saturday, Nov 10th, 2012



ZCZ12 | Commodity Futures Price Chart for Corn December 2012

Bio for Rick Nychuk

Name: Rick Nychuk

Farm Affiliation: K & N Farms

Description of Farming Operation: 2200 acres of grain & oil seeds

Family Involvement: Second generation farm. Farming for 20 years, Rick & his wife Irmgard have 3 children

Formal Education: Agriculture Diploma from University of Manitoba with a major in economics 1992. Certificate of Attainment in Heavy Duty Mechanics from Assiniboine College.

Previous Experience or Employment: Managed the Complete Feed Division at East Man Feed in Winnipeg from 1992- 2002.

Community Involvement: Treasurer for the Domain Rec Club for the last 12 years.

Manitoba Hydro Bipole III Transmission Project

Review of Project Information Filed by Manitoba Hydro On Agriculture

Prepared for the Bipole III Coalition by

Reg Friesen

Prairie Sky Aviation Ltd.

Niverville, Manitoba

November 12, 2012

Aerial Spraying

INTRODUCTION

In the 1970's, spray planes typically cost about $20,000 - $50,000 and consisted of low hp piston driven engines. Today's 600 – 1000 hp turbine-driven aircraft cost in the order of $700,000 - $1.6 million. Today's pilots are highly trained professionals flying highly technical planes. My firm's next turbine-driven plane will cost about $900,000 dollars. Yet, because of the efficiency of these machines, the actual machine and pilot cost is held to about $8.00 per acre as a charge rate to the customer. Any physical obstruction in the area (such as a transmission line tower) will make the application of these fields prohibitive because of the off target exposure; the extreme reduced efficacy of the product being used; and, the most important factor being the safety of the public and the applicators involved in the process.

FIELD APPLICATION

When considering and planning for a field application of the many different products used, we have to consider many different aspects of the given job. It may start with evaluating if the field has reached the thresholds of needing a protection product. If so we will then consider if the field can be properly and evenly applied with the product. Under-application of the product can lead to the pest or fungus become immune to the product. Over-application can be dangerous to the environment or surrounding habitat or communities. It might be thought that the application decision is up to the applicator, but in reality, it is controlled by strict government standards set out by the Pesticide Management Regulator Agency or the PMRA.

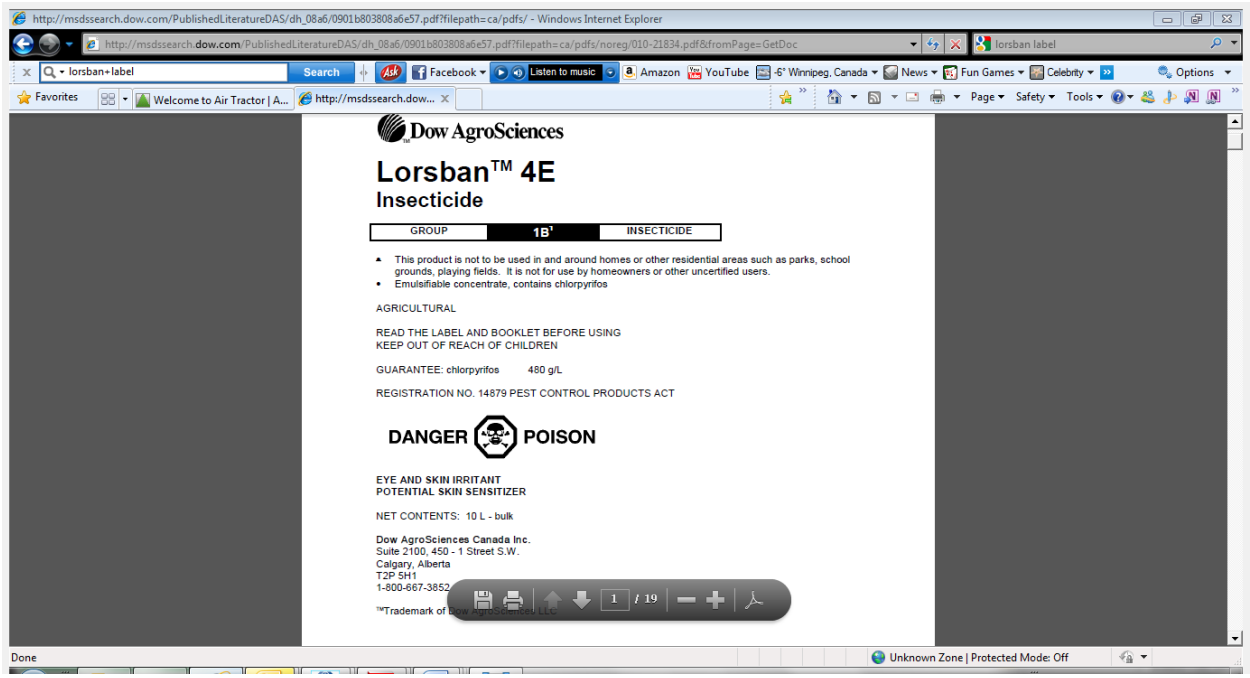


Fig. 1

Every product we use has a label set forth from the PMRA which clearly states all label rates and buffer zones (Fig. 1). Lastly, the paramount consideration in applying crop protectants using spray planes is safety—safety of the pilot, safety of the landowner and safety of the innocent public who, by coincidence, happens to be in the area on the day that crop protectants are being applied.

CHALLENGES TO AERIAL SPRAYING

Sometimes it is possible to adjust the method of applying the crop protectant by changing the direction of application or by changing the type of turn made by the plane as it prepares for the next pass. Flying under the wires is possible, but only in an emergency situation. It is a last resort and it is never a part of the initial plan for

applying the crop protectant to the field. It is employed only to get out of an unplanned situation during the application. However, it is certainly not considered a safe means of application. For example, with a canola crop canopy that can reach 2 meters (six feet) high and corn that can grow to three meters (ten feet) in height, it is easy to understand why.

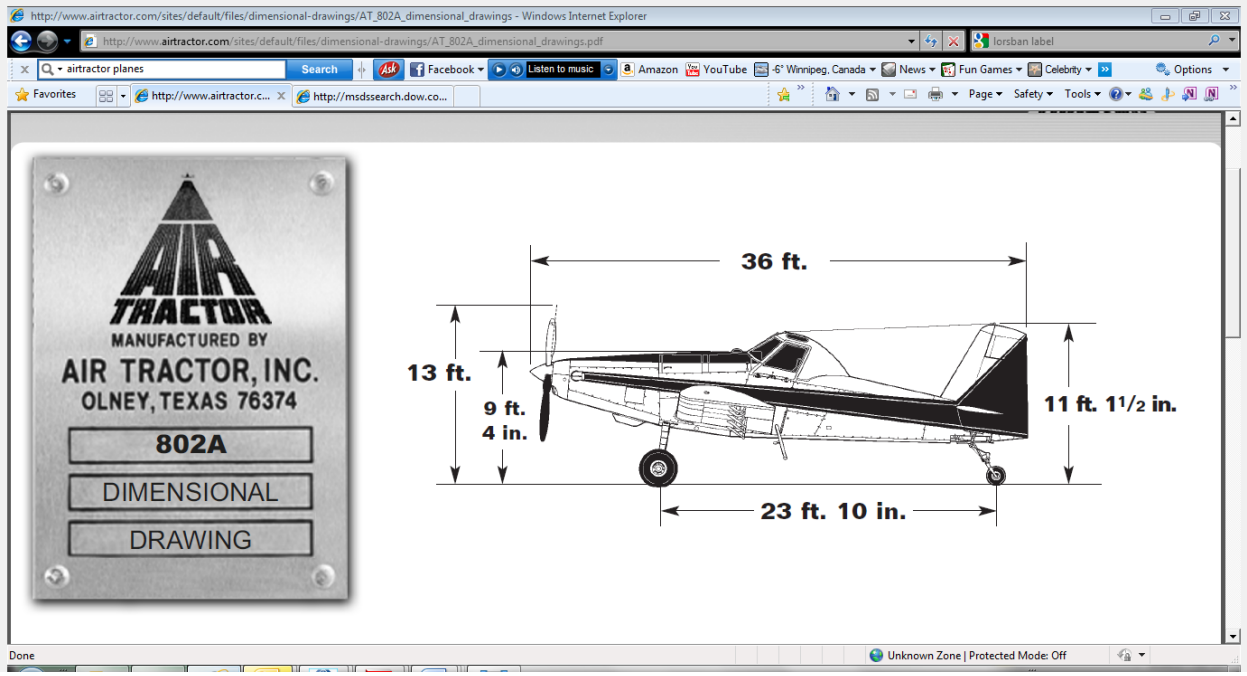


Fig. 2

Example for canola:

Crop height	6 feet
Plane landing gear above crop (Fig. 2)	10 feet
Plane height when flying	14 feet
Safety margin between tail and wire	20 feet
Total clearance needed	**41 feet**

ECONOMIC CONSIDERATIONS

Consideration must be made to the economic losses that farmers will endure because crop protectant cannot be applied at exactly the required rate in all parts of the field or because it cannot be applied at all as a result of constraints imposed by the physical environment. Aerial application is a significant and essential tool available to today's agricultural producers. It is especially valuable in areas such as southern Manitoba where soil capability is high and, as a result, productivity is high. The southern part of the proposed route for Bipole III will traverse a section of southern Manitoba that has a high percentage of row crops, special crops and indeed some irrigated land. High-value crops are being grown on an annual basis and these crops are often sprayed by air and often several times in one season. These crops are not just potatoes that can be sprayed in some cases 14 times or more in one season but also dry beans, edible beans, sunflowers, corn, soybeans, and even wheat that is sprayed more than three times per year.

It is fair to say that close to 100% of farmers in the intensively agricultural land in Southern Manitoba, covering the entire Bipole III Project Study Area from Riel to PTH well north of 16 highway use or will use aerial spraying on a regular, if not annual basis. Since the whole southern and central area is growing all of these high value crops, it is completely unrealistic to think that aerial application is not considered an essential form of crop protection needed by farmers of today and in the future. With the areas of Manitoba that are prevalent for different types of fungus, harmful insects, and weed issues, due to its climate, aerial spray application is especially needed. For an example of the devastation that can be caused by a single disease outbreak, see Fig. 3 below.

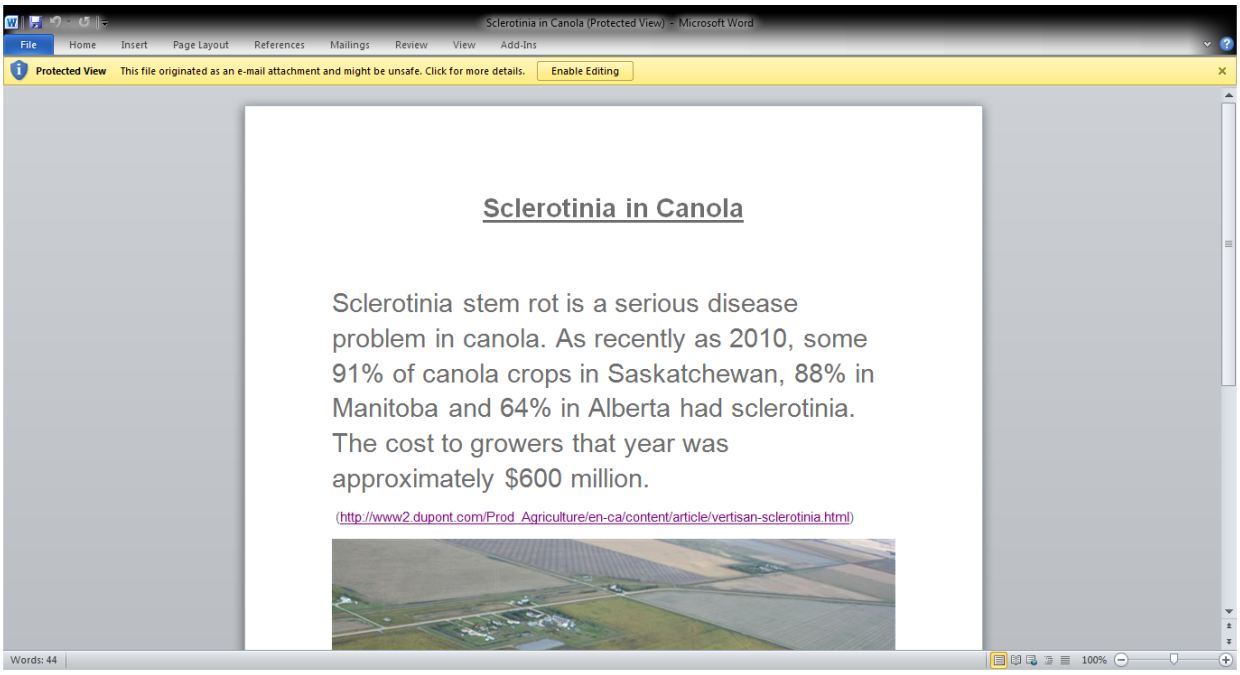


Fig. 3

Source: DuPont

Since the cost of application is higher in fields in the vicinity of a tower, the economic threshold levels for the damage agent goes up when safety considerations mandate that more costly application patterns be adopted. To illustrate, if the target pest is diamondback moths attacking a field of canola (Fig. 4), a tripling of the cost of application can increase the number at which it becomes economic to protect the crop from 200 to 600 moth larvae per square meter. If the actual number of moths in the field is just below the threshold level, it is not economic to spray the crop; and, if the field is not sprayed, the farmer must accept the loss. The calculations apply to the entire field which may be 160 acres and, in some cases 320 acres, not just to the crop in the immediate vicinity of the transmission towers. If the cost of application triples from $8.00 per acre to $24.00 per acre and the size of the field is 160 acres, the additional loss that must be accepted is the difference, $16.00 per acre, applied to all 160 acres, in total about $2,500, in this example without taking into account the cost of the extra crop deterioration. When multiplied by several thousand acres, over several years, the economic loss becomes immense.

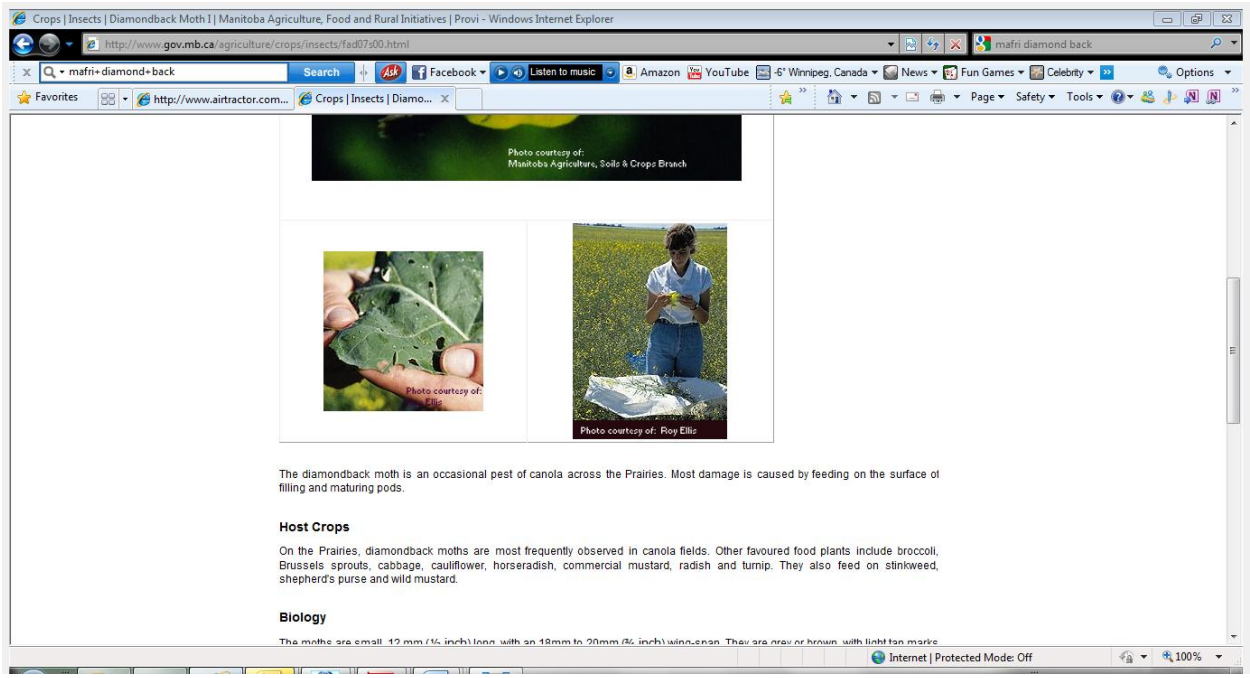


Fig. 4

PROBLEMS IN AERIAL SPRAY APPLICATIONS

The use of non-standard patterns of application can result in the crop protectant being under-applied in some parts of the field and over-applied in other parts. Under-application results in incomplete control of the target weed, the insect, or fungus, and with that, a loss of revenue. Setting aside the environmental liability of over-application, there can also be loss of revenue if the over-application takes the amount of product beyond the optimum and into the range of yield depression or crop quality decrease. This problem can compound annually if an applicator makes under / over applications contrary to the PMRA product labels. Although there may be many different ideas on how to applicate or apply product around these lines, it is virtually impossible to do it uniformly, thereby increasing the risk of staying legally in accordance with the PMRA and the mandatory label requirements of every product registered for use in Canada today.

BIPOLE III AS AN OBSTACLE

These issues occur not just in the strip of land underneath the line, and not even just in the buffer strip that must be left beside the right-of-way for safety reasons, but also in the corners of the field adjacent to the line, if there are physical obstructions in the sides of the field adjacent to the line. Also, they manifest themselves even if the line is in the preferred position along one of the property lines, either along a property line shared with another landowner or along a road allowance. The simple reality is that we are looking at thousands of acres more than the acres immediately adjacent to or beneath the line, which potentially will limit aerial application of crop protectants. As an example, I refer to the proposed Tourond correction area of the route which for illustration purposes is very short distance (Fig. 5). There are several areas where the proposed line will be perpendicular to the direction of the crops.

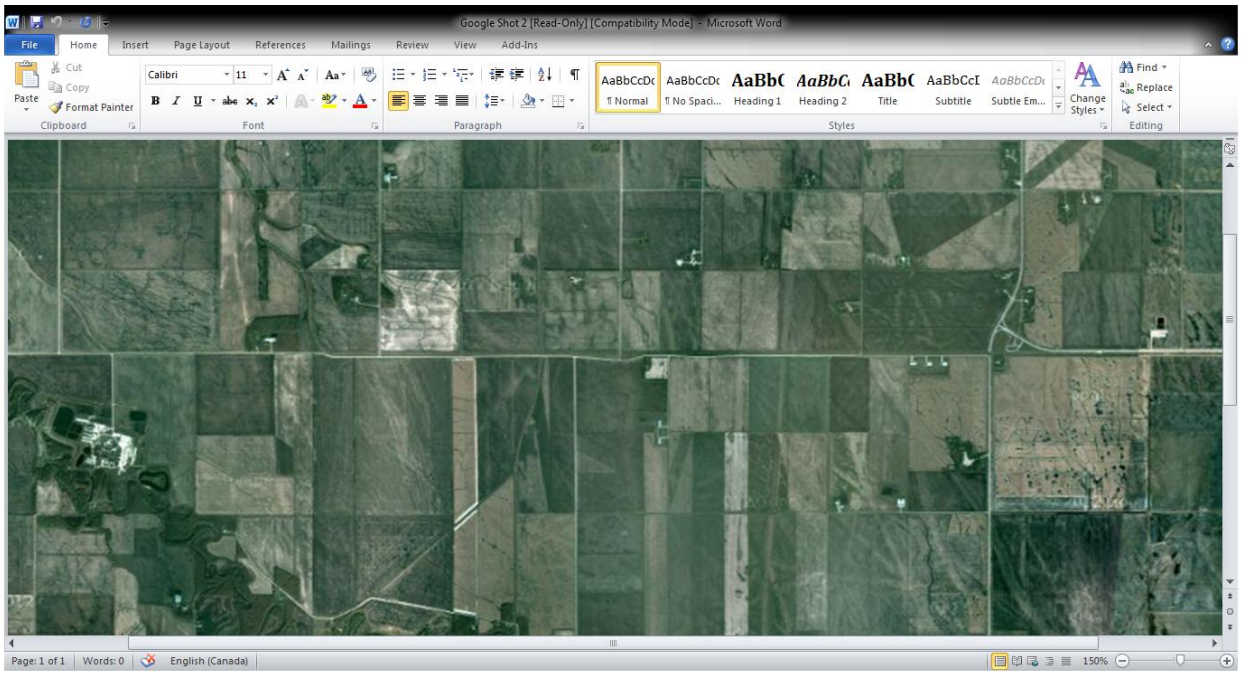


Fig. 5

Just to be clear, with a transmission line having towers that are a minimum of 154 feet (47 metres) in height and with today's planes, loaded with enough solution to spray substantial acreage in a fill and travelling at 230 kilometres per hour, the **risk zone is one mile on each side of the line, depending on the location of the line in relation**

to the direction of the seeding of the crop. Planning an application for any less distance from the line, represents a compromise of safety. Indeed, the tradeoff is safety and it will take ethical operators and ethical farmers to avoid that compromise. This industry has always valued safety above all else and I trust that value is not compromised in the future because of the ill-advised routing decision of this line.

It should be pointed out that every physical obstruction presents a risk that has to be taken into consideration in planning the approach to how a field will be sprayed. A transmission line with its tall towers simply compounds the challenge. A safety-conscious pilot always does a reconnaissance run ahead of the actual start of the application to identify any physical obstructions that constrain the plan.

Planes exhaust their speed to its minimum value as they rise 100 to 150 meters (300 to 500 feet) above the field in the turn that is executed before the next pass. It is at the apex of this turn when speed is the lowest and the capacity to adjust the downward travel to the field's edge is at its lowest that the danger of hitting a physical obstruction is the greatest.

A line, such as a mid-field position, either toward the center of the field or an offset of 33 - 42 meters from the road allowance, as Manitoba Hydro intends for much of the Bipole III line, simply compounds the problem. The only worse choice for the line than the preferred routing offset identified by Manitoba Hydro, which will be 33 - 42 meters from the road allowance is a line that is located diagonally across the field. I understand that, notwithstanding Manitoba Hydro's efforts of reducing diagonal lines, there are several kilometers of line that will be located diagonally in the field.

PREVALENCE OF AERIAL SPRAY APPLICATION

Generally, aerial application is a normal practice that is used every year (in my area) because of the excellent droplet coverage and effectiveness. It is used regardless of ground conditions being wet or dry. It is also used in other situations when the crop is at

such an advanced stage that ground-based equipment would cause physical damage from which the crop would not have sufficient time to recover before harvest and to avoid the associated yield loss of the mechanical damage. But in situations where there is insufficient capacity in the aerial application industry to accommodate all of the business, the aerial applicators will naturally gravitate to the fields that can be sprayed with the lowest risk and most cost-effectively. The result will be that fields near transmission lines will be left unsprayed and at the mercy of the damaging pest. If that pest is a weed, the negative impact can be not just on the crop during the current year, but in several future years, because the weed population is allowed to increase unimpeded. If the pest is an insect or a fungus, the impact will differ but the direction of that impact will always be negative.

In wet conditions, a farmer with a field near a transmission line who has been unable to engage an aerial applicator but, who still wants to save his crop, will be tempted to go on his or her field with ground-based equipment when conditions are really too wet. The result is field ruts that take several machine passes and expense to eliminate, missed areas because the equipment cannot navigate excessively wet areas in the field and the spread of weeds that stick to the mud on the wheels of the ground-based equipment and get transferred to other parts of the field.

POTENTIAL COST CONSEQUENCES

With crop revenues approaching $1,000 per acre and increasing rapidly each year, a modest 30 percent loss of revenue in a 160-acre field results in a loss of almost $50,000 in that field in a single year. It is entirely feasible that, if the problem is an insect or disease outbreak, losses would be much greater and at times it could be close to a complete loss. When one considers this financial impact in a year on a single quarter section and then extrapolates that annual figure over the estimated 50-year life of the line, for a strip a mile wide on each side of the line over a portion of the line in southern Manitoba, it is possible to arrive at an estimate of the negative economic impact over the life of the line. A conservative estimate of the negative economic impact of the line

using 150 miles as the length of the line in cropped areas produces an annual loss of 60 million dollars. This illustration is given, not to assert that a 'perfect storm' of crop loss will occur along the entire in a single given year. It does bring into focus, however, that the crop revenue losses in any given year can be in the millions of dollars. The answer to mitigating these obviously potentially devastating impacts cannot simply be compensation. In some cases, no amount of compensation can properly mitigate such ongoing potential losses. Certainly, a one-time compensation package is completely unrealistic.

There is no way of predicting the situation in farming five years ahead, let alone 50 years ahead, but it is easy to see how the present value of the negative economic impact on agriculture over the life of the line could approach a billion dollars even recognizing that in some years it will be possible to apply crop protectants on some fields using ground-based equipment.

ADVANCE IN AGRICULTURE

One more point to consider about agriculture in Manitoba is how fast things change. One of the major parts of our crop production business is seed sales. 10 years ago we started selling seed and picked up a soybean line more as of interest than anything. In 2000 the value of soybean production was $1 - 2 million dollars in Manitoba. Soybeans were considered a crop grown in the Midwest and southern USA. In 2007 when the Bipole III Project was launched, the value of soybeans grown in Manitoba was about $58 million dollars and 5-10% of them were row cropped. In 2011 the value had moved to $179 million dollars and based on our company's revenue, I would believe that at least 50-60% are row cropped. The 2012 and 2013 years should show a huge jump from 2011. One must ask, how long will it take until we need irrigation pivots to help our production? What is our next size and type of equipment? What is our next new crop that we never thought would come this far north, cotton….peanuts? I live my life in agriculture. I depend on it for my family and their families to come. Notwithstanding my experience, I clearly would have to admit that I could not be a reliable source in

predicting what the future will bring in Manitoba agriculture. What would make Manitoba Hydro so convinced that it has addressed agriculture's problems for the next 50 years?

One has to wonder if Manitoba Hydro has really understood the economic impact of running the Bipole III line through the crop-producing areas of southern Manitoba. If it had, it would have found a different route for the line.

In addition to my Prairie Sky Aviation business, I operate ground-based equipment on a custom basis. I also raise crops on about 1,000 acres. I want to draw on my experience as a farmer to focus the remainder of this report on a few aspects of how I see the Bipole III transmission line impacting on farming.

PHYSICAL DAMAGE

As a first point, the major equipment manufacturers do not make equipment to Manitoba hydro transmission line specs. There are so many other performance factors that dictate equipment design. Some of the newer and larger models have communication antenna that will come dangerously close to the line conductors at the mid-point of the span as the conductors sag on a hot day. That is the reality in 2012. As the trend to larger equipment continues, it can be expected that this problem will only become more prominent in the future and represents a major safety risk. To revisit an earlier problem that was pointed out, 33 - 42 meters off the edge of a tower is not enough to allow most new sprayers or harrows to pass since they already measure in excess of 130ft. (43.33 m). We do not need to wait for the future to see that the proposed tower placement is ill-conceived.

It is a worry to myself as a landowner that Manitoba Hydro seems to view the matter of responsibility for damage to the line as resting with landowners or at least on the farmer, if the land is leased. It is not unusual for a field to experience six to nine operations during a season. Add liquid manure application to the scenario and you can add another four operations on the same piece of land. Some operations are done at night or under other conditions of reduced visibility. Much of the equipment used is wide and some of

it is operated at high speeds. The equipment is heavy, pulled or driven with high horse power tractors It is capable of inflicting major damage in a situation where it strikes a tower.

Farming today continues to have a strong family component to it. It is usually an intergenerational activity with younger people, both family members and hired staff, operating the equipment. This fact will not change just because a transmission line is built through a field. No amount of training replaces the experience of older operators. Accidents are predictable as there is no way to train a worker to work under a transmission line.

Some operations, such as cultivating and the application of manure, are carried out on the diagonal with GPS and auto-steer technology. A machine travelling at 10 kilometres per hour (6 mph) crosses under the transmission line on the average every seven minutes. If the operation is carried out perpendicular to the line, the frequency of crossing under the line or near a tower is even more frequent, every five minutes. The point is that there is plenty of opportunity for an accident.

As the newcomer in a field, Manitoba Hydro should not have the right to pass on the responsibility for accidents to the people who are established in the area and who did not create the risk. Manitoba Hydro needs to accept at least some of the liability for the new circumstances. Responsibility for increased insurance premiums arising from a situation that he or she did not create should not rest with the landowner and/or the farmer. Nor should the landowner and/or the farmer bear the risk of losing insurance coverage should a claim become necessary. Hydro needs to revisit its stance on liability.

CONCLUSIONS

I will be the first person to admit that I am not an expert on Manitoba Hydro's business. I would admit I have very little knowledge of electrical generation. I would admit that I also have little knowledge of transmission line routing. I would put forward though that

Manitoba Hydro has grossly neglected its responsibility to the impact and irreversible footprint that it is about to impose on the agriculture sector of Manitoba. I repeat that the damage that will occur will not solely be just a little square around each tower, but it is clear that damages created could be in excess of $60 million dollars in a year, such as the current summer we just had, when you calculate the true extended area on either side of the line that clearly is affected.

Manitoba Hydro has a responsibility to all Manitobans, including the people involved in agriculture, to ensure that it takes the safety and economic implications of what it is doing seriously and strives to find solutions to the problems that it is clearly creating instead of trying to minimize or ignore these issues. Manitoba Hydro has not performed its due diligence in trying to solve any of these issues, and, in fact, seems to be intentionally ignoring the issues of agriculture to move this process forward. Clearly, with the resources it has and the professionals it has hired, it could not possibly believe the minimal effect on agriculture, both in safety and economics that it is claiming.

In light of the serious adverse consequences Bipole III will have on the agricultural component of the line, re-routing is the only viable option to mitigate against long lasting extensive damage.

As a poor alternative to a complete re-routing, there is a need for Manitoba Hydro to accept 100% responsibility for the following points:

(1) Liability: There is a very dangerous situation created with the routing of the line through agriculture land. With the amount of activity under and around these towers Manitoba Hydro needs to be responsible for any damage that may occur to the structures or infrastructure of the line and **most definitely be responsible for any injury or death resulting from any accidents** resulting from the routing of this line.

(2) Economics: With the changing face of agriculture and the incredibly fast rate that agriculture is changing it is clear that a “one-time” payment is ludicrous. To represent the stake holders involved, whether they are farmers or agribusiness, the only fair way to cover any of the losses they incur would be to evaluate the acreage, the crop, the commodity price, and the input cost of any said crop in each individual field, **every year.** This way Manitoba Hydro will be closer to properly covering the true losses of the stake holders involved. Importantly, the affected area is no less than 1 mile on either side of the proposed line, for much of the line.

Bio for Reg Friesen

Name: Reg Friesen

Business & Farm Affiliation: Owner/Operator of Prairie Sky Crop Solutions, & RPL Farms Ltd.

Description of Business & Farming Operation: Prairie Sky Crop Solutions is an independent seed, crop protection and custom application agricultural retailer that delivers high quality products and services primarily to corn, cereal, and oilseed producers. Prairie Sky Crop Solutions offer both aerial and ground custom application. RPL Farms Ltd is a farm operation that includes 1000 acres of cropped land and interests in a hog operation.

Family Involvement: Third generation farm. Reg was born and raised on the farm near Niverville. Upon graduation Reg was actively involved in the family farm. Twenty years ago, he started Prairie Crop Solutions which services many farms in the area. He owns and operates his own farm operation as well. Reg and his wife Pauline have 3 children.

Industry Involvement: Reg is a member of the Canadian Aerial Applicators Association and served as a board member for 4 years.

Reg served for 2 years as Vice President of the Manitoba Aerial Applicators Association before serving as President for a 2 year term with the MAAA.

Reg has been an active member with the Manitoba Aviation Council for the past 13 years.

Manitoba Hydro Bipole III Transmission Project

Review of EIS Sections on Birds, Caribou, Severe Weather, Agriculture, Economics, GHG, Climate Change

Summary of Major Findings and Options for Avoidance, Mitigation and Compensation

Prepared for the Bipole III Coalition by

Jim Collinson

Arnold/Collinson Research and Consulting

Ottawa, Canada

November 12, 2012

EIS REVIEW: PROPOSED BIPOLE III TRANSMISSION LINE

ANALYSIS AND

AVOIDANCE, MITIGATION AND COMPENSATION OPTIONS

JIM COLLINSON[1]

Chapter 1: Introduction

1.0 Scope

This report considers potential impacts of the currently proposed Bipole III line. It draws on information provided by Manitoba Hydro (MH) in its Environmental Impact Statement (EIS), research papers and articles relevant to the issues in the affected area, as well as personal knowledge and experience.

Four areas of concern are addressed within the context of the three major "impact zones". Environmental and economic factors are dealt with under categories as found in the MH EIS: i.e. Birds, Ungulates (essentially caribou and moose), agriculture and security.

It concludes with a general commentary regarding more general economic factors, including the issue of climate change. Finally, options are proposed to address primary concerns.

1.1 Background/context

MH has proposed routing a new transmission line from the Lower Nelson River generating stations to a new converter station (Riel) in Winnipeg.

The proposed route, currently under review by the Manitoba Clean Environment Commission (CEC) starts on the north side of the Nelson River about 65 km downstream from Gillam and ends in Winnipeg. It follows a route that cuts diagonally from the Nelson towards The Pas, then south to the west edge of Lake Winnipegosis, east of Swan River in a SSE direction to just west of Portage la Prairie. From there it continues about 50 km south of the Trans Canada Highway, then goes east to a point just short of Steinbach, and from there north to the east side of Winnipeg.

[1] Jim Collinson is a consultant on strategy and complexity: see resume appended (pages 65 – 70).

The proposed line, estimated at 1384 km in length, will involve some 2800 km of HVdc conductors, 1400 km of optical ground wire strung between and attached to the tops of the towers, and 2854 towers. Guy wires will support the northern towers but, to reduce footprint, the towers in the agricultural area affected will be on concrete pads without guy wires.

The optical ground wire will require four permanent repeater stations spaced along the route. These sites will require regular access for servicing and refueling the generators where they are needed.

Clearing right-of-way and construction of the line will take place in winter months in the north, and anytime practical in the southern more accessible region.

On-going monitoring and maintenance will be carried out once the operational phase begins.

1.2 Economic/environment/energy context

This project proposal comes forward at a time when the entire global energy market situation is in a state of flux. Moreover, energy factors cannot be separated from economic and environmental factors. They are all interrelated.

Market uncertainty exists world-wide with economic difficulties facing Europe, the beginning of oil depletion in the Russian mainland, security issues in Nigeria, political uncertainties in Venezuela and a significant shift in the energy realities (movement towards self-sufficiency) in the United States. This latter factor most directly affects Manitoba and its electrical energy market. The global situation is not expected to return to any sort of “equilibrium” in the foreseeable future.

The Nelson River development has served Manitoba well since the 1970’s, but continued development needs to be considered in a much altered future context.

Both Canadian and US energy demand has been affected by reduced consumption. For example, efficiencies derive from such developments as automobile fuel efficiencies, appliance efficiencies, improved insulation in homes and offices, etc.

On the supply side, recent adaptation of fracking for natural gas extraction has changed energy cost options. Gas-fired generators can be located closer to markets in the US than the Nelson River, thus final delivered costs are readily competitive with MH. Natural gas reserves are substantial, and not a passing diversion despite some arguments, not scientifically proven, that surface pollution may become a factor.

Given the above, MH needs to consider accessing other markets as well as pacing the development of the remaining Nelson River sites to reflect realistic

potential US demand, as well as other sales opportunities. A review of the latter is now contemplated. Although selling surplus energy at a loss may be best use of power that otherwise is lost, a sustainable business cannot exist by selling below cost over the long term.

Transport of energy in the future could take different forms, with notably different impacts. For example, demand for hydrogen may well grow in the near future, and it could be produced on site at the Nelson River through electrolysis of water, and then shipped by rail along the existing line to such markets as the Alberta oil sands, or by rail to Churchill and forwarding by ship to developing European markets.

As societies better understand and address energy and emission realties, climate change becomes more of a concern. The resources currently available may dramatically change and societies may face uncertainty about their capacity to successfully adapt to shifts in climate. In the case of Manitoba, the likelihood of increased frequency of severe weather events, including both flooding (e.g. reduced crop production) and drought (e.g. greater probability of forest fires in the north and reduced agricultural production in the south) is now becoming a strong possibility.

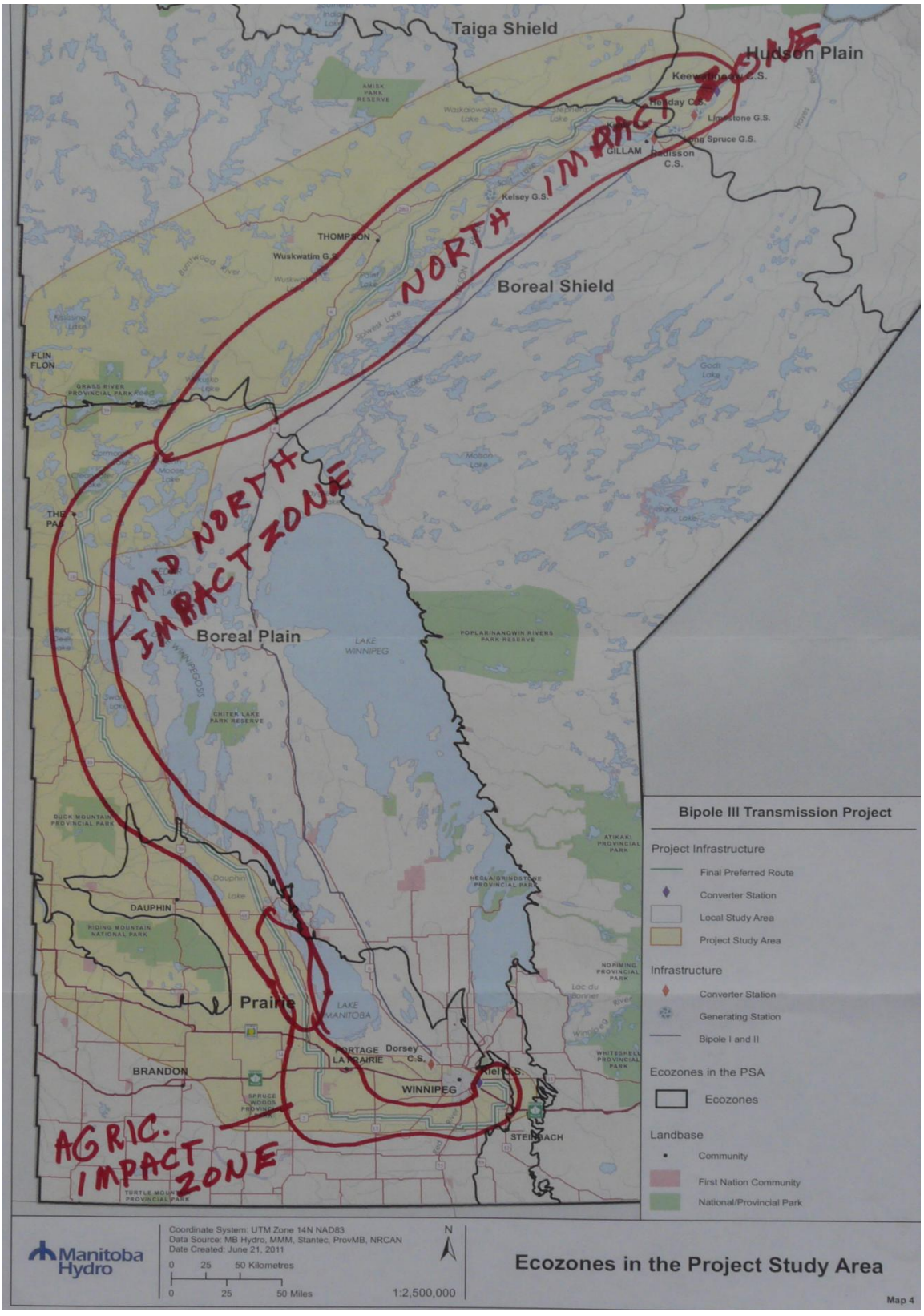
Environmental assessments also become more complicated as understanding grows about the complexities of economic, energy and environmental interactions. It is no longer simply a matter of individual disciplines assessing the impact on one species at a time, but the interrelationships of these impacts on aggregate ecosystems and the economic activity and social well-being that must be addressed.

The concern, then, is not simply local environmental impacts, but these plus the cumulative environmental and economic impact and the implications over the longer term for Manitoba taxpayers, as well as those impacted beyond Manitoba's borders.

The proposed route passes through what are essentially three zones of impact. Although there are physical and ecological zones affected (these are noted in the EIS), it is the actual impacts of the proposed transmission line and its converter stations that are under review. These impacts derive in part from ecological and physical features, but also from external factors, including climate, industrial activity, and protection, and use and enjoyment of Manitoba migratory bird resources both within the province and beyond.

1.3 Impact zones

For purposes of clarity, this report reviews impacts of the proposed Bipole III transmission line in the context of three major "impact zones" as shown on Map 1, which has been made using the MH EIS Ecozones map.


Taiga Shield
Hudson Plain
Boreal Shield
Boreal Plain
Prairie
NORTH IMPACT ZONE
MID NORTH IMPACT ZONE
AGRIC. IMPACT ZONE
Keewatinoow C.S.
Limestone G.S.
Long Spruce G.S.
Kelsey G.S.
Wuskwatim G.S.
THOMPSON
FLIN FLON
DAUPHIN
BRANDON
WINNIPEG
STEINBACH
Dorsey C.S.
Bipole III Transmission Project
Project Infrastructure
Final Preferred Route
Converter Station
Local Study Area
Project Study Area
Infrastructure
Converter Station
Generating Station
Bipole I and II
Ecozones in the PSA
Ecozones
Landbase
Community
First Nation Community
National/Provincial Park
Coordinate System: UTM Zone 14N NAD83
Data Source: MB Hydro, MMM, Stantec, ProvMB, NRCAN
Date Created: June 21, 2011
0 25 50 Kilometres
0 25 50 Miles
1:2,500,000
N
Manitoba Hydro
Ecozones in the Project Study Area
Map 4

Map 1

1.3.1 The northern impact zone which runs from the Nelson River to just short of North Moose Lake (approximately 500 km).

This zone is primarily boreal Precambrian (except for the far north-east which extends into the Hudson Bay Lowlands), with significant mineral deposits (greenstone belt), considerable hydro-electric development, some forestry activity, and tourism investments. Significant wildlife habitat is found in this region, particularly for woodland caribou and moose, as well as for wolves, black bears and wolverine. Polar bears use some parts of the Lowlands area for denning and migration purposes, and may be expected to occasionally "visit" the lower Nelson where some of the later dam sites will be located, especially if garbage is not effectively contained. Barren ground caribou frequent the coast of Hudson Bay in summer.

In this zone, the primary concerns are caribou, moose, mineral activity and line security. The primary security factor here is the separation from the other bipole lines for risk reduction associated with severe weather events. Bird-sensitive areas exist at many points along the proposed route. Those of particular note are the Partridge Crop Lake/Wintering Lake area and Setting Lake area. Although some portions of the route within this zone are not nearly as significantly impacted as those in the mid-north impact zone, woodland caribou calving habitat in the area north and east/west of Ponton are important. Woodland caribou are classified as "threatened". Consequently, these require special attention. Their low fecundity rates represent a serious danger to their continued existence.

1.3.2 The mid-north impact zone which runs from east of North Moose Lake to the south side of Big Grass Marsh (approximately 630 km).

The essence of the importance of this zone derives from its wildlife habitat: primarily for birds, both migratory and resident. They rely on the marsh ecologies and sparsely wooded terrain for migration, staging, feeding and nesting. The area is a critical portion of the Mississippi Flyway, where migratory birds, including many species of ducks and several geese, as well as Sandhill Cranes, Great Blue Heron and many other water-oriented and songbirds stop and feed on their routes both north and south. The length of these feeding stops varies depending on weather, but often can be up to 3 weeks in both the spring and fall, sometimes more. It represents critical habitat within a long migration route for these birds. Local birds, particularly several species of grouse, rely on the area for year-round food supply, mating locations and nesting areas.

Woodland caribou are also a significant wildlife resource in this area. The only herd that showed any sign of growth, according to data in the EIS, is

The Bog herd, located in the area to the south of the Pas, down to the Overflowing River. The proposed line goes directly through this area. Moose are also common to this area, and represent a considerable food resource for aboriginal people.

Although there are smaller areas of good agricultural land in the Dauphin area, they are well away from the proposed line. The Swan River area and Carrot River farming area near The Pas are more directly within the feeding area of birds near the proposed line. Swan River area agricultural practices will be impacted by the proposed line.

1.3.3 The agricultural impact zone which runs from the south of Big Grass Marsh to Winnipeg (approximately 270 km).

Although there is some agricultural activity in the mid-north zone, the bulk of commercial farming along the proposed route begins to the west and south of Big Grass Marsh. There are farming areas beginning north of Swan River, but continuous commercial annual crop farming near the proposed route effectively starts farther south. Mixed farming and livestock operations, however, are to be found considerably farther north. From there to Winnipeg, with the exception of a small area south of Portage la Prairie, lies much of the best agricultural land in Manitoba. These lands are classified under the Canada Land Inventory as Class 1 to 3: essentially prime land for cultivation and growth of agricultural crops.

Migratory bird feeding activities of considerable magnitude take place in this agricultural area in both spring and fall.

Chapter 2: Birds

2.0 Scope of work undertaken

The Environmental Impact Statement (EIS) provides two volumes of material on birds. The work that produced these volumes involved detailed data collection as well as considerable literature review. Because of the initial larger study area, massive data collection and analysis was undertaken, and the results were assessed and conclusions reached. This resulted in a set of proposed means to address impacts. However, the data were not collected specifically to facilitate analysis of impacts of the Final Preferred Route (FPR), but for the selection of it. Consequently, it lacks detail needed for careful final review.

Despite the huge geographical area involved, the work undertaken has been carefully done and assessed. Unfortunately, data on total migrating populations, and more precisely their particular route segment (which side of which lake), along with numbers for each route segment, are not available. This is a significant gap in the information. For example, although the EIS map shows routes of equal width on each side of Lakes Manitoba and Winnipeg, the largest migration routes are in fact through the southern Interlake and to the west of Lake Manitoba[2].

2.1 The Mississippi Flyway[3]

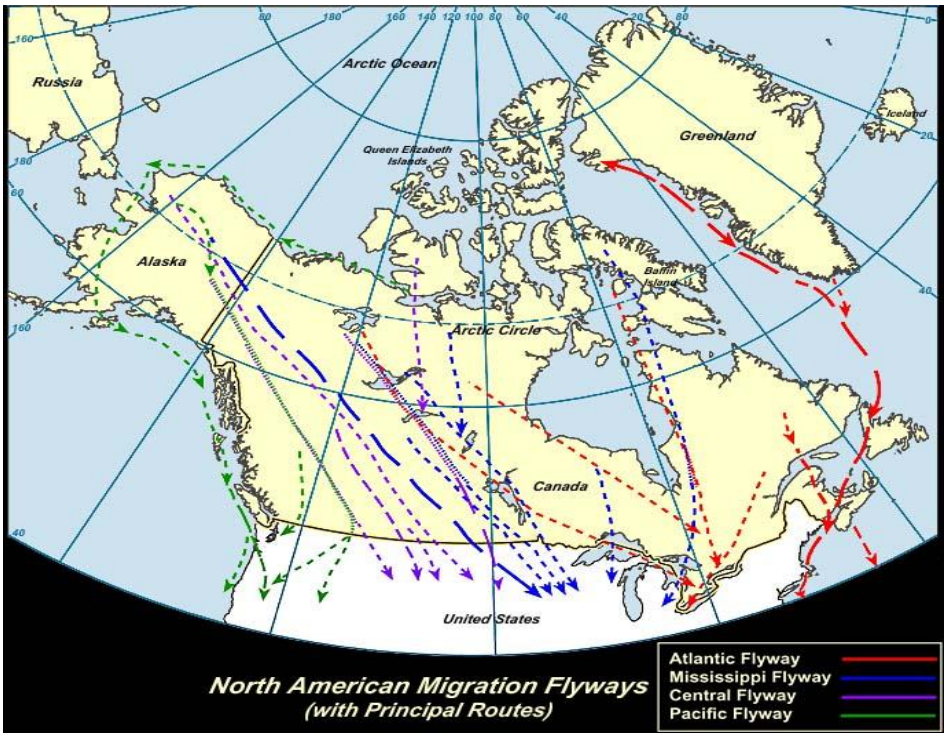
The particular international migration route affected by Bipole III is known as the Mississippi Flyway (see dark blue routes on Map 2). Nearly half of North America's bird species and 40% of North American waterfowl and shorebirds migrate along this route[4]. Although some birds may migrate all the way from the Arctic Ocean to Patagonia, the majority stops in or near the southern US states along the Gulf of Mexico coast, primarily Mississippi, Louisiana and Texas, as either a wintering site or a way-point en route to South America. In all, this route takes them up to 5000 km each way. It is ideal in the sense that along the way there are no high mountains (Baldy Mountain is the highest, at 832 m), and there are many water-covered areas in the form of small or large lakes, as well as potholes and marshes. It is also blessed with a mid-point where ample food is available to permit a "break" both on the way north in the spring and south in the

[2] Personal observations over some 20 years from 1963 to 1982, and work associations then with wildlife biologists, including Al Pakaluk (who sadly was killed in a helicopter crash while working on Oak Hammock Marsh), and with Jack Howard, Gene Bossenmaier and Rich Goulden.

[3] www.birdnature.com/allupperflyways.html

[4] http://en.wikipedia.org/wiki/Mississippi_Flyway

fall, where the birds can rest and eat to build strength for the remainder of their migration. This mid-point is mostly in Manitoba and adjacent states. A large percentage of the migrating birds fly along both sides of Lake Manitoba.



Map 2

Map source: birdsnature.com/allupperflyways

For the above reasons, the strip of the Mississippi Flyway through Manitoba is a critical element of the entire Flyway.

The impacts are not just those that occur within Manitoba, but those which contribute to the overall health and habitat of the migratory birds covered by the Canada-United States Migratory Birds Convention: a document signed first in 1916 in recognition the value of this shared continental resource. Initially, it was a focus for protecting birds for hunting (establishing bag limits, hunting seasons and poaching penalties but, within the past few decades, recognition was given to the need to protect habitat[5], realizing that without protection there would be little left to either hunt or watch. The relevant section of the Migratory Birds Convention Act, 1994 follows:

[5] Migratory Birds Convention Act, 1994, see Article IV

"*Article IV*

Article IV of the Convention is deleted and replaced by the following:

Each High Contracting Power shall use its authority to take appropriate measures to preserve and enhance the environment of migratory birds. In particular, it shall, within its constitutional authority:

(a) seek means to prevent damage to such birds and their environments, including damage resulting from pollution;

(b) endeavour to take such measures as may be necessary to control the importation of live animals and plants which it determines to be hazardous to the preservation of such birds;

(c) endeavour to take such measures as may be necessary to control the introduction of live animals and plants which could disturb the ecological balance of unique island environments; and

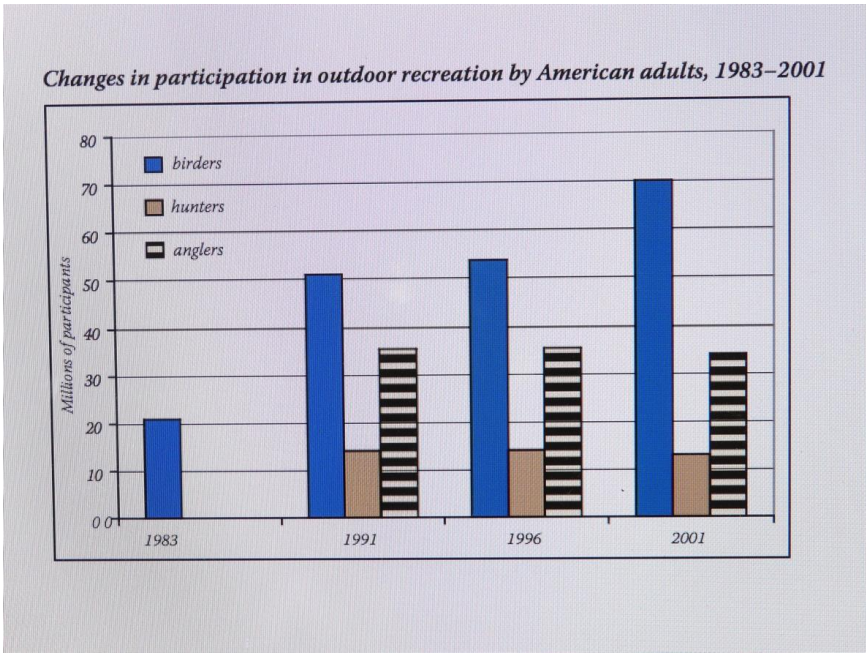
(d) pursue cooperative arrangements to conserve habitats essential to migratory bird populations."

The bird population of the Flyway represents seasonal sources of food, particularly for aboriginal people, and sport for avid hunters throughout its route, provides economic returns for a wide range of services and goods associated with hunting, and gives considerable enjoyment, recreation benefits and economic activity associated with bird-watching. The latter activity has grown rapidly in recent years, and includes a disproportionate segment of well-educated, higher income people in both countries. Although comparable data are not readily available for Manitoba, the magnitude of data from the United States gives a good indication that it is significant. This is highly relevant, as it illustrates how a continental resource is affected.

Some examples of economic significance do exist. In 1987, Parks Canada conducted a study of Point Pelee bird-watching impacts, and discovered that $5.4 million ($US) was spent in that area alone, with a higher per capita daily expenditure than visitors who arrived for purposes other than birding. As an aside, some $800,000 was spent on film processing, an expenditure that would not register today! Recent information from the US shows that 20% of all Americans are birdwatchers, contributing $36 billion to the US economy in 2006[6]. Participation in Montana and Minnesota exceeded 30%. In that year, 71 million US residents reported observing, feeding or watching birds and other wildlife, spending $45 billion. Bird watching is a growing activity, while hunting is gradually dropping in participation rates.

[6] http://news.mongabay.com/2009/0715-birds.html#ixzz21Sy7GyDH

The chart below illustrates this point.[7]



Unfortunately, data for Manitoba alone is weak.

Hunting remains a significant element of bird management, with 45% of waterfowl hunters in the US active within the US portion of the Mississippi Flyway. Waterfowl hunters, numbering 1.3 million in 2006, spent $900 million on travel, food and lodging and equipment[8]. Although comparable figures for Manitoba are not available, it would be logical to assume they are somewhat higher in ratio, in recognition of food hunting by aboriginal people, plus an influx of US hunters.

The economic impact of the Mississippi Flyway in the US alone, due to bird watching and hunting, illustrates the significance of the Flyway and confirms the wisdom and importance of the Migratory Birds Convention. Impacts from a major transmission line are not limited to a strip of Manitoba, but are significant all along the migratory routes from north to south.

The EIS uses Mallard Ducks, Bald Eagles and Great Blue Herons as representative of larger birds found along the FPR. It is unfortunate that geese (Canada, Blue, Snow) as well as Sandhill Cranes are not given attention as they exist in huge numbers within the Mississippi Flyway, and are the best known of the large migratory birds. These larger birds, including Tundra Swans, are particularly susceptible to striking power lines, especially in poor weather

[7] "Restoring North America's Migratory Birds, Report to the White House, January, 2007
[8] Economic Impact of Waterfowl Hunting in the United States, Report 2006-2, US Fish and Wildlife Service.

conditions, as they have difficulty making sharp maneuvers. There are many songbirds, shorebirds and others that make up the living elements of the Flyway. As noted in the EIS, a number of these that are recognized as "species at risk". Several of these include for example, the yellow rail, least bittern, short-eared owl, common night hawk (below the tree line), olive-sided flycatcher, Canada warbler and rusty blackbird. These birds are present along the proposed route, and most notably in several of the sensitive areas shown on Map 3.

2.2 Non-migratory birds

Resident birds are also present within the proposed route area. Ruffed grouse are found along most of the route outside intensive agricultural areas, spruce grouse and ptarmigan in the more northern regions and sharp-tailed grouse mostly in the southern 2/3 of the route. All three species are susceptible to collisions with guy wires on towers, as well as transmission wires.

Clearing will have some impact, especially on ruffed and spruce grouse nesting and winter cover areas, and sharp-tailed grouse leks MUST be identified in advance of clearing right of way. Given that their use varies from as early as March and on into July in some cases, although normal use is more likely to be between mid April to the end of May, construction activity anywhere near an active lek should be avoided. The EIS implies leks are used only for several years, but this is highly unlikely in the areas proposed for the route. In large measure, vegetation along the west side of Lake Manitoba where the line is proposed to go, is not fast growing, so leks (essential to ensure survival of the local group of birds) are very likely to be used for a decade or more. Cutting growing trees and taller shrubs within the lek, to ensure sight lines from the edge are not impaired for the females while they ponder their choices, may even extend years of use. Certainly, line clearing through an active lek or over the winter prior to mating season will severely frustrate the capacity of the group to breed.

The US Bureau of Land Management has recognized these risks, and has issued the following[9]:

"To reduce the risk of collisions, avoid the use of guy wires for turbine or MET tower supports. All existing guy wires should be marked with recommended bird deterrent devices.

The siting of new temporary MET towers must be avoided within 2 miles of active sage-grouse leks, unless they are out of the direct line of sight of the active lek."

[9] http://www.world-wire.com/news/0912160001.html, "Federal Action to Prevent Fatal Bird Collisions with Western Public Land Structures Praised"

2.3 Tundra Swans: a "cross flyway" species

One species that passes through the proposed route that is not mentioned in the EIS is the tundra swan. This bird has been monitored for some considerable time by both the US and Canadian Wildlife Services. Interestingly, the swans winter along the Atlantic coast (Georgia, South and North Carolina), which is within the Atlantic Flyway, but their migration to the high arctic tundra region of Canada, essentially in the region of the Northwest Passage, takes them south of the Great Lakes and through Manitoba, primarily along the west of Lakes Manitoba and Winnipegosis. These are large birds, as large or larger than Great Blue Herons and Sandhill Cranes, and are susceptible to injury or death from collisions with wires or towers (the latter in poor weather as these birds are not readily able to make sharp turns quickly).

2.4 The Central Flyway

The Central Flyway passes through western Manitoba and Saskatchewan. It is not affected by the proposed Bipole III line.

2.5 The Environmental Impact Statement and implications of bird/line interactions[10]

The bird report within the EIS, as noted above, is detailed in terms of general factors for the larger Study Area, and these have been refined to the extent possible for the specific proposed route. It is stated by MH in the EIS that the information was taken into account in determining the final route siting. Clearly, it was not possible for additional data to be collected to refine the analysis subsequent to the actual routing being chosen. It is also clear that the significant bird impacts were subordinated by other factors, implying they were judged insignificant.

By taking one species at a time and using the best information available on the route finally chosen by MH, the data becomes somewhat thin; yet aggregating the data provides some basis for considering how the issue can be approached.

By superimposing a combination of significant impact areas for all species considered onto one map, along with the locations of all actual bird counts, a picture emerges that indicates that the impacts are not to be taken lightly. This is shown by red circles on Map 3, using the MH map of Mallard sightings in the EIS

[10] An interesting compilation of bird kills from human-made structures has been done, indicating the magnitude of concern about this issue: see "**BIRD KILLS AT TOWERS AND OTHER HUMAN-MADE STRUCTURES: AN ANNOTATED PARTIAL BIBLIOGRAPHY (1960-1998)",** *John L. Trapp* *mailto:john_trapp@mail.fws.gov*

as a base map. These areas marked represent very significant bird areas for nesting, feeding and resting during migration and staging. With the exception of physical damage to leks, the dangers from wire and tower/guy wire collisions exceed the damage from clearing, and are on-going for the entire life of the line.

Map 3

Critical bird areas, using MH data from EIS re bird sightings and prime habitat superimposed on Mallard sightings map

It is noted that North Dakota studies indicate that between 124 and 200 bird strikes occur annually for each kilometer of line[11]. Extrapolating even the lower figure by half the distance and the number of years the line is expected to operate, generates a significant number of bird deaths: 8,400,000! It should be noted, however, that the North Dakota area did not have as great a concentration of birds as west of Lakes Manitoba and Winnipegosis, and up past The Pas. Although a much lower figure will apply generally to the rest of the line, the area noted is that which experiences significant feeding and staging activity over up to three weeks twice a year for birds on route north and south, in addition to those nesting in the area.

Over all of Manitoba, there is no route that would negatively impact birds and their movements <u>more</u> than the one chosen by MH.

The conclusions in the EIS regarding bird impacts rest on two key factors: one, the basic assumption that the inevitable bird deaths caused by construction and operation of the proposed line are not significant overall, and second, that the impact on habitat is below 5% (<2% in most cases). In other words, bird fatalities are given the lowest priority over other factors.

The magnitude of economic impact from birds and their migrations has been outlined above. In addition, there are specific impact implications that need to be taken into account in determining the final route for Bipole III. These implications include:

- **Heavy impact areas cover a large proportion of the proposed route**

  The Bird Technical Report identifies the bottleneck to the northeast of The Pas, but the conclusions do not reflect the significance of it in terms of risks of collisions with wires and towers. Although the length of the bottleneck is about 75 miles, or 125 km, it affects a significant proportion of flyway activity.

  Taken alone, this section may be the longest section causing major concerns, but there are many additional critical areas to the south as far as the south end of Big Grass Marsh. Feeding in agricultural fields in spring and fall will bring birds, especially Mallards, Sandhill Cranes and Canada Geese, into regular proximity to the proposed line all the way to Winnipeg.

[11] Albert M. Manville, II, "Bird Strikes and Electrocutions at Power Lines, Communication Towers, and Wind Turbines: State of the Art and State of the Science – Next Steps Toward Mitigation", US General Forest Service General Technical Report, PSW-GTR-191.2005, p. 1055

The Big Grass Marsh is shown as outside the affected area of the proposed route, but birds will be moving between Lake Manitoba and the Big Grass Marsh in large numbers, so this fact will need to be taken into account. Unfortunately, the numbers of Sandhill Cranes in the area of the Big Grass Marsh has already dropped from over 6000 in the mid-1960s to less than half at present. Studies have shown that 25% of Whooping Crane deaths are due to collisions with transmission lines[12]. Sandhill Cranes have the same type of difficulty doing quick maneuvers.

- **Recent MH responses** to questions on bird/line collisions indicate that two mitigation measures are proposed: routing away from sensitive areas and where this is not possible using bird diverters.

    - **Routing choice**

      MH has indicated that it has chosen the route so as to avoid close contact with sensitive bird areas, such as those in the area known as the "pothole country" in the Minnedosa region to the south of Riding Mountain National Park. MH is correct in noting the importance of this significant waterfowl and bird part of Manitoba. What has been ignored is the critical bird areas along the west sides of both Lakes Manitoba and Winnipegosis, as well as Swan Lake and the west corner of Cedar Lake. Moreover, the second very critical area northeast of The Pas is also ignored. Both these highly important bird areas must be avoided.

    - **Diverters do not solve it all**

      Reliance on diverters over such long distances is expensive and speculative at best. What can be done after the fact when monitoring shows that collisions are still significant? Diverters have some effect with certain birds, particularly those birds that fly during daylight hours. Others, however, including large birds such as geese and some ducks, often fly at night[13]. Moreover, they fly regularly at dawn and dusk going to and returning from feeding areas. At such times they are most susceptible to wire and tower strikes. Large birds such as cranes and Great Blue Herons have difficulty making sharp maneuvers during

[12] See Anne E. Morkill and Stanley H. Anderson, "Effectiveness of marking power lines to reduce Sandhill Crane collisions", Wildlife Society Bulletin 19:442-449, 1991.

[13] **"**Evaluating diverter effectiveness in reducing avian collisions with distribution lines at San Luis National Wildlife Refuge Complex, Merced County, California", *Linda Speigel,* Ventana Wildlife Society, August 2009CEC-500-2009-078 *Prepared For:* **California Energy Commission,** Public Interest Energy Research Program; **Pacific Gas and Electric Company; Edison Electric Institute**

flight, so are particularly at risk to wires[14]. With clear visibility, one study found that diverters did reduce crane impacts by 66%[15]. But, reduced visibility due to weather conditions contribute significantly to collision frequency. Such weather realities are not uncommon in the area proposed for the line.

Reflectors that illuminate at night giving earlier warning of lines are available, and may have some value under certain conditions. However, they are ineffective in conditions of fog, precipitation, overcast skies and wind conditions favorable to migration[16]. They need to be placed no more than 10 m apart, and on different lines. If installed during the construction phase, costs will be lower, but if they are added after the line is operational, installation may have to be done by helicopter at considerable expense and risk.

Illuminating diverters cost $40 each, and to space them at 10-m intervals (as recommended) from east of North Moose Lake to Winnipeg (the area most likely to record bird strikes due to feeding activities) would cost about $4 million for the material alone, with no assurance they would be sufficiently effective. Labour and associated costs would be extra, and significant where helicopters must be used after the line is in operation.

Even with diverters installed, monitoring would be essential to determine the number of strikes and types of birds that still encounter the wires. Given the separation of the conductors of the line compared to regular local and regional distribution lines, the 10-m spacing might not be sufficient, and a shorter spacing regime might need to be used.

The research on bird strikes in the southern Interlake near Oak Hammock Marsh is not particularly relevant to the proposed Bipole III line: MH admits they have

[14] Morkill and Anderson, op cit, "Our results confirm the overall effectiveness of wire marking as a way to reduce, but not eliminate, bird collisions with power lines. If raw field data are not corrected by carcass losses due to scavengers and missed observations, findings may be biased. The high cost of this conservation measure suggests a need for more studies to improve its application, including wire marking with non-visual devices. Our findings suggest that different species may respond differently to marking, implying that species-specific patterns should be explored, at least for species of conservation concern."

[15] A study in South Carolina found a 53% reduction in bird collisions with deflectors, but found that 82% of all collisions were with static wires: see "Avian behavior and mortality at power lines in coastal South Carolina", Anthony J. Savereno et al, Wildlife Society Bulletin, 1996.

[16] **"Weather influences on nocturnal bird mortality at a North Dakota tower", Michael Avery, Paul f. Springer, j. Frank Cassel, The Wilson Bulletin, Vol 89, June, 1977**

not carried out research on bird/wire collisions on the Interlake portions of either Bipole I or II. These have been around for many years, and it is difficult to believe that no one ever thought it would be helpful to have done so, especially in the context of Bipole III planning.

- **The optical ground wire not considered**

  The EIS neglects the known danger to raptors from the centre optical ground wire. These have been shown to be particularly deadly to raptors during an attack on prey, where the two larger lines are readily seen but the bird strikes the centre line during its downward plunge. Raptors, particularly bald eagles, are common along the proposed route. More time is spent in the EIS on the possibility of collisions with vehicles (neglecting the fact that most strikes can be avoided by not driving at night), yet nothing is mentioned in the Report about the optical ground wire being a danger. Some studies have shown that these smaller wires are a significant factor (68%) in all bird strikes[17]. Studies from many sources indicate that attention to the optical ground wire deserves special attention, especially for raptors, which alone should have indicated its importance. Furthermore, the EIS concentrates only on the optical ground wires for the addition of deflectors, when recommendations indicate they need to be staggered amongst all three lines: otherwise, the other two lines, in times of poor visibility, put birds at risk.

- **Repeater stations and generators**

  The EIS notes that "repeater station sites will require an all-weather access road or a helicopter pad, an ac electric service pole line, and a property sufficiently large to develop a graded and gravel- surfaced area, approximately 33 m x 40 m in dimension, to accommodate parking and building areas. The building area will require a chain link perimeter fence and will house two structures, a back-up diesel generator (genset) building and a communications building. The generator structure, approximately 2.6 m x 3.5 m in size, will house a diesel motor, fuel tank and ac generator. The communications building, approximately 4.3 m x 11.0 m in area, will house communications equipment, lead acid standby batteries, and an electric toilet."

  These facilities are proposed to be located near Partridge Crop Lake and east of Dauphin Lake: both bird-sensitive areas. As with the line location, care will be needed to avoid leks and prime nesting and winter habitat, as well as

[17] EDM International, Inc. Dr. Arun Pandely, Richard Harness and Misti Kae Schriner Fort Collins, Colorado 80525 Commission Contract No. 500-01-032, 2008. ***Prepared For:*** Public Interest Energy Research (PIER,)**California Energy Commission**

minimizing chances of collisions with the smaller and lower lines.

2.6 Recent legal implications for large projects impacting birds

Syncrude in 2010 was under court order to pay a $3 million fine[18] as a result of 1600 ducks being killed in a tailings pond in the oil sands development: thus setting the price of a duck at $1875! They were supposed to prevent ducks from entering the pond: Manitoba Hydro by analogy should be under the same vigilance with respect to collisions with wires.

A similar case occurred in North Dakota where companies agreed to pay significant fines associated with bird deaths by electrocution and by contact with hydrocarbons in uncovered storage tanks. The birds were identified as being under the US Migratory Bird Act. This Act is similar to Canada's legislation based on the North America Migratory Birds Convention.

> "*In July 2009, Pacificorp agreed to pay $10.5 million in fines, restitution and equipment upgrade costs for the deaths of at least 232 golden eagles, 46 hawks, 50 owls and nearly 200 other birds that had been electrocuted in Wyoming since January 2007. The cost per bird computes to a little less than $20,000. (2) "On August 13, 2009, ExxonMobil pled guilty in federal court to charges that it killed 85 birds—all of which were protected under the Migratory Birds Act. The company agreed to pay $600,000 in fines and fees for the bird kills, which occurred after the animals came in contact with hydrocarbons in uncovered tanks and waste water facilities on company properties located in five western states," reports Robert Bryce. Each bird kill cost the company over $7,000.*"[19]

Towers also represent obstructions that kill birds, and the Bipole III line will have about 2900 towers, about 70% of them with guy wires.

2.7 Climate change considerations

Climate change is noted in the EIS as an additional possible source of stress on birds. This is a factor that needs attention, as more recent shifts in climate in the form of more frequent "events" occur, even though they are within the bounds of previous "records". It is the frequency, and perhaps the duration of these events that appear to be on the way to becoming phenomena worth noting.

Periods of warmer weather in recent winters have already impacted the viability of winter roads. Drier periods imply increases in forest fires. Periodic heavy rains or winter storms lead to flooding, etc. It is the shift in intensity that is

[18] http://www.upstreamonline.com/live/article233656.ece

[19] Jack Dini, Canada Free Press, "Bird Death Fines Depend on Who Kills the Birds", September 19, 2011.

particularly worrisome. Although the Canadian north has had milder winters recently, the opposite is true of Europe.

Work continues on projecting expected changes and how to deal with them, and attention needs to be given to these while also dealing with the known situation at this time. If drier conditions occur, there will be lower levels in some lakes and marshes, but they are not likely to disappear in the medium term. Temporary sloughs that develop in wet periods may become fewer, but may also increase in size with occasional heavy rains that may occur instead of more "normal" precipitation. Therefore, it is these extreme variations that are of greatest concern.

2.8 Concluding remarks

Based on the above, it is clear that the impacts on migratory and resident birds are of a magnitude that requires a re-examination of the route proposed.

Massive mitigation efforts, relying primarily on diverters, hold a very high risk of not solving the problem. Impacts are not just on birds within the route itself, but the entire length of the migration routes of those birds that migrate (a high percentage of all birds using the area) with subsequent and significant economic effects as well as serious implications to Canada's role in the century-old Migratory Birds Convention with the United States. To argue that only 2% of migratory birds would be impacted ignores the fact that if 10 other projects having similar impacts within any segment of the Mississippi Flyway were put in place, the impact would be 20%. Creeping impacts occurring as a result of considering one project at a time produce cumulative effects that no amount of mitigation can correct.

The deficiencies in the EIS from ignoring geese, Sandhill Cranes and Tundra Swans and the implications of the optical ground wire have a considerable effect on the conclusions reached by MH.

An option would be to put the line underground, especially in agricultural areas where feeding takes place. This could be expensive in more northerly segments where rock is so close to the surface, but relatively inexpensive through Class I to III lands south of the Yellowhead through to Winnipeg, where very little rock exists..

By superimposing all the bird-sensitive areas noted within the EIS onto a map with acquired sightings plus habitat analysis (Map 3), **it is clear that the line should not pass through the part of the mid-north zone presently proposed without more serious attention being addressed to the reality of bird-wire (including guy wires) and bird/tower collisions in the context of options for alternate routes having less impact.**

Chapter 3: Caribou, Moose, Wolves and Polar Bears[20]

3.0 Scope

Five herds of caribou live within the impact zones of the proposed Bipole III project. Two herds of coastal caribou inhabit the lowland areas along Hudson Bay, and three woodland caribou herds range within the FPR to the southwest of the generating stations down as far as Lake Winnipegosis. Both groups have different characteristics and will be affected in different ways.

Moose are also found in most of the northern and mid-north areas. They represent a significant source of food for aboriginal people, although their numbers appear to be declining. In the areas also frequented by caribou, moose (although they do not compete for the same food) tend to attract wolves which, once drawn to the area, will also prey on caribou.

Wolves form part of an interdependent troika with caribou and moose. If the three are (ever) in balance, they symbiotically strengthen each other: wolves (and black bears) cull frail animals from the herds, leaving healthy ones to share the food and breed strong calves (although calves are also primary prey for the predators). Often, however, the "balance" is uneven, and the risk of excess depletion of either caribou herds or moose is increased.

Therefore, the three are discussed together in this section, along with specific concerns regarding polar bears and coastal caribou over the life of the line. Implications of the construction and operational activity proposed at the generating stations and the northern converter station are taken into account.

3.1 The Environmental Impact Statement

The section on "caribou and neighbours" in the Environmental Impact Statement (EIS) was done essentially as a review of the entire Study Area, to facilitate delineation of a tentative Final Preferred Route (FPR). Unfortunately, the data within that section, although adequate for its purpose, was not sufficiently detailed to assess the FPR with confidence. Consequently, in August of 2012, Manitoba Hydro (MH) released a "Supplemental Caribou Technical Report" to fill some of the gaps. Although this Report contains considerably more information pertinent to the FPR, it should have been provided as a part of the original EIS. As it stands, it has required a major rework of an assessment based on the original, with less time to fully absorb the findings, many of which differ substantially from the original. These differences are not surprising, given that the newer data focus more directly on the FPR. The new data are appreciated, but the timing suggests the original tabling of the EIS was rushed.

[20] Unless otherwise specified, information for this section comes from the EIS, along with a Supplementary Report provided by MH dated August, 2012.

In late October, a further revision to better accommodate caribou and moose ranges was tabled before the CEC.

3.2 Coastal caribou

Caribou studies (most particularly on barren ground caribou) of an *ad hoc* nature have been ongoing for some time, and in fact began in the '50's when there were times the Hudson Bay Railroad trains had to stop for several hours while a barren ground caribou herd crossed the tracks. Those days are long gone, but some years barren ground caribou still migrate into the area north of the Nelson River.

There are two herds of coastal caribou that live much or most of the year near Hudson Bay.

The Pen Island herd tends to occupy the area to the south of the Nelson River, and their range extends into Ontario, as well as some distance to the south.

The Cape Churchill herd occupies the area from the Cape down to the Nelson River, tending to spend considerable time around the Owl River region. At times there might be a slight overlap of the two herds at the Nelson, but the river itself tends to provide a sort of dividing line except in limited cases where some have crossed the river for short periods.

Both herds periodically occupy territory near the sites of the lower Nelson generating stations, as well as the proposed converter and ground electrode sites. Except for minor contact incidents due to construction or operations as the herds move through or browse in the immediate area, impacts are not expected to be serious. However, as these sites fall within the critical winter range of coastal caribou, caution will be needed to avoid noises and activities during the periods the wintering areas may be occupied. A rather large winter range for these caribou exists along the north side of the Nelson River from the Henday converter site to the west end of Stephens Lake. Activity within this area during the winter months need to be carried out with care and, if possible, avoided until other times of the year. Although this may not be possible for the converter site, it should not affect line construction unduly as long as the actual locations of the caribou are known at the time and monitored regularly.

Barren ground caribou have been known to wander through facilities during periods of limited activity without much apparent concern[21]. But, for coastal caribou, wintering and calving areas are quite a different matter. Winter range is important for their survival, so significant disruption can have serious effects. Coastal caribou keep together as a herd. This means there are many animals

[21] One example of such wandering, confirmed by the author during site visits in 1974, was at Prudhoe Bay on the Alaska north slope, particularly near Deadhorse.

nearby at the time of calving. External noise and activity nearby can seriously disturb the animals at that time, with tragic effect. However, the activities associated with the construction and operations of the line and generating stations are not close to calving areas, so little impact is anticipated.

The numbers of both coastal caribou herds appear to have grown from those of the '70s, so herd viability is not at any immediate risk, as long as no activities take place that could seriously impact wintering or calving habitat. As these are known, avoidance should not be a problem.

Cape Churchill coastal caribou near the Owl River on Hudson Bay, 8/87 (Jim Collinson)

3.3 Potential polar bear threat?[22]

These two coastal caribou herds occupy common territory with polar bears along the coastal region. To date, these animals seem to have generally ignored each other. However, if continued warming occurs so that Bay ice persists for even shorter periods, the availability of seals as a source of food for the bears will diminish, and the caribou could become a secondary source. Although this is outside the direct implications of the Hydro project, it is nonetheless a valid projection which requires recognition that the Bipole III line will not exist within a vacuum: the world is continually changing, and those changes are a part of the

[22] This section has been developed based on the author's personal experience and observations between 1967 and 1989.

reality for any proposed development. In this regard, Bay ice longevity and polar bear health needs monitoring to detect any notable change from the present.

Polar bears just north of the Owl River on Hudson Bay, 8/71 (Jim Collinson)

The area of coastal beach ridges is perfect denning habitat for female bears and their offspring. Although the sites impacted by construction and operations at this point are not within prime denning terrain, they most certainly will be nearby. Polar bears are known to wander near the area where construction is proposed[23], and this may become a concern if garbage is not very carefully managed. Potential impacts of climate change will be discussed in a later chapter.

3.4 **Woodland caribou** (threatened species)

There are eight herds of woodland caribou in the north and mid-north impact zones. Their primary areas run from west of Thompson down to the area between Lake Winnipeg (near Long Point) and Lake Winnipegosis. None are particularly large.

Three herds will be directly impacted by the proposed Bipole III line. These occupy the ranges known as Wabowden, Reed Lake and The Bog.

[23] Personal observations

Woodland caribou differ from the coastal caribou. They are somewhat less gregarious, and at calving time the females split off and calve in solitaire, often using small "islands" in boggy areas for protection from predators. It is believed that this is a general protective measure leaned by this species. Hence, calving areas are quite large[24].

The calving season is mid-to-late May (primarily closer to the end of May)[25], so any construction activity at that time will cause serious problems. The woodland caribou by nature is a shy animal, and tends to avoid contact with human activities and their residue by a considerable distance. For this reason, the EIS recommends buffer or setback distances of 3 km around calving complexes (when occupied) and 5 km around core winter ranges[26]. Construction work on a line passing through their natural territory can become extremely disruptive, essentially cutting up their habitat or forcing disruption of their patterns, causing them stress.

Recent studies noted in the EIS indicate that fecundity, which is generally low for woodland caribou anywhere in North America, is extremely low in the area studied. In only one of the three ranges under review was there an actual addition to the herd[27] from newborn animals, within the sample groups of collared animals. What this implies is that, even if there are no other mortalities in those sampled in all three herds, only three calves[28] will survive their first summer to be recruited into overall herd size. This happens despite a pregnancy rate of 87%. The fact that several other animals will die from age/predation and perhaps hunting means that a gradual decline in herd numbers is the likely current trend. The studies for the EIS and Supplemental Report confirm this potential.

Both provincial and federal wildlife agencies are actively working to improve woodland caribou viability: they are a "threatened" species. Impacts of any magnitude from construction and operation of the transmission line will have severe consequences, thus line routing should not be allowed to cross or cut up their critical ranges.

This point deserves special attention. Given their sensitivity to external impacts, and given their low recruitment rates (slightly negative at present), is it reasonable to permit intrusions into sensitive calving and wintering areas while knowing additional negative impacts could occur? Although a case may be made that less than 5 km in certain instances can be justified, it needs to be set

[24] EIS and Supplementary Report

[25] EIS p.37

[26] EIS p. 164

[27] EIS p.157

[28] The three were only amongst those monitored, so the actual number could be higher. Nonetheless, the chance of herd growth, even without Bipole III, is precarious, and reason for concern on the part of both the federal and provincial governments.

in the context of long-term herd viability, which is why the woodland caribou are "threatened" to begin with. Beyond some unknown point, they may not be able to recover in numbers that ensure their continued existence. The Supplementary Report indicated that sample data indicate more limited impact outside 2 km[29], but does not tie this finding to their other findings that, although wolves prefer to be somewhat near water and young growth vegetation, a cleared line will provide the latter in a matter of time. It is much easier to facilitate growth in a larger herd than in a very small one. By the time monitoring shows continued decline, it may be too late for the herd to recover, given all the other factors militating against their survival. Moreover, if the decline can be traced to right-of-way clearing, it would be impossible to replace the vegetation in time to turn around the impact: regrowth is slow in this area. The coastal caribou can lose some numbers and still be viable: the woodland caribou may not.

Woodland caribou feed primarily on lichens, which are found in old growth forest as well as bog areas. Corridors through heavily treed areas disrupt their habitat while offering easy and fast access for predators. The EIS proposes various options for mitigating this damage by such methods as spreading cut organic material, allowing smaller trees to grow, construction of barriers to make travel for predators awkward, etc. This endeavor at least recognizes the problem. However, there is little evidence that they will work. The fact that the construction and disruption alone will cause the animals to try to avoid critical habitat for up to 5 km each side (a 10 km strip of habitat taken away from their range) means that serious impacts are probable.

The Supplementary Report[30] notes that wolves tend to frequent areas near water and near relatively younger growth: obviously, these areas are where their preferred prey are to be found. Although they do not frequent newly cut or burned area, these areas will become "young growth" in a few years, thus becoming a preferred area for wolves: an additional reason for a cautious buffer area.

The most significant range of the three is The Bog, which lies to the south of The Pas and runs down between the Saskatchewan border and the west shores of Cedar Lake and Lake Winnipegosis. Although there is a highway and existing hydro lines through that area, incremental damage to the habitat and increased activity can only add to the stress on the animals and impact their survival. The Supplementary Report notes that The Bog falls below Environment Canada's 65% habitat benchmark to be self-sustaining[31], yet this appears to be the one herd that has some vitality. Specifically, the Supplemental Caribou Technical Report, page 52, states "The Environment Canada (2011b) CEA currently indicates The Bog as likely as not to be self-sustaining, whereas Reed Lake and

[29] Supplemental Report, p.38

[30] See Supplementary Report, Executive Summary, pp. ii and iii

[31] Ibid, pp. 51-52

Wabowden ranges were all identified as self-sustaining." Then, the August Report goes on to appear to contradict this statement in Table 37 (page 56 of the August document) where it is indicated that total disturbance is about 15%. Some clarity is needed in this case.

Using the 65% figure as a "falling off the wall Humpty Dumpty absolute" implies a reality not readily supported by logic. It implies that 65.1% demonstrates viability while 64.9% does not. At least a third category should be contemplated. 65% may well be the drop-off point, but it is likely that somewhere in the 75-80% range there is a point where susceptibility to herd viability becomes more serious, and this needs to be explored further so that action can be taken before it is too late.

The installation of generators to power the optical ground wire is proposed for locations near Partridge Crop Lake and Lake Winnipegosis. These, too, could result in a 10 km diameter area being effectively removed from woodland caribou habitat.

The other herds that will be impacted significantly are the Wabowden range and Reed Lake range herds. Both herds will have their winter range impacted. In the case of the Wabowden herd, an up-to-now intact wintering area will be cut by a corridor if the line goes according to the Preferred Final Route. Winter range is critical to the animals, and bisecting it with a transmission line will severely impact a herd that is already struggling to maintain its population. Again, beyond creating a corridor with all its implications, another 10 km alley is effectively eliminated from their critical winter range. Similarly, a portion of the Reed Lake winter range will be impacted. Winter is a particularly sensitive time for any disturbance to occur to the wintering herd. As they live on lichens, their diet tends to give them some protection from predators because other ungulates do not share their diet and will be wintering elsewhere. Map 4 indicates the locations of critical and wintering habitat for woodland caribou. Construction and clearing activity in these ranges will increase stress on the animals and lead to even lower Reed Lake numbers because only a small portion of its winter range is affected by the FPR, and calving areas are farther away, yet the FPR, as well as the Wuskwatim line, runs right by it, and together will result in a larger area of young growth to develop in time that will attract moose and their wolf predators.

The Supplemental Report also notes that only 3.43% of calving habitat[32] in the Wabowden range will be affected (2.99% for The Bog), but these statistics need to be put in context of the recruitment rate for that herd. They cannot afford to lose any such habitat!

Note: the list of responses to questions received from Manitoba Hydro on August 15, 2012, indicated (CEC/MH-VI-311.P.274) that the FPR "avoids

[32] See Supplemental Report, p. 31

known calving areas and potential critical caribou calving habitat". This obvious contradiction needs to be corrected.

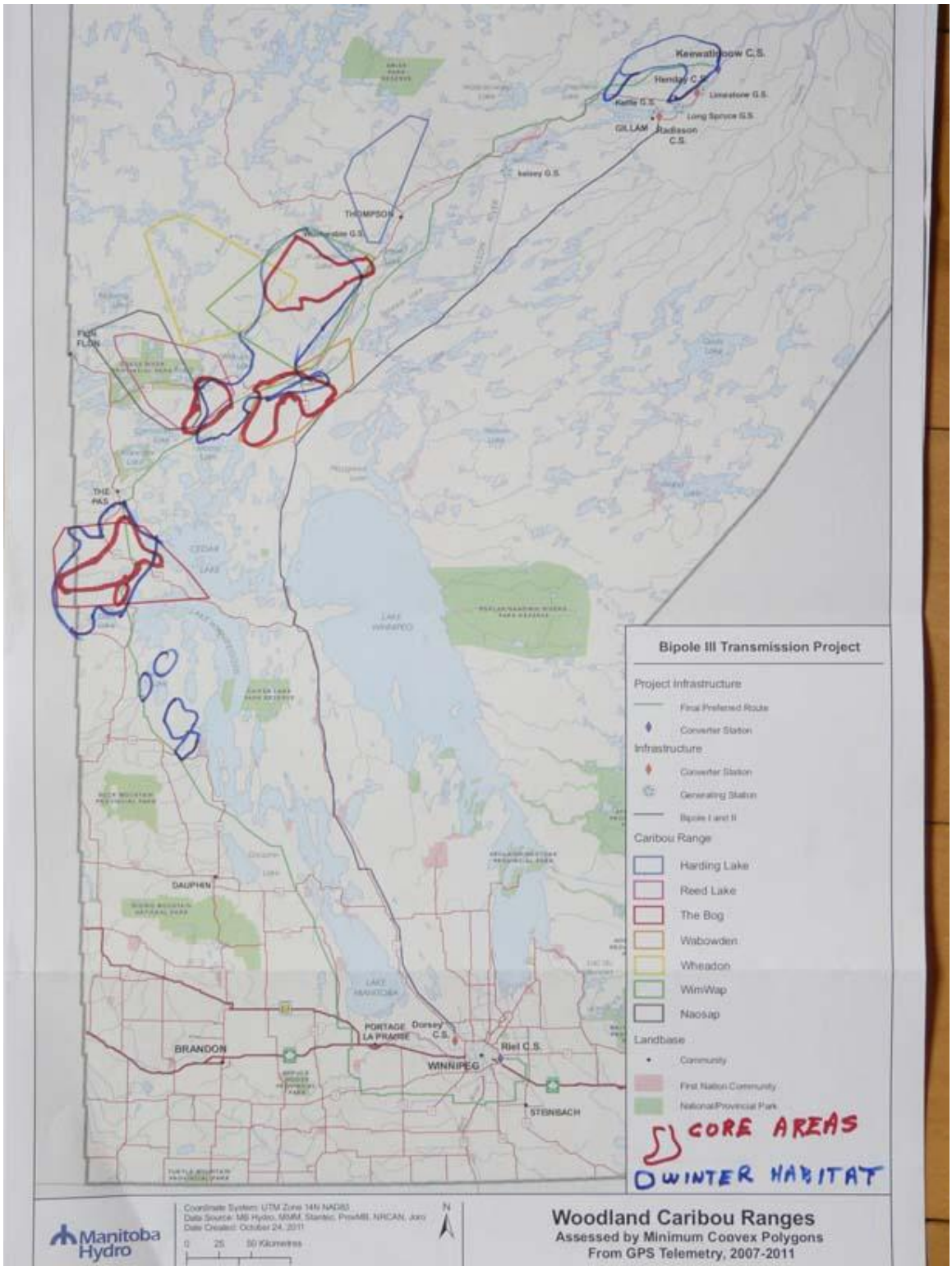
It is noted, however, that the latest proposed modification to the FPR, the line has been moved away from segmenting key winter habitat for the Wabowden herd, reducing the impact accordingly. Again, however, the lateness of this modification illustrates the problem of rushing the process without complete consideration of all factors. For example, are any leks located within the new proposed route? In other words, every decision becomes another variable, and a full review is required for every change.

The concluding paragraph of the Supplemental Report (p.88) states the following (bolding added):

> "*As described in Chapter 8 of the Bipole III Transmission Project EIS, predicted effects of the Project on boreal woodland caribou evaluation ranges intersected by the FPR may include increased mortality from predation, decreased reproductive capacity (i.e., increased disturbance = lower Lambda rates), direct and sensory loss of habitat, and habitat fragmentation. The results of monitoring and data analysis all support the conclusion that the residual effects of the HVdc transmission line on boreal woodland caribou evaluation ranges,* ***after successful implementation of the mitigation measures outlined in the EIS, are expected to be negative in direction, small in magnitude, short-term (construction) and medium-term (operation) in duration, regular to continuous in frequency and reversible after Project decommissioning, and therefore not significant.*** *Similarly, the predicted effects and cumulative effects described in the Bipole III Transmission Project EIS for coastal caribou also remain consistent based on the new analyses presented in this supplemental report".*

To go from the findings to this conclusion is a leap of faith. It assumes that the caribou still exist, then it assumes that extracting the wires and towers will not create any disturbance. The reality is that the fecundity rate and recruitment rate are so low now that there is a much greater likelihood that the drop in vitality of the woodland caribou herds will have been so great (assuming the caribou even exist by the time of decommissioning), that reversing the trend will not be possible.

This is the very real risk that must be given careful attention.


Bipole III Transmission Project
Project Infrastructure
Final Preferred Route
Converter Station
Infrastructure
Converter Station
Generating Station
Bipole I and II
Caribou Range
Harding Lake
Reed Lake
The Bog
Wabowden
Wheadon
WimWap
Naosap
Landbase
Community
First Nation Community
National/Provincial Park
CORE AREAS
WINTER HABITAT
Manitoba Hydro
Woodland Caribou Ranges
Assessed by Minimum Coovex Polygons
From GPS Telemetry, 2007-2011
BRANDON
PORTAGE LA PRAIRIE
Dorsey C.S.
Riel C.S.
WINNIPEG
STEINBACH
DAUPHIN
THE PAS
THOMPSON
GILLAM
Radisson C.S.
Kelsey G.S.
Long Spruce G.S.
Limestone G.S.

Map 4

Winter and key habitat areas noted in the EIS superimposed on the MH Caribou Range map

3.5 Other Threats

Woodland caribou face considerable difficulties from other sources. Global climate change may result in more forest fires that could seriously affect habitat. It could also increase the possibility of encroachment into their habitat by deer, which carry a parasite the caribou cannot fight. Although deer to the south of The Bog currently may not carry the brainworm, it does not follow that in future they never will. The chance of the infection spreading amongst existing deer farther south cannot be discounted.

Increased hunting pressure (legal or otherwise) may follow easier access to their areas and predation by wolves following moose (covered in the following section) and regrowth areas could decrease their numbers. The cumulative effects of roads, mining and forestry also impact the caribou. All such activities need clear regulations and monitoring, but the fact that these other disturbances exist is not justification to approve a transmission line through key habitat that is known to have negative effects on a threatened species.

To assure even a chance of avoiding extirpation of the woodland caribou, the route cannot be allowed to cross known critical wintering range of existing herds. Other threats to their existence are real, but should not be used as an excuse to build the line through their territory, simply because they may not survive anyway. Other initiatives are ongoing to address these issues.

3.6 Monitoring is not mitigation!

Monitoring programs are included in the EIS to track future changes in caribou numbers and herd health. However, fragile woodland caribou herds are already threatened, and results from the monitoring may very well come too late to make any difference other than to record their extirpation. If the problem turns out to be fragmentation and its effects on regrowth, what kind of mitigation can be taken after the corridor is in place? Complete regrowth in that area would take many decades, and in the meantime would provide younger browse for other animals that attract wolves. Thus, monitoring should be seen as a recording technique only, and it needs to be recognized that if problems occur, no amount of monitoring will help the caribou once their habitat is seriously impacted and their numbers diminished.

Thus, monitoring may be of interest to biologists and to MH, but of little value to the caribou after the fact.

3.7 Moose, wolves and black bears[33]

These three different animals are discussed together because they have an interesting impact on caribou.

Moose share some similar general habitat to caribou, but not the same food, so they do not compete in that respect. What they do, inadvertently, is bring wolves along with them.

As moose expand their range, they share woodland caribou areas. Although moose are the main target for wolves, the existence of the smaller caribou in the same area makes these caribou equally targets for the wolves. The effect, then, is that the caribou are put at risk by the moose.

Wolves: Healthy wolf packs operate throughout the north and mid-north areas. It is important to recognize their role in wildlife balance. They generally attack weaker animals, including sick or older animals. The result is that the herd health in a perhaps perverse way is maintained. Young and elderly moose are also prey, but the fecundity of moose is sufficient for this not to represent as great a problem for the overall population. Hunting pressure, legal or otherwise, is a different matter, and may explain why some moose populations are declining, and others moving into caribou territory in greater numbers. Low fecundity for caribou substantially reduces their capacity to rebound in numbers.

Wolf/caribou interrelationships: This relationship is noted, not to suggest that wolves should be reduced in numbers, but to illustrate the intricate mix of species and how their activities affect each other. Efforts to "manage" wildlife by species alone, specifically, reduction of predators by bounties, extra hunting, etc., have not had the expected results.[34]

Black bears: Black bears are also known as occasional predators of caribou, particularly calves. These bears are found along the entire route of the line outside of the agricultural areas, and occasionally even within them.

Hunting: As hunters seeking moose, either for food or sport, enter areas containing caribou, the risk to caribou increases. Roads or trails made to facilitate line construction and associated facilities will improve access to such areas. No matter how diligent the attempts to foil such access, determined hunters will find a way to enter the areas left susceptible to caribou hunting. Regular monitoring may locate breaches in the barriers, but then it will be too late. Fines for poaching, assigned after the fact, cannot bring back a poached animal, even though it may be a threatened species.

[33] See EIS and Supplemental Report

[34] For examples of what not to do, see Alston Chase, "Playing God in Yellowstone: The Destruction of America's First National Park", 1986.

The re-routing of the transmission line to avoid caribou habitat is the only viable approach that gives any assurance the herds can survive.

Chapter 4: Severe Weather Security Threat

4.0 Introduction

Two Bipole transmission lines running more or less in the same right-of-way currently link the Nelson River generating stations with Winnipeg.

The location of the proposed third Bipole line is under review, and Manitoba Hydro (MH) has determined that its location is to be separated from the others by at least 40 km to provide a greater degree of security, particularly from severe weather events. A severe storm such as the one that impacted the southern segment of both lines in September 1996 put them out of service while a costly repair was carried out. Given this experience, for security reasons, MH has established criteria requiring this new line to be preferably not less than 40 km from the other two.

Already, this stated criterion has been compromised by MH. In order to meet demands from the mining sector, about 110 km of the 440 km distance from the Henday Converter Station to south of Wekusko Lake fall inside the 40-km security zone- 25% of that route segment.

It raises the question about how important the setback of 40 km really is. In other words, do long term weather predictions for northern Manitoba rule out major weather events, or is MH prepared to put mining interests (and by extrapolation potentially others) ahead of the security of power transmission and supply for Manitoba ratepayers?

4.1 Background

People living in southern parts of Manitoba are not strangers to severe weather events. Heavy rains and thunderstorms are common in summer (as they are, incidentally, in the north, where they are responsible for lightning strikes that start forest fires). Strong winds occur throughout the province from time to time, and icing can be a factor for transmission lines in winter.

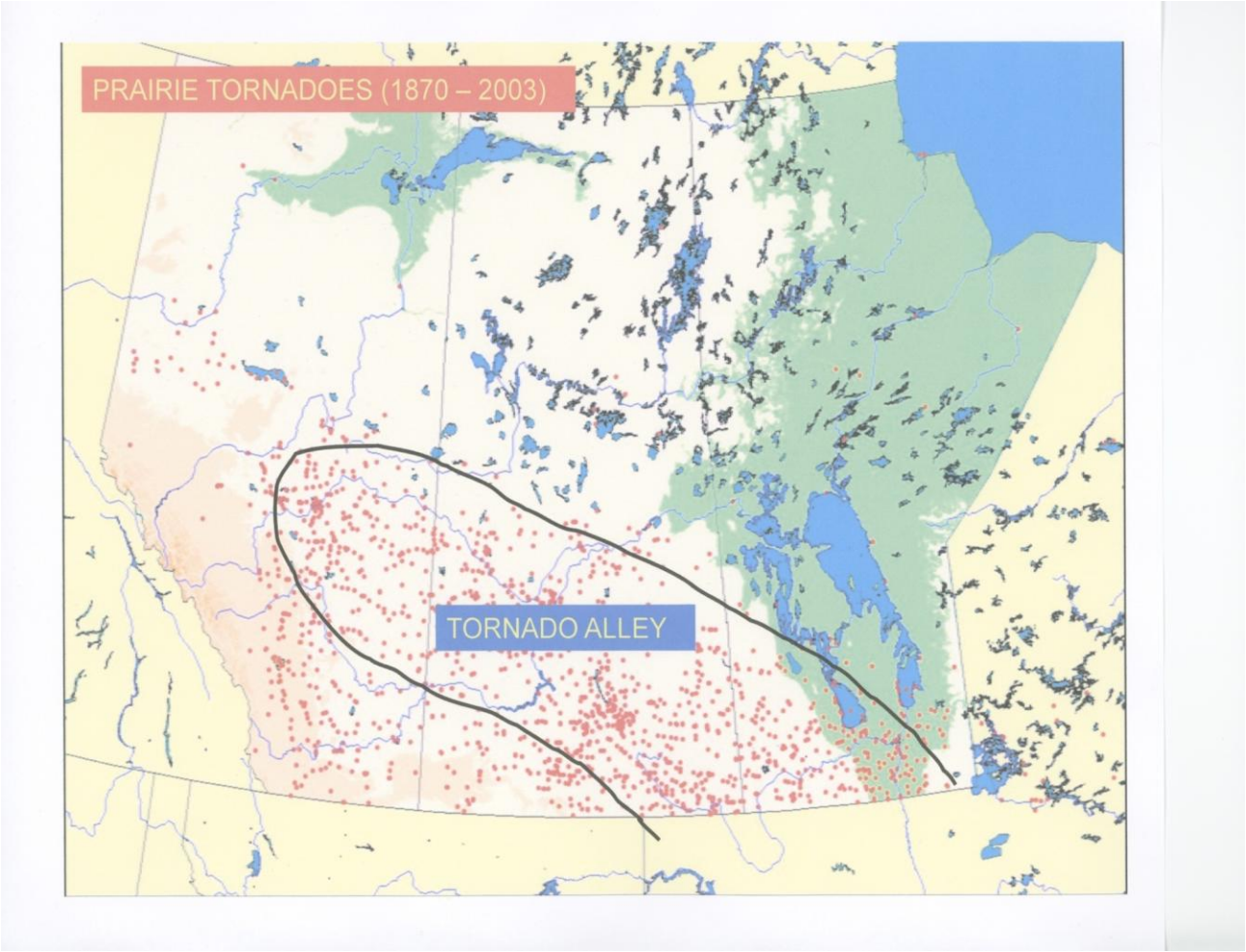
There is always risk associated with long-term weather projections, but to imagine a summer devoid of heavy storms, including some tornadoes, is difficult. Many parts of southern Manitoba, particularly the agricultural areas that run from the southeast to the northwest areas that are generally suited to arable farming, experience numerous severe weather events throughout the normal summer storm season.

In recent years, the intensity, if not the frequency, of many storms has increased throughout the Great Plains[35]. Manitoba has not escaped this apparent climate

[35] EPA website, Great Plains Impacts and Adaptation.

shift, which has also resulted in hotter summers and heavier spring rains with accompanying floods in some locations.

Map 5 below illustrates Manitoba's severe weather risk region by plotting the location of tornadoes in the Prairies over a 133-year period.[36]



Map 5

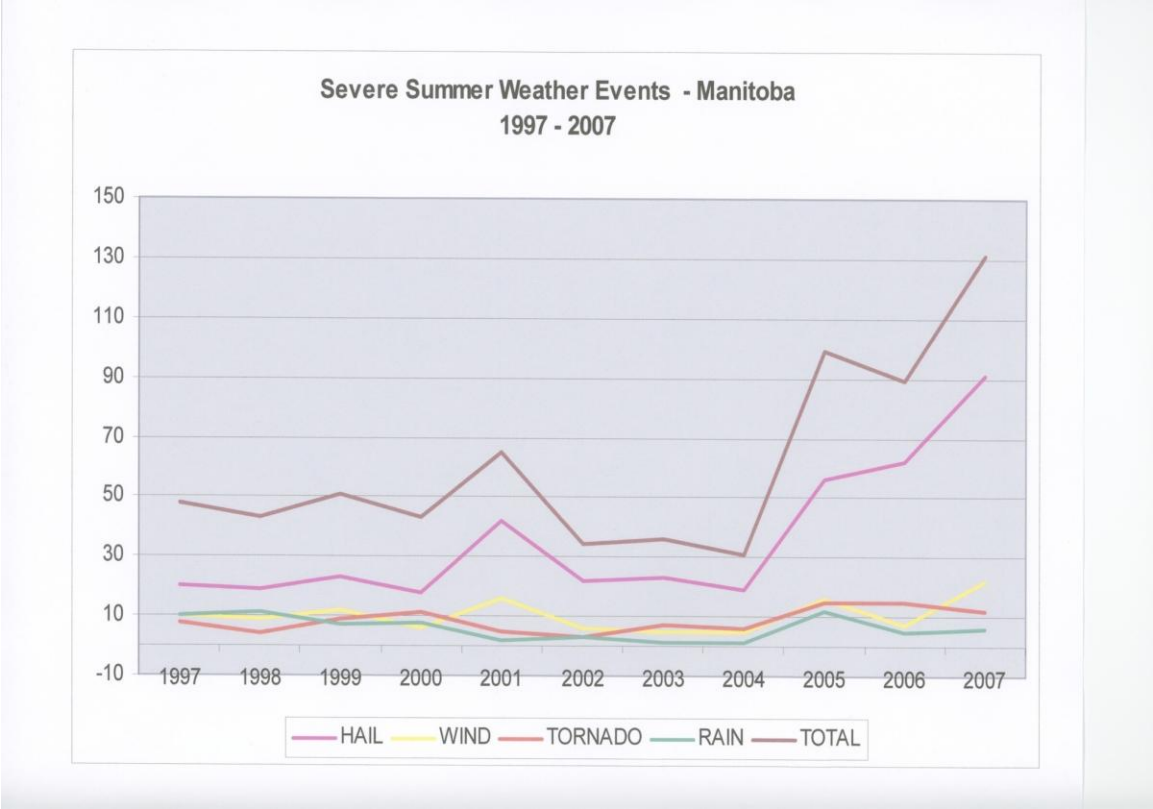
It is clear from this map that there is high risk of severe weather events, including tornadoes, along the proposed route from the Swan River area all the way to Winnipeg. The west side of Lake Manitoba has been affected, as has the agricultural lands to the south, to and beyond Winnipeg. The F5 tornado that touched down at Elie in 2007, would have demolished a section of Bipole III, had it been in the way of that storm. The MH statement that the new towers are much stronger than those of the earlier lines, although true, would not prevent

[36] Map developed by Rob Paola, Meteorologist, Prairie and Storm Prediction Centre, Winnipeg

damage from a storm of that intensity. Under projected conditions of climate change, storms have the potential to become more frequent if not more severe.

Secure mitigation would involve putting the line underground through the tornado-prone region. If that was done, significant repair costs would easily offset any increase in construction expenses, and a more direct route could be taken from west of Portage la Prairie to Winnipeg, concurrently reducing the cost of the line and of line losses.

A further illustration of severe weather in Manitoba can be seen on the chart below[37].



Although the lines in the above chart for recent years show a rise in hail and tornado events, data for the years since 2007 do not show any particular trend. Nonetheless, Manitoba will continue to experience tornadoes and other severe weather events, particularly in the southern agricultural region.

Locating a major transmission line through this area for security purposes does little to reduce risk unless it is underground or relocated to a more acceptable route.

[37] Rob Paola, Meteorologist, Prairie and Arctic Storm Prediction Centre, Winnipeg

Underground costs are approximately between two and three times as much as above ground. The lower of these costs are the most recent from experience with underground lines as described at the IEEE Conference in San Diego this past July[38]. In that respect, recent responses to questions have elicited information from MH that it has been using costs of five or six times the overhead line costs: these appear to be outdated, unless they are assuming it has to go underground the entire route. Europe is effectively using this technique, sometimes combined with underwater, to a greater extent, including for transmission from "massive green energy" sources and between countries[39]. The new "Champlain Hudson" project will transmit up to 1,000 MW of wind and hydro power from the Canadian border to New York City. The DC cable transmitting this power will be under waterways or buried beside rail routes to minimize impact[40].

Given the reduction in distance possible for the agricultural area affected by the line, the cost differential between above ground and underground would appear much less than asserted by MH. The assumption is that going underground in soil devoid of stones or subsurface rock would lead to costs at the low end of the cost estimate range. Combined with the high probability of damage from severe weather along that particular portion of the proposed route, there could be a real cost savings associated with the shorter underground line. Moreover, bird collisions with the wires over that distance would be eliminated.

There would be no particular need to cross agricultural fields, as the underground lines could go within or immediately adjacent to road allowances, perhaps even along the right-of-way of both the Yellowhead Highway (PTH 16) and the Trans Canada Highway or, if needed, the route could be modified to ensure no pipelines needed to be crossed. The lack of other underground installations through this area would keep construction costs to a minimum, and horizontal drilling makes it possible to go under other infrastructure such as the Portage Diversion or the Trans Canada Highway etc. without difficulty.

4.2 Conclusion

Severe weather can be projected to have a real impact on the proposed Bipole III line as now planned. This threat raises the question of reliability of the line to provide dependable and consistent electrical power to MH customers.

Therefore, Bipole III should and can be located away from areas at risk of severe weather events or, if there is no other option, the prospect of going underground through the storm-prone agricultural area should be explored. This point is also

[38] Dennis Woodford, personal communication

[39] Europacable, "An Introduction to High Voltage Direct Current (HVDC) Underground Cables", Brussels, 10 October, 2011

[40] http://www.chpexpress.com

covered in the section on options that follow the analysis of the remaining topics (particularly agriculture).

Chapter 5: Agriculture

5.0 Introduction

The Environmental Impact Statement (EIS) for the proposed Bipole III transmission line estimates that it will pass through some 586 km of lands within the agricultural area of Manitoba, south of Mafeking. Of this, about half is cultivated (282 km). With a few exceptions, the great majority of these cultivated areas are south of the Yellowhead Highway (PTH 16), east of Gladstone. However, areas of good arable land exist through much of the area to the north of the Yellowhead, especially in the Swan River region.

Line construction and operation impacts differ depending on the type of land use, and this in turn is governed by the nature of the soil and its capability for varying types of agriculture. Native pasture and wild hay, and to a degree tame forage crops, can be more readily managed with transmission towers and lines within the fields. This is in large part because haying machinery is much narrower than is the case with equipment for annual crops. Indeed, there are impacts on these lands, but of a very different nature than intensively cropped areas.

The cultivated lands are most seriously affected. The EIS used a combination of data from Soil Surveys, Canada Land Inventory (CLI), and current use to arrive at certain conclusions. These data provide a solid basis for assessing impacts. However, the conclusions reached in the Technical Report suggest far lower impact than, in all likelihood, will actually occur over the course of the construction and long term operation of the line.

5.1 Preferred route

According to the Agricultural Technical Report prepared by J & V Nielsen & Associates Ltd.:

"The preferred line will require 3 to 4 towers per mile. The line will necessitate a new right-of- way to be developed, of which 231 km (Table 17) will be in field away from road allowances or field edges, 104 km will be on the 1⁄2 mile and 251 km will be on the diagonal (crossing lands with limited agricultural use or agricultural potential). There will be 244 km of field severance or approximately 42% of the line will cause a field severance. The agricultural portion of the transmission line is 586.5 km long. Baseline information about the line includes the percentage cultivated and tame hay lands at 48% or 282 km. The percentage pasture, native grass lands is 17% or 98.5 km and the percentage trees, water, marsh lands is 32.4% or 191 km. None of the route is on the road allowance or drainage ditch edge."[41]

[41] Bipole III EIS, Agriculture Technical Report, p. 50-51 (italics added)

5.2 Impacts on agriculture are unique

When considering the impacts of Bipole III on birds, ungulates, etc., it largely involves assessing how the construction and operation of the line would affect a rather predictable annual pattern. For example, birds go south in the fall, north in spring, nest, feed, some stage and feed, and the annual cycle goes on. Ungulates have their annual patterns too. They have wintering areas, calving areas and summer grazing areas. Both forms of wildlife have predators and the proposed line impacts both as they go about their annual activity patterns.

In the case of agriculture, a significant variable makes such patterns very different. Agriculture itself is not a living thing: it is an activity carried out by people that use land and space to produce living things that become food and fibre. In the course of this activity, inputs to the business of agriculture are purchased from third parties. These include fertilizer, seed, feed, machinery and parts, chemicals for weed and insect control. Purchases also include services including repair technicians, veterinarians, accountants, technical services including aerial spraying and an array of electricians, plumbers, carpenters and mechanics and many others. Most importantly, agriculture is a business that applies an ever-changing array of technologies to put the farmer in a position to compete in an international market.

5.3 Environmental Impact Statement and Agriculture Technical Report conclusions

As noted in the introduction, there are agricultural activities along many parts of the proposed route from Mafeking south to Winnipeg. In addition, some agriculture is carried out near The Pas.

The EIS on agriculture covers basic factors, and identifies the key lands impacted as well as the nature of agriculture operations on these lands. The description of where the different lands are along the route will be used a basic starting point for consideration.

Essentially, there are two types of agriculture affected, for purposes of line impact considerations. These are arable on the one hand and largely non-arable operations on the other. The latter take place (on lower capability lands) to a very high degree to the north of the Gladstone area (the Yellowhead Highway), and the former (on high capability lands) to the south and east. Within these two general distinctions, there are additional breakdowns, but the two set the stage for a different approach to analysis, mitigation and compensation.

The problem, however, arises for the better soils suited to cultivation. In its approach to compensation on these lands, MH does not use a true present value analysis, even though it would have limitations for these particular areas. MH

essentially uses a crude market-value calculation of the land alone, ignoring how that has changed and will change as a function of technology and global food demand. Land is only one component of the agricultural industry, but an essential one. Without land as the basis for crop production, the opportunity to add capital, technology and management skills to produce food and fibre does not exist. Therefore, every acre taken out of production, and every accessibility issue and every inconvenience added to the mix that frustrates production on adjacent lands and increases costs, must be factored into the equation. Thus, the opportunity costs associated with this issue lead to concern that using the land and impact corridor for power transmission is a misallocation of resources. The value, now and over future years, is highest for agriculture when all relevant factors are taken together.

5.3.1 Agriculture on lower capability lands

Agriculture on lower quality lands (categories 1 to 3 in the Agricultural Technical Report) usually involves using the lands for native pasture and hay, sometimes special seeds may be harvested (e.g. alfalfa from narrow fields surrounded by bush where the leafcutter bees live that fertilize the alfalfa). In some cases, limited land areas may be suited to some cultivation, and tame hay or oats or other feed may be grown.

There are lands of higher capability to the north of the Yellowhead, especially for a part of the Swan River section. Therefore, the impact of the line cannot be ignored in this area, even though the land currently, on the whole, is not as arable.

However, this report will not cover farming in these types of soil capability areas.

5.3.2 Farming on arable agricultural lands

Agriculture on arable agricultural soils (categories 4 to 7 in the Technical Report) is a very different matter, as these are large contiguous areas well suited (due to a combination of soil type, climate and topography) to growing a wide variety of crops. These crops range from grain crops such as wheat (spring and winter), barley, rye, and oats to oil crops (flax, canola, sunflower and soybeans) to row crops including potatoes and corn. Other special crops are also grown in these areas, and as new varieties of crops are developed in the future, they will be added to this list, including those currently grown elsewhere because of climatic needs.

Irrigation is now used in some cases where soil conditions and the availability of water make it possible, and there remain many other areas where irrigation could be practical in the future. The heavy clay soils in the lower Red River Valley are less suited but still open to irrigation, and

much of those areas to the south and west have potential, with some already developed.

The area to the south of Winnipeg has evolved somewhat differently, with large hog, poultry, dairy and other similar intensive operations locating close to market. This also reflects on the evolution from original operations over time. Rural residential developments have also evolved near the City.

All the literature cited in the Report noted there was an additional cost to the farmer if towers were located within a field and had to be avoided. This decreases efficiency by the extra turning needed, overlap of seed and fertilizer, and extra spraying costs because aircraft cannot operate safely close to the lines. There is the additional problem with aerial spraying in that, especially in the heavy clay soils near Winnipeg, soil moisture often prevents ground-based spraying, and for many crops more than one application per season is needed. Especially where soil moisture is present, crop damage of some magnitude can occur. Towers within fields could impact tile drainage systems, and frustrate injection of liquid manure by equipment trailing a flexible hose carrying the manure. This latter is an operation strongly recommended by the Manitoba Government to prevent nutrients from entering streams.

Although MH has routed the Bipole III line in a manner that attempts to avoid, except for a segment in the Swan River area, most of the best farming areas from the north as far south as the Yellowhead, (at the expense of major impacts on migratory birds), the same cannot be said for the agricultural land further south.

Once down to the Yellowhead, MH ran out of both avoidance options and imagination: the rest of the lands, with the exception of the Almasippi soils near St. Claude, right to Winnipeg are high capability agricultural lands. Mitigation efforts need to consider inconvenience and inefficiencies for farmers in the high capability soils areas: the lands of highest value to agriculture. Alternatives to compensation, such as avoidance deserve attention. Compensation is the only an option of last resort for this major Manitoba industry. Recognition of the complexity, importance and pace of technological change implies complete revision to avoidance options, with mitigation the prime alternative.

Map 6 illustrates the extent of agricultural lands, both fully arable and those generally less suited to large arable operations. The latter are, however, well suited to livestock and mixed farming.

General map of route through agriculture areas: note most affected are in red

Map 6

5.3.3 Roads and infrastructure

MH set up some additional location criteria with regard to roads and other infrastructure, to avoid damage impacts from vehicle collisions. The line is not permitted to be adjacent to roads, and MH has arbitrarily chosen a setback south of the Yellowhead of 42 metres rather than the 33 metres to be used north of the Yellowhead. This setback ignores the maneuvering of large machinery currently in use. It does not, however, mitigate the effects on decreased efficiency noted earlier. Nor, does it take into account the progressive trends in increasing size and complexity of machinery.

An additional concern by MH was that, if the route were within a road allowance, one of the lines could be near or almost above the road itself, risking contact with light or sign apparatus. This seems a weak argument considering the impact of a line within farm fields. Alternatively, MH would permit the line to run on the half mile (104 km). Although efforts were made to avoid diagonal field crossings, it was not achieved for considerable lengths (251 km of the 586, mostly in the lower soil capability areas).

A**ny incursion of the transmission line into cropped fields represents a cost**. It is not clear that options to avoid damage to towers on road allowances have been fully investigated. Obviously, there is a safety factor there for motorists, but they drive by office buildings in cities at highway speed every day, and barriers prevent damage. Why is it so difficult to design appropriate barriers to achieve their power transmission needs without undue impact on drivers? **Barriers protect drivers from going into rivers or rock cliffs, why not protect towers?** After all, there are only 3 or 4 per mile. The lack of imagination boggles the mind. Or, is it simply cheaper to make the farmers avoid the towers at considerable loss of efficiency and increased safety risk than to place protection devices along roads?

5.3.4 Irrigation system issues

The Agricultural Technical Report itself takes note of serious problems in the southern area:

> *"The clay soils turn to sandy soils at Carman to Elm Creek. The sandy soils have irrigation potential and quarter-section irrigation pivots are common for the production of potatoes and some other crops. The sandy soil treed area contains numerous smaller farms and many rural residences. These are found from Carman to Elm Creek, St. Claude, Rathwell in the R.M. of Grey, and to the Assiniboine River. All types of*

crops are produced from potatoes, corn, wheat, oats, barley, canola, sunflowers, alfalfa, peas and other pulse crops. Mixed farming is common with the utilization of tame pasture and alfalfa hay as well as native grazing and haying in sandy dunned (sic) soil areas. Active pivot irrigations systems exist north of Carman and west of St. Claude.

The sands with irrigation potential continue across the Assiniboine River and north past Highway #1 to Gladstone in the R.M. of Westbourne. Active pivot irrigation systems are found on both sides of the Assiniboine River on the lower side of the Arden Ridge, as well as south and north of Bagot, MacGregor and Austin. Several new irrigation pivots are found south of the community of Beaver in the R.M. of North Norfolk. North of Beaver the soils are more clay based and therefore they have less potential for irrigation."[42]

It was noted that the transmission line and towers could impact irrigation systems. Towers prevent pivot irrigation systems from turning if they are within the field, and the line may affect the irrigation system if water sprayed hits a conducting wire. Moving or assembling pipes could result in contact with conducting wires. **Consequently, the line was to be located away from existing irrigation systems. This helps those farmers now irrigating, but is of no value to those who may choose to install irrigation in the future. The line clearly should avoid all lands with irrigation capability.** The impact of irrigated lands on productivity is considerable, and needs to be taken into account in location of the transmission line.

MH's position on irrigation systems is set out in the Agricultural Technical Report.[43] It clearly implies that the transmission line takes priority, once

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[42] Bipole III Agriculture Technical Report, p.18 (italics added)

[43] *"Irrigation systems operating in proximity of energized transmission lines pose a number of hazards to the personnel on the ground and their equipment as well as to Manitoba Hydro due to:*

- *Electric flashovers caused by water spray contacting energized conductors;*

- *Electric flashovers during installation or maintenance of the irrigation equipment and contacting energized conductors; and*

- *Line outages causing disturbance to Manitoba Hydro system. Safe co-existence of both transmission lines and irrigation systems is possible providing the following safety measures are taken:*

- *Safe separation between irrigation pivot and energized conductors is maintained;*

- *Safe spray irrigation clearances to energized conductors are maintained; and*

- *Safe operating procedures are followed to install and maintain the irrigation system. It is*

the line is built, if no foresight is used in avoiding land with irrigation or irrigation potential.

5.4 The magnitude of Manitoba's agricultural industry is significant

Agriculture is a complex industry with a very high capital to labour ratio. It is also one of Manitoba's largest industries, having directly generated about 4.5% of Manitoba's GDP annually[44]. This number increases to nearly 12% when all spinoffs from the agri-food sector are taken into account. The following page from the "State of Agriculture in Manitoba", published by Manitoba Industry Intelligence, MAFRI, illustrates the point that the industry is a critical element of Manitoba's economy.

CONTRIBUTION OF AGRICULTURE

"In Manitoba, the agricultural industry is a key driver of productivity and prosperity. The diversity of agriculture in the province plays an important role in maintaining economic strength and generating socio-economic stability.

Agriculture contributes to Manitoba's Gross Domestic Product (GDP) through net profits and incomes including wages, depreciation and investment income. Improvements in GDP can be attributed to improved crop prices and production. Historically, agriculture's direct and indirect contribution to GDP ranges between 4.4% and 4.8%.

Food processing represents close to one-quarter of the total manufacturing output and with approximately $4 billion of foods processed, contributes an additional 2 to 4% to provincial GDP. Agriculture supports growth and employment in the rural economy by providing a market for services needed by the industry.

Agriculture-connected industries, including food and beverage processing,

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impossible to provide a one-stop-shop solution to all irrigation system issues. Each case will have to be dealt with individually to assess its physical size and operating mode and to determine if the location of the Bipole III corridor and its towers will interfere with safe irrigation. If conflict occurs the following mitigation measures should be considered:

- *Relocate the Bipole III centre line and tower locations;*
- *Change irrigation operation scheme (i.e., adjustments of spray nozzles, change in overall geometry); and*
- *Relocate irrigation system."*[43]

[44] Manitoba Agriculture and Food and Rural Initiatives, (MAFRI) "State of Agriculture in Manitoba", undated

supply inputs to agriculture, as well as wholesale, retail and other service sector components which supply services to farmers and other agriculture-related workers. When agri-food's indirect contribution to the GDP is added to its direct contribution, an estimated 9% of Manitoba's GDP is attributed to agriculture in 2011. It is estimated that when tierciary (sic) level contributions are included, the total impact on GDP may be closer to 12%."

5.5 The pace of technological change

The pace of change has a significant bearing on how the impacts are calculated and how compensation, if needed, must be considered. The old practice of projecting current productivity into the future, applying a discount rate and arriving at a present value to determine fair compensation is no longer a viable or acceptable practice. Imagine the technological change that will take place over the next 60 years: the projected life of the line. How can the effect of 60 years of change be estimated?

Considerable work on the pace of change has been carried out by Ray Kurzweil on what he refers to as "accelerating intelligence"[45] Following years of work tracking changes over the past decades and centuries, he has concluded that at some point the rate of change for a given process or activity becomes exponential. Clearly, the rate of change in agriculture in recent years has taken off, especially if one thinks back a century ago when farming was done with horses, a few small capacity machines and considerable labour. Agriculture today is a very modern business based on the latest scientific innovations and business management practices. These changes and the pace at which they are occurring result from the combined evolution of what, on the surface, seems to be a disjointed incremental flow of new ideas and consequent technological progress emanating concurrently from myriad scientific efforts, but which, taken together, make the future of agriculture predictably much different as time passes.

The farmers of today are productivity managers operating a complex business enterprise that employs capital with technology to produce huge amounts of food with limited labour inputs. The sea change in agriculture is due in no small way to the resourcefulness and the acumen of farmers and of the industries that support farming. Forms of technology utilized by farmers today are vastly different than those used 60 years ago, and those 60 years into the future will be orders of magnitude beyond current experience.

[45] See @Kurzweil on Accelerating Intelligence.

Tractors today are huge by 1950 standards, and electronics do today what a lever or trip cord used to do. Monitoring is electronic: no more relying on a rag attached to a pulley on the far side of the combine to tell the operator it's still turning! Cabs have replaced the "heat houser" and come complete with not just stereo and air conditioning, but with a slate of electronic monitors that tell the operator exactly what is happening on all fronts. Many activities that used to require a special talent to perform have been replaced with scientific technologies requiring very different skills. GPS is one example of these new technologies, and its use and scope increases as the years go by. Machinery is now so large and wide (50 to 80 feet, some even up to 130 feet) that previous mechanisms to help the operator avoid overlaps or misses can no longer cope. Everything needed for the seeding operation can now take place in one pass. Tied into a GPS system is the option of using GIS technology to overlay the soils variations of the field so that seed or fertilizer applications will be adjusted according to soil fertility and type.

Breakthroughs in genetics represent another example of a rapidly changing field that is also impacting agriculture. Who would have thought, 60 years ago, that eurucic acid could be bred out of rapeseed, making it a food product rather than just a lubricant, paving the way for canola which, in 2009, produced sales that reached almost $1.3 billion? Seeds for varieties of crops are now tailor-made for specific purposes, and have been developed with certain features that include modifications to eliminate undesirable characteristics. Many other seeds now have features that improve yield, prevent diseases or improve quality. An entire team of specialists from plant breeders and nutritionists to engineers and economists are at work seeking ways to produce more and do it more efficiently.

The above illustrates how differently agriculture must be considered when it comes to assessing the impacts of Bipole III. It is a major industry, with changes occurring as part of the natural industry evolution. The pace of change in agriculture, although not as fast as that of electronic devices such as smart phones, is nonetheless fascinating to observe. Electronic developments play a major role in how this pace is continuously advancing, and has been a key player in the modernization of agriculture into a progressive and science-based industry.

In light of this, assessing the impacts of the Bipole III line construction and operations becomes a more complex matter than might have been contemplated initially, and is certainly more complex than is reflected in the EIS for Bipole III.

5.6 Compensation

MH has developed a well-intentioned and comprehensive policy for compensating farmers for the negative impacts of the proposed transmission line. This approach has had merit in the past, and the idea that, if mitigation fails, compensation should be available to those impacted is valid in most circumstances.

> *"Mitigation cannot eliminate all of the effects of the presence of the transmission line on cultivated or uncultivated agricultural land. Therefore, easement agreements will include provisions to compensate landowners for the physical impacts associated with the transmission line. Manitoba Hydro compensates landowners by acquiring an easement for the right-of-way and by payment for structure placement on agricultural land. For towers structures the right-of-way easement is 66.0 meters wide. Compensation for all of the lands within the easement is calculated at 75% of market value.[46] Normally land under the transmission line continues to be farmed.*
>
> *Payments are a onetime lump sum to compensate for all impacts of the structure for the lifetime of the line. With the assistance of Manitoba Agriculture, Manitoba Hydro establishes a payment rate per tower for the year it is placed on the farmer's land. The annual compensation rate is calculated and then capitalized into a onetime payment per tower. The main considerations are:*
>
> - *Lost income from land taken out of production;*
> - *Reduced yields around the structure;*
> - *Additional time required to work around the structure;*
> - *Extra cost of double application of seed, fertilizer and chemicals; and*
> - *Weed control around the structure."*[47]

Beyond the difficulty in projecting the impacts of technological change over the longer term, taking this the next step to develop the value today of a flow of losses into the future provides an unusual challenge. The state of the global economy suggests that choosing an appropriate discount rate for present value calculations would be difficult. On the one hand, interest rates, which are often used for such calculations, may be low in terms of the cost to the Government of Manitoba, but risks and uncertainties are having

[46] Now 150% of market value

[47] EIS Agriculture Technical Report, pp. 65-66

interesting consequences in Europe, and on local governments in the US where overspending during times of economic decline has become a serious concern. Given the concern about markets for new power generation contemplated in Manitoba, is there a chance, that as the guarantor of MH loans, Manitoba could be putting its own credit rating at risk? Regardless, making the assumption that a particular discount rate can be valid over a greater-than-60 year period carries high risk of error. It rewards a current farmer for future revenue lost by someone other than the person who could be the farmer 40 or more years into the future.

The problem, however, is even greater, as MH does not use a true present value analysis, even though it has limitations as noted above for this particular case. MH uses only a crude valuation calculation of the land alone, ignoring how that has changed and will change as a function of technology and global food demand. Land is only one component of the inputs to the agricultural industry, but an essential one. Without land as the basis for crop production, the opportunity to add capital, technology and management skills does not exist. Therefore, every acre taken out of production and every accessibility issue and inconvenience added to the mix that frustrates production on adjacent lands and increases costs must be factored into the equation. Thus, the opportunity costs associated with this issue lead to concern that using only the value of the land today, as the EIS does, understates the impact of the corridor on farming. The value, now and over future years, is highest for agriculture when all relevant factors are taken together.

A once-only payment to farmers to compensate them for their long-term losses is both unfair and, given the pace of technological change, virtually impossible to calculate in a manner that is fair to all sides. Nor, does it address the fact that impacts will still be felt long after the current farmer is no longer in the business: his/her successor will still be affected, and the assumption that the difference in productivity is taken into account through the price paid for the land is speculative, and only of value to MH. Farmers receive income annually, not in a one-time lump for the rest of their career. Their compensation should follow that course. It also has the benefit of compensating whomever the landowner is at the time. Over the life of the line, there could be several different landowners.

The conclusion reached from this analysis is that landowners should be compensated on the basis of the following:

- Compensation should be calculated on a present value basis for periods between five and ten years at a time, but <u>not</u> exceeding ten years, in order to correct for the impacts of technological change a decade at a time; and

- Compensation so determined should be disaggregated into annual payments made to farmers each year to more accurately represent the flow of income foregone due to the presence of the line, as well as having a more realistic impact on income tax.[48]

- Compensation based on the above should be managed with the involvement of a third party organization to ensure fair oversight of the process.

5.7 Concluding summary

There are serious impacts on agricultural operations from the construction and operation of Bipole III with the choice of the Final Preferred Route.

Routing

Some tinkering with siting along road allowances could help to a limited degree, but the best way to mitigate these impacts would be to select an entirely different route or structural approach that avoids the problem projected for cultivated lands.

One such option would be to place the line entirely underground for the section from the Yellowhead to the Riel Converter Station (or better yet La Verendrye). Assuming the highest costs would be incurred in areas of rock, and the lowest in reasonably dry soils with few if any stones, then line costs would be only double for the underground section. The actual length would be considerably shorter because proximity of an underground line to the existing bipoles and their converter station would have no bearing on reliability problems that could occur as a result of severe weather events. It could pass through lower-quality land to the north of Portage la Prairie and go directly to the north of Winnipeg and then southeast to the Riel site (or La Verendrye). The distance could be reduced substantially, and in addition to the construction savings, this shorter distance should also reduce line transmission losses, making it a viable option worthy of consideration.

Compensation

Appropriate compensation cannot readily be calculated with any degree of confidence for the entire useful life of the line, at least within the arable land area. The pace of change within the agricultural industry is too rapid to offer any means of calculating present value that will yield a reasonable estimate. This being the case, if the line, as a result of the final decision, actually

[48] Personal communications with CRA officials disclosed that a one time lump sum payment is subject to taxation in the year in which it is received.

crosses CLI land capability classes 1 to 3, (classes 4 to 7 as described by the categories used in the Agricultural Technical Report), **compensation should be paid in annual increments, with each payment determined from a maximum of ten-year present value estimations using the best information available at the time.** To do otherwise leaves an unfair advantage to MH, while penalizing future farmers by sidestepping line implications in the distant future. Annual payments more accurately reflect income foregone and tax implications to the landowner annually.

However, while this change in compensation policy would be an improvement over the proposed policy, it would be of no help to the migratory and resident birds affected by the lines farther north, nor would it help the caribou (a threatened species) and other ungulates and their predators.

Chapter 6: Economic, Greenhouse Gas and Climate Change Issues

6.1 Economic impacts

The economic impact assessment provided in the Technical Reports[49] takes information provided by MH and identifies direct and indirect economic benefits in terms of employment, labour income, GDP and tax revenue. The findings come from running the estimated expenditures and direct jobs created through the Provincial Input-Output Model. This is normal practice for such a project, and yields a set of numbers that are reasonably accurate as long as the data provided are correct.

It does not assess the primary benefit or cost: that being the flow of benefits from secure and economical (if true) electrical power and return on investment that MH has argued are the underlying reasons for proceeding with the project. Without criticizing the assessment per se, this type of analysis is most suited to those projects that have already met the tests of due diligence. Given the findings of this report, that is in serious doubt.

The problem is not what was done, but rather what was not done. MH might have been pushed by the Government of Manitoba to avoid the east side of Lake Winnipeg and, as the Government has the responsibility to allocate and manage Crown resources, they have the right to do that. MH, on the other hand, has the responsibility to provide reliable and affordable electrical power to Manitoba residents and businesses. It does not follow from the above that a transmission line must always go above ground. The reluctance of MH to give only passing attention to alternatives (the job of looking into the Lake Winnipeg option several years ago was contracted out), without any indication that MH was prepared to have or encourage a capacity in-house to consider a variety of options. The easy way to protect the *status quo* seemed to be to argue the costs were too high.

If due diligence had been done, then the other question is whether or not the cost estimate is reasonable. Oddly, if the estimate is high, the short-term benefits or impacts of higher expenditures are even greater, even though the project itself may lose money. In other words, if so much is spent on the project that it is not economically viable, the impact of spending the money to build it will be greater than if the cost were lower; a seeming contradiction, yet real because the cost of construction has its own particular short-term impacts. However, any benefits from it are overwhelmed by the losses incurred by the operation of the project itself over time. In a time of high unemployment, this would be less of a factor, because of the stimulus effect of the expenditures. But, even under these circumstances, the question of opportunity cost most probably would point in another direction, towards

[49] Technical Reports Volume 9

initiatives that directly address the portions of the economy causing the slump. If there is full employment in the construction trades, for example, what is produced is inflation.

Little more needs to be said about the economic analysis of the investment dollars in terms of impact. It is properly done, but adds little to the consideration of the project itself.

6.2 Greenhouse gas lifecycle

In a somewhat similar vein, the section on greenhouse gas lifecycle analysis follows an acceptable methodology. In this case, however, the entire study contains a huge set of assumptions; which is due to the lack of direct site-specific information for the route proposed. Although over 3000 hectares of forest land is calculated to be permanently disturbed, it is not clear how this figure was reached. As a rule of thumb for this particular boreal area, about 35% is densely tree covered, the rest is sparsely or open tree/shrub, rocks, lakes, streams and bog.[50] There is reference to European forests, the source of some of their estimates, as being perhaps more dense than those of northern Manitoba. Also not included, is the increase in diesel fuel needed by farmers to maneuver around towers.

In the end, the emissions are not particularly significant, given the nature of the project. They would, however, be reduced if one of the possible shorter alternative routes were assessed using the same methodology.

6.3 Climate change

Climate change is a global phenomenon, caused by gases that impede heat from the sun escaping back into space. The actual changes in climate globally are driven primarily by changing ocean temperatures, and their impact on air temperature and flows.

Water vapour (a greenhouse gas) is a major contributor to warming and, as air gets warmer, more water evaporates and the air can hold more vapour, so the warming process feeds on itself. Other greenhouse gases[51] are believed to contribute to the effect, and include such well-known gases as carbon dioxide (CO2) and methane (CH4). Both can be released as a result of human activities and from the decomposition of vegetative matter.

[50] A Report done in 2008 by IISD, Winnipeg, of the area east of Lake Winnipeg proposed for World Heritage consideration, assessed that area as having 32.3% dense coniferous, broadleaf or mixed tree cover, with another 19% open or sparse. See IISD, "Pimachiowin Aki World Heritage Project Area Ecosystem Valuation Assessment", November, 2008, p.11

[51] http://climate.nasa.gov/causes/

NASA notes the following evidence of rapid climate change:[52]

- Sea level rise: 17 cm in the last century, with the rate for the past decade nearly double that of the last century.
- Global temperature rise: the earth has warmed since 1880, but all of the 20 warmest years occurred since 1980.
- Warming oceans: top 700 metres of ocean water rose 0.3F since 1969.
- Ice Sheets: decreased in mass (Greenland up to 250 cubic km/year from 2002 to 2008.
- Arctic sea ice: declining rapidly.
- Glacial retreat: occurring everywhere.
- Extreme events: high temperature events in the US, low temperatures getting warmer since 1950, increased rainfall and severe weather events.

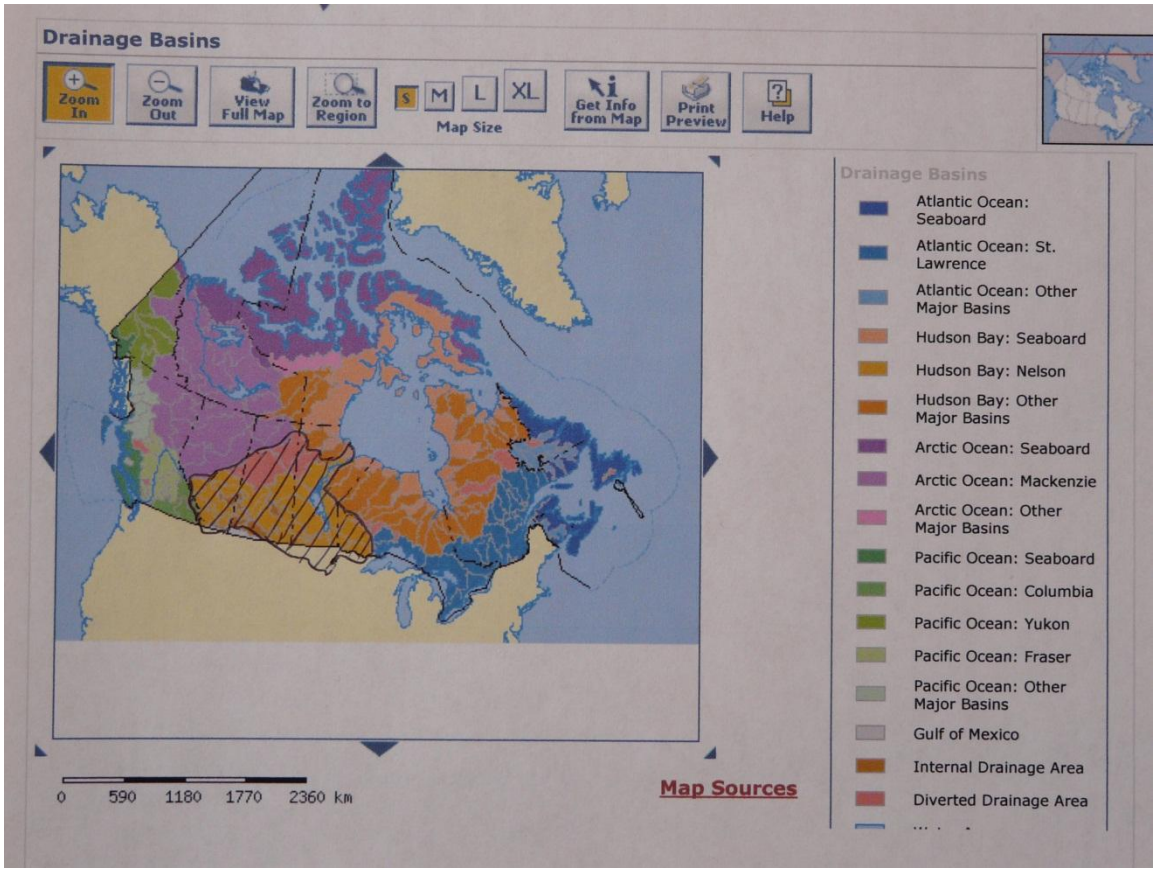
Climate warming has been occurring in Canada for longer than the past decade.[53] Like elsewhere in the world, the degrees of impact vary across the country.

6.3.1 Nelson River watershed

In the case of the proposed Bipole III line, the area through which the line runs deserves attention in this matter. But the entire Nelson River watershed, along with that portion of the Churchill River watershed that is diverted into the Nelson, also needs to be taken into account. After all, it is the flow of water available in these two watersheds that will power the generators from which the electricity comes for the line to carry. When plotted (Map 7), the importance immediately becomes clear: the drainage area extends from the Alberta almost the NWT border north of Reindeer Lake to south of Fargo, North Dakota and on into Ontario.

[52] http://climate.nasa.gov/evidence/

[53] Statistics Canada, "Climate change in Canada", http://www.statcan.gc.ca/pub/16-201-x/2007000/10542-eng.htm



Map 7

Map from Atlas of Canada, hatching added shows combined Nelson and Churchill basins [54]

> Within the combined Churchill-Nelson Basin, overall water flows might increase as time passes, mostly due to increased melt and drainage from the Rockies, a main source of water anyway. Precipitation and both summer and winter temperatures are all projected to increase, with intensity of rainfall events greater at times[55]. This projection is now ten years old, but events since that time suggest the original work was close to the mark. Although precipitation is projected to increase, evaporation and evapotranspiration will also increase due to the additional heat. In turn, this will increase water vapour in the air, which can increase greenhouse effect and keep temperatures up. It is possible that total flows could increase somewhat, but greater annual variations in precipitation are expected to increase over time, indicating a need for greater attention to flow management, along with its accompanying frustrations. These latter

[54] http://atlas.nrcan.gc.ca/site/english/maps/environment/hydrology/drainagebasins

[55] http://atlas.nrcan.gc.ca/site/english/maps/climatechange/potentialimpacts/sensitivityriverregions/1

include high shoreline water damage in such basins as Lake Winnipeg, as well as the possibility of miscalculating and finding there is either too much stored or too little: the former could cause flooding problems and the latter energy shortages.

This kind of climate impact has been more obvious in the past few years, as flooding on the Souris and Assiniboine Rivers has occurred, and both wet and dry periods have persisted longer than "normal". Winters have become milder, summers hotter, which is not to say yearly variations will not occur; only that the long-term trend will be in this direction, with significant annual variations becoming more frequent. Severe weather events may be expected to increase in frequency and intensity, and both drought and flooding could materialize with greater impact.

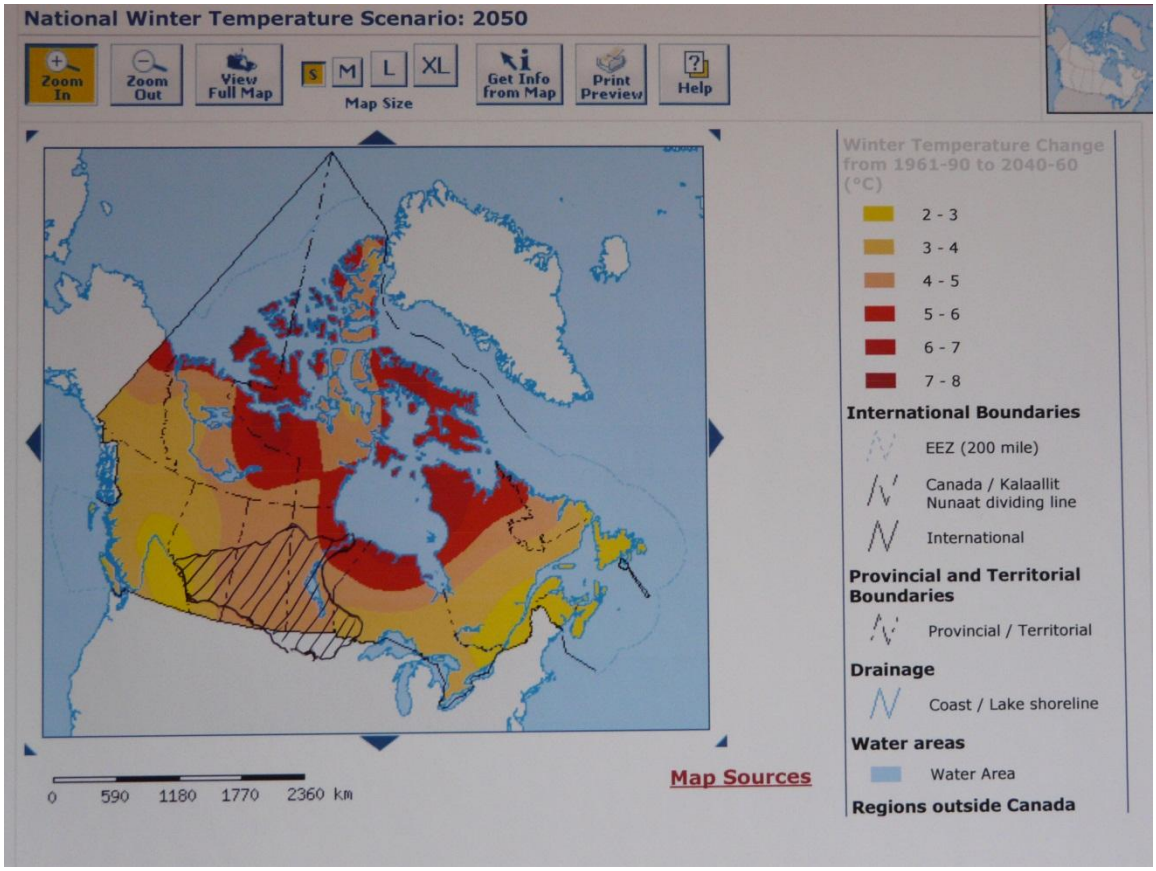
Shorter periods of sea ice, including in Hudson Bay, mean that the whiteness of the ice is not around as long to reflect heat back to space, so the process feeds on itself as water absorbs some of the heat. Similarly, in the agricultural areas, even if there is somewhat of an increase in precipitation, the warmer temperatures will speed up evaporation. The severe drought to the south in the American Great Plains this year illustrates the difficulties. Fortunately, farming practices are no longer those of the 30s, and limited tillage should prevent the kind of dust storms common in those years.

Northern Manitoba has been affected very directly in recent years. The most obvious impact has been on winter roads, which are now useable for as little as one-third of the period that had been previously expected, especially the major winter road up the east side of Lake Winnipeg to the Island Lake area. In forested areas, the invasion of pine beetles, a species that can survive if not subjected to temperatures of minus 40º C, may begin to kill pine trees, which makes the forests more susceptible to serious forest fire situations[56]. Warmer winters have facilitated the movement of pine beetles out of British Columbia into the northern prairies. Ice over Hudson Bay does not remain for as long as historically has been the case, reducing the time polar bears have on the ice to feed on seals, their prime food source. Melting permafrost may also affect their denning areas along the beach ridges back from the Bay. Warmer winters and summers may not reduce precipitation, but increase more severe events, and make fires more challenging. This could well impact birds and ungulates.

The Atlas of Canada (Map 8) has the following projection for winter temperatures to 2050: the hatched area of the Nelson-Churchill basins has been added for reference in this report. It notes that it is the inland

[56] Ibid.

and northern regions that are likely to be most heavily affected. A similar increase in summer temperatures is projected as well, both through the prairies and most particularly in the north.



Map 8[57]

Climate change will occur whether or not Bipole III is constructed along the FPR. What it means, however, is that MH must consider potential future impacts that could result, and make adjustments accordingly. Essentially, the FPR runs through areas with serious risks to wildlife, farming and to the line itself as noted above. In summary, although it is impossible to project all the possible impacts of climate change on the FPR, it can be expected that there is likely to be an increase in severe weather events, probably moving farther north than currently being experienced. Forest fires could increase. Shorter periods of ice on Hudson Bay could result in polar bears frequenting the areas near the Lower Nelson generating stations, as well as the converter stations. As a minimum, garbage disposal becomes an important consideration, as well as a program to keep the bears separated from workers. The bears could be entering into a period of major adjustment due to lack of traditional

[57] http://atlas.nrcan.gc.ca/site/english/maps/climatechange/scenarios/nationalwintertemp2050

food, and it would be most unfortunate if some had to be killed for attempting to adapt, simply by coming into proximity with human activity. Churchill has learned to deal with it, so efforts will be needed on the lower Nelson River to adjust to bears in the vicinity.

Woodland caribou may find their habitat further impacted by forest fires, and the general increase in forest fire risk from climate change suggests that forest fire capacity and strategies be carefully reviewed to prevent burns from affecting their key habitat areas. Traditional "forest fire fighters" tended to regard their role as protecting harvestable timber, but this notion needs to be updated to ensure that key habitat is given a much higher priority.

Bird migrations may begin earlier in the spring, and southbound birds could spend more time resting and feeding along the FPR west of Lakes Winnipegosis and Manitoba, as well as in the key agricultural areas south of the Trans Canada Highway. In this respect, they could be exposed for longer periods to the risk of collisions with the proposed line.

As a result of uncertainties about precipitation in agricultural areas, farmers on land suitable for irrigation will be giving serious thought to putting in irrigation systems to improve productivity and reduce risk. If MH places Bipole III through lands with capability for irrigation, this will seriously reduce the options of those farmers to remain competitive. It is the annual variations in climate that will make farming a greater challenge[58]. Means to hold water longer close to where it falls as precipitation will become a priority. If this can be accomplished, downstream flooding will be reduced to lower peaks, and a return to more riparian type of vegetation will improve wildlife vitality and retain moisture to "dampen" the impacts of droughts that will become more common. Manitoba has limited sites where large impoundments can be located, but re-creation of old potholes could go a long way to restore some form of buffer against frequent variations in climate.

Severe weather events are likely to increase along the southern parts of the FPR, exposing the line to potentially greater risks than at present.

[58] Dr. Paul Bullock, Soil Science Department, University of Manitoba, personal communication.

Chapter 7: Cumulative Findings from Previous Sections: New Strategic Options Evolve

7.1 Conclusions from the review of the Environmental Impact Statement for birds, caribou, extreme weather, agriculture and climate change

Previous sections of this report have assessed impacts of the proposed FPR for Bipole III. The conclusions reached are unsettling. Some mitigation efforts will help relieve some impacts, but others are of either such a magnitude, or of a lose/lose nature, that the question of significant route modifications appears to be worthy of attention.

This question comes from the following conclusions:

1 The impact on migratory birds, even if the use of bird diverters over most of the line is assumed, remains significant. Migratory birds, protected under the North American Migratory Birds Convention, will be heavily impacted. The Mississippi Flyway, which accounts for 40% of the migratory birds in North America, crosses through the southern Interlake and the west side of Lakes Manitoba and Lake Winnipegosis. This area is also used by the birds for staging and for feeding in both spring and fall, leaving them vulnerable to collisions with some 650 km of transmission line. This impediment is particularly the case with larger birds which are either unable to maneuver quickly enough to avoid colliding with the high but small "optic ground wire" or raptors so intent on their prey that they do not notice the line. Between 35 and 50% of other bird strikes may be mitigated but the residual number that strike the line, when some 1400 km of line over some 60 years is taken into account, becomes a very large number (approximately 8,400,000 for 50% of the line). If this alternative is the best routing of all options within the study area, Manitoba has a problem. There are too many "bottlenecks" (e.g. The Pas to past North Moose Lake) and narrow routes (from the west side of Cedar Lake to the Delta Marsh), for adequate mitigation and/or rerouting to be effective. Certainly, as pointed out in the EIS, going farther west to implicate the "pothole country" does nothing to lessen the impacts.

2 Woodland caribou are an endangered species and are not able at this time to improve fecundity and recruitment rates. Even what would be minor impacts to other species would appear to have strong probability of increasing the risk of extirpation of this species. Three of eight herds are somewhat negatively impacted by the proposed routing.

3 Severe weather events along the west side of Lake Manitoba and across the southern Manitoba east-west portion of the proposed route are well documented. Whether changes in climate will increase severity or not, it is certain that, over time, frequencies of incidents could increase,

and the area known as “tornado alley” will still exist. Risk of line disruptions are therefore relatively high, as has been the case since Bipoles I and II went into operation. It was a tornado in 1996, near Winnipeg, that put Bipoles I and II out of commission for a short time, and the one that hit Elie in 2007 was only about 30 km from the existing lines. Better ways to avoid exposure to these events need consideration.

4 Agricultural production on arable lands to the south of the Yellowhead Highway (PTH 16) all the way to Winnipeg will be impacted. These are some of the most productive lands in the entire province. Mitigation will only go so far, and costs to farmers will rise as they maneuver around towers. Spraying, particularly on special crops that need crop protectants several times before harvest, often when soils may be wet from rain and not amenable to the use of ground-based equipment, must be done by air; which is made dangerous and more costly with large power lines through fields. Aerial sprayer operators may simply not accept contracts where lines are near. Weed growth under and around towers could prevent marketing of certified seed crops and necessitate the removal of those lands from registered seed production. Compensation cannot be calculated to anticipate the pace of technological change affecting the farming industry, so those farmers affected will fall behind their peers in competitiveness.

5 Climate change over the life of the line will have some impacts that warrant attention. Birds will likely begin migrating earlier, and stay to feed longer in Manitoba, particularly during their southbound flights. Warmer winters and summers, increased summer evaporation and evapotranspiration will put more vapour into the air, thus increasing greenhouse effects. Greater variations in climate could increase severe weather events and the risk of forest fires, putting woodland caribou habitat at risk and requiring MH input to fire protection for habitat that might not fit routine forest fire priorities. Polar bears will be affected by reduced periods of Bay ice, and special programs may be required to maintain bear/worker separation. Irrigation on lands suited for it will likely increase, implying that MH should avoid lands with irrigation capability.

Taking these factors together, it becomes evident that the FPR presents many significant problems for the future, and consideration of wider options deserve attention. The government policy decision to avoid the east side of Lake Winnipeg proposed to UNESCO for World Heritage consideration creates a conundrum.

It may be possible to correct some critical agricultural impacts, most severe weather impacts and a portion of the negative effects on migratory birds by putting the line underground from the Yellowhead to Winnipeg, but not on woodland caribou; nor on the remaining 500 km or so of line and tower (and guy

wires) impacts on the birds; nor on agriculture in the Swan River and The Pas areas.

7.2 The broader energy and economic setting is in a state of flux

7.2.1 That there is a need to improve system security is not in question. MH has proposed Bipole III as the means to achieve this objective.

7.2.2 However, if that is the only criterion, then construction of a second converter station near Winnipeg, perhaps even at La Verendrye, would enable MH to significantly improve security without actually needing Bipole III until clear evidence of sustainable demand growth materializes. After all, MH states that the sole purpose of Bipole III is to increase security.

7.2.3 The market for the energy produced by MH is uncertain at this time. Efficiencies and an economic slowdown, particularly in the US, have caused demand to flatten, and this has been exacerbated by the availability of natural gas at very low prices. Although recent evidence shows that some gas wells in Montana, on the same gas/oil field as in North Dakota (Bakken), Saskatchewan and Manitoba, are showing signs of reduced production after six years, it is not clear this is a trend for the entire field, or for fracking operations elsewhere. Huge potential exists over much of North America for developing these deposits, both in Canada and the US.

7.2.4 It is clear, however, that the US will not be needing extra shipments of
Manitoba power in the short term, thus, the construction of an additional converter at Winnipeg will offer as much as a decade of breathing space to allow a more comprehensive review of transmission options from the Nelson, if they are ever to be needed, given the range of increasing alternatives due in large part to innovations and technology.

7.3 The present situation

7.3.1 The currently proposed route for Bipole III is beyond doubt the worst possible, beginning with its alignment through a considerable area susceptible to severe weather incidents: including tornadoes. Booming ahead on an out-of-date macro plan developed over 40 years ago, recently modified by provincial policy, has resulted in an extremely expensive track that defies full mitigation, and has impacts that cannot be compensated effectively. More specifically, woodland caribou could be further reduced to the point of "endangered", or worse; migratory birds would have one more major barrier impacting their North American patterns; security would be little improved as the FPR goes right through

"tornado alley"; and commercial agriculture in Manitoba will suffer effects that will slow the pace of improved productivity needed for farms along the route to remain competitive, and the Manitoba agri-food industrial sector will be forced to acknowledge effects on growth. These concerns are of a magnitude that effective mitigation is impossible (for the caribou), expensive for migratory birds, and costly on arable agricultural lands (going beyond the limits of traditional compensation calculations due to the pace of technological change).

7.3.2 This raises the question about other alternatives, bearing in mind that a significant portion of the east side of Lake Winnipeg has been dedicated by the Government of Manitoba for some form of protected area.

7.3.3 MH has been operating on the assumption that plans from the 1960s and 70s remain valid today. This is no longer the case, even though the plans were valid at the time. Moreover, new options are available that open up possibilities for different approaches to electrical transmission: all it needs is a sea change in management thinking from "doing things the way they've always been done", to "let's see what our choices are".

7.4 There are other options

7.4.1 **The construction of a second Winnipeg converter**, appropriately relocated and replacing a tired existing converter offers time to think about and assess these new options.

7.4.2 **Going underground for the arable land portions of the current FPR** is one variation that will mitigate some of the problems forecast for the southern area. However, there are no obvious ways to address bird and caribou impacts with any certainty that they will be sufficient. Overall distance and consequent line losses remain significant. Nonetheless, for comparison purposes, this variation and the original FPR are included to keep all options open.

7.4.3 **Employing a combination of transmission modes in a new route.** This option employs one principal idea. Essentially, starting at Keewatinoow, the line could run south of the Nelson River, cross the historic segments of the Hayes somewhere near Oxford House, then run south to the east side of Molson Lake and over to the northeast end of Lake Winnipeg. All of this route misses woodland caribou range, is away from prime mining activities, and is outside major bird migration routes (although there are migratory birds that nest there). The Pen Island barren ground caribou use the part of the area traversed near the Nelson

from time to time, but after construction, little impact is expected because of the nature of this species.

This proposal would require crossing Lake Winnipeg at various possible points.

No doubt the requirement to go underwater for distances across of Lake Winnipeg would present engineering challenges but not to explore all options does a disservice to the environment and people along Bipole III who are adversely impacted by a selection not under their control.

It is critical to seek alternative locations for the proposed line, conceptually at least, and/or means to mitigate impacts (particularly agricultural) that, as things stand, could prove to be seriously underestimated in a short time.

These options have been cited, not as firm proposals, but simply to illustrate that alternative routings might be available, keeping in mind the provincial policy to avoid the proposed protected area east of Lake Winnipeg.

No doubt there are other options as well, but these are put forward as examples worth exploring.

As mentioned previously, evidence elsewhere indicates that an underground is not out of line, (at about double above-ground costs) especially where there are no underground or underwater obstacles to be conquered. It also avoids the need for compensation for agricultural lands and can be drilled under major roads or under other major structures, for example, the Portage Diversion. Costs may be in the order of double the costs of above ground lines, but this varies with soil and type of sub-surface material (e.g. granite or limestone). The areas where the line is proposed to go underground generally consists of loam to clay topsoil with largely similar or mostly clay subsoil, with few stones and virtually no rock.

It is important to note that underwater and underground, often in combination, are not just theories. Examples exist in Europe[59] and a new transmission line is underway in the State of New York, linking Canadian electrical power to New York City and other locations via what are primarily underwater lines below Lake Champlain and the Hudson River[60]. The fact that Lake Champlain freezes in winter makes it comparable to Lake Winnipeg.

Although MH argues maintenance is more frequent and expensive, it has not clearly disclosed in the EIS the number of incidents that have affected Bipoles I

[59] Europacable, "An Introduction to High Voltage Direct Current (HVDC) Underground Cables", Brussels, 10 October, 2011

[60] http://www.chpexpress.com

and II, nor do technologies appear to have been explored that can be used or adapted.

The point is that the option as promulgated by Manitoba Hydro is unacceptable. If reliability is key, as asserted by Manitoba Hydro, then the status quo as well is unacceptable. "Tweaking" the line will not solve the many and cumulative negative impacts of Bipole III. Best practices requires a fresh and serious look at alternatives, other than the 'doomed to dismissal' of the other alternatives selected by Manitoba Hydro in its EIS as a comparison to Bipole III.

Environmental assessments of major projects are going to continue to identify significant problems into the future, so the time has come to be more open to new ideas and technologies.

Appendix 1:
Resume for Jim Collinson

University of Manitoba, BSA, (Agricultural Economics): course work included, *inter alia*, chemistry, microbiology, botany, zoology, constitutional and common law, economics, agricultural economics, marketing, statistics, animal nutrition, plant science, philosophy and agricultural engineering.

University of Michigan, MSC, (Conservation and Resource Economics): course work included economics, resource economics, demography, water resources, land use and conservation

Jim is a management consultant with particular focus on research and strategy pertaining to the complexities surrounding energy/economy/environment issues. His consulting focus has evolved in part from training and experience and from following changes taking place globally that set a context within which national as well as more local situations develop. Some of these observations are outlined in a paper produced several years ago[61]. Today the reality of global complexity is that everything is changing, everywhere, all the time.

Consulting clients have included Federal and Provincial departments and agencies as well as corporate clients in the areas of organization. environment, energy and economic strategies, and the World Bank and FAO on environmental information management systems.

Consulting followed 30 years in senior public service positions in the Manitoba and Federal governments. Specific examples of responsibilities include:

- **Assistant Deputy Minister for Canada's State of the Environment Report.** Jim had responsibility for planning, establishing relevant content, coordinating and bringing to fruition the "The State of Canada's Environment Report, 1991". The Report reflected Jim's interest and concerns with the interrelationships of all the factors affecting Canada's environment. Particular emphasis was placed on the necessity for all elements of the natural environment as well as human activities and motivations to be viewed as interactive pieces of a whole, not isolated parts. He edited and wrote parts of Chapter 1 (overall conceptual framework and direction), reviewed and commented on all other chapters, and was responsible for final signoff on content in all other chapters. The Report is regarded as a milestone in environmental information for Canada. Concurrent with these responsibilities, Jim was **Head of Canadian Delegation to the OECD High Level Committee on**

[61] http://www.new-management-network.com/publications/Global Complexity-New-Opportunities.pdf

Economy and Environment, 1991-93. This group focused on the inter-relationships amongst environment and economy, coming out of the Bruntland Commission Report[62], which coined the term "sustainable development". Jim was the only member of that Committee with a background in both ecology and economics.

- **Assistant Deputy Minister (position now classified as CEO) Parks Canada** for five years. Relevant activities included developing and implementing a process for management planning that established and followed specific criteria for protection of natural ecosystems while concurrently ensuring public access and enjoyment to these national treasures. During this period, management plans for all existing national parks were updated, and new legislation was initiated and eventually passed that recognized the importance of protecting ecological systems.

  Of particular significance were sensitive individual negotiations with British Columbia and the Haida Nation that culminated (after over three years of intense work) in the creation of Guaii Haanas National Park Reserve and Haida Heritage Site, on what was then known as South Moresby, in the Queen Charlotte Islands. The Agreement was based on respect for the history and the objectives of all parties involved, and provided a management structure and process that equally respected each participant. Guaii Haanas illustrates how many objectives, sometimes apparently conflicting ones, can be achieved through understanding everyone's principles, history and future objectives and working to achieve them all, as compared to operating in win/lose situations.

  Northern Ellesmere National Park Reserve, Grasslands, Pacific Rim and Fathom Five Marine Park were also finalized during that period. Of special interest was Northern Ellesmere, where as a result of an aerial inspection Jim realized that although not many tourists were likely to make use of the Park, resource protection was needed, as scientists and other explorers were leaving behind garbage and doing damage that in such eco-climatic regions would remain for decades, if not centuries. Consequently, the Reserve was established in less than two months to provide regulation and protection for this fragile environment.

  Notable specific issues addressed over that period included bangs disease and TB in the Wood Bison herd in Wood Buffalo National Park, deer damage and deer ticks at Point Pelee National Park and tourist impact on high use and sensitive ecological areas in several popular

[62] Report of the World Commission on Environment and Development: Our Common Future, United Nations, 1987

destinations. Highlighting the breadth and scope of the resources involved and emphasizing sustainable practices, he set in place the capacity for and published the first "State of the Parks Report".

Continued interest in the Hudson Bay area involved several trips along the coast from York Factory to Churchill, that concluded with an agreement with Manitoba to begin studies to consider a national park in that area. This is now the Wapusk National Park of Canada, highlighting the polar bear of the region and protecting their denning areas. The erosion of the bank of the Hayes River remains a concern, and pictures of Port Nelson are fixed in memory as an illustration of the impact of "investment ahead of analysis".

- **President of the UNESCO World Heritage Committee**, 1986-88. The Committee, composed of experts appointed by countries signatory to the Convention, reviewed in detail assessments of nominations from the IUCN (natural sites) and ICOMOS (cultural sites) and decided on listings for the World Heritage List. Natural Site assessments often included endangered species (e.g. White Rhino) and sustainable biodiversity.[63] Jim set up a review of procedures to ensure all applications met criteria, and began a process that culminated in "cultural landscapes" becoming a category that included both natural and cultural features as valid elements of a nomination.

- **Assistant Secretary to the Cabinet for Aboriginal Constitutional Affairs and**
  Chair: Neilsen Task Force on Program Review on Native Programs.
  In this role, Jim established a team of private sector and public service experts to carry out research on aboriginal concerns and their connections and relationships to lands and resources. He made presentations on these factors to many Ministerial committees within the processes leading to First Ministers meetings, and spent considerable time consulting aboriginal groups to ensure their concerns were documented and understood. An overriding concern was the negative impact of change on the decision-making processes of aboriginal communities, particularly the more remote ones. These had long-standing and effective systems for community decision-making that were designed to handle several decisions each year, and were suddenly being expected to meet new demands to address numerous decisions each day.

[63] Examples of natural sites listed during his terms include the Queensland Rain Forest, Kakadu National Park and Tasmanian Wilderness in Australia, Gross Morne National Park in NL. Iguazu Fall in Brazil and Argentina, Sichuan Giant Panda Reserves, Kilimanjaro National Park, Tanzania, etc.

Jim has had a long association with aboriginal people and their objectives, concerns and interests. Beginning initially in Northern Manitoba, this involvement expanded over the years to all of northern Canada and later to all of Canada. The importance of listening, respecting and honestly defining concerns was clearly the critical aspect of this association, and led to ultimately resolving issues in ways no-one might have been able to predict in advance.

- **Assistant Deputy Minister for Regional Economic DREE for Western and Northern Canada**, including responsibility for PFRA from 1975 to 1982. He emphasized the provisions of the then British North America Act regarding federal and provincial responsibilities, by emphasizing close cooperation with provincial governments, involvement of private sector and consultation with interest groups, farmers and the academic community to ensure policies and programs under development were realistic and practical. DREE's decentralized organizational structure encouraged solutions that were directly relevant to the region involved.. Solutions were found for real problems, without as much concern for setting an unacceptable precedent elsewhere. These initiatives included: revised assistance for developing water sources on farms; managed programs to address serious drought in 1979, that included both crop impacts as well as water table and stream flow (community and hydro water supply) issues.

  During his tenure, DREE began to apply programs to northern areas for the first time, beginning with the first of three multi-year comprehensive development agreements for Northern Manitoba. These included airstrips, housing, water supply, training, resource management and economic development., and applied to all of northern Manitoba. The first of these agreements was signed at Norway House in 1975. Subsequent to that, DREE programs were initiated in all four western provinces and the (then) two Territories, with special emphasis on development for aboriginal communities and businesses.

- **Assistant Deputy Minister for Industry, Science and Technology Canada**
  Consulted provincial and territorial governments and aboriginal leaders in the process and program design that resulted in the establishment of the Native Economic Development Fund, and set up its management structure.

- **Assistant Deputy Minister for Mines, Resources and Environmental Management for Manitoba**: including research and policy development for Northern Manitoba, which led to a northern regional development strategic planning map. Based on trips through all parts of Northern Manitoba with a team of specialists in various fields, the findings and

concerns of all disciplines were integrated into a coherent overlay of options and concerns. This map was used as a guide by at least three successive governments. Considerable time was spent on the Nelson River area, the Hudson Bay coast and the corridor between Thompson and The Pas.

- **Under Special Assignment, Chaired the study team on the social and economic impact of the Churchill and Nelson Rivers and Lake Winnipeg Regulation Hydro-Electric Project**: one significant finding was the impact on community decision-making processes that were not able to cope with the sudden deluge of issues. The Report[64] led to the Northern Flood Agreement. This project involvement provided an opportunity to become well acquainted with the natural resources of the area from the top of Lake Winnipeg to the Lower Nelson, and over to Saskatchewan along the Burntwood and Rat Rivers, Southern Indian Lake and the entire length of the Churchill River within Manitoba. It also provided the opportunity to spend considerable time in formal and informal settings, with aboriginal leaders and community members in each community potentially affected by the Diversion. The result was a report that reflected all parties objectives and concerns at that point in time.

- **Assistant Secretary to the Manitoba Cabinet** responsible for federal-provincial agreements, including northern development. Jim managed a review of northern development potential and needs, publishing an internal report consisting of papers prepared by working groups he coordinated. Of interest was a special job development program in 1970, involving both federal and provincial programs working with the private sector and local government to achieve job creation. Many projects were initiated in the north, and included airstrip development and forestry/fishing/trapping programs. A parallel set of training options was put in place, reflecting the need for a flexible and comprehensive approach.

Additional background:

Having grown up on a dairy/grain farm near Souris, MB, as a youth Jim spent much of his spare time walking around bush and slough areas of the farm observing the habits of animals and birds, and for several years operated a small trap-line. He was fascinated by the interactions of birds and animals with farming activities, including how deer flourished on crops planted near the edge of bush,

[64] The Report was published along with all other reports on the Project. This one, however, as agreed with The Premier at the time the assignment was accepted, was released to the public the same day it was received by the Government of Manitoba, and communities affected were briefed on the findings before the final report was completed, so any last minute concerns could be taken onto account.

sharp tailed grouse came to the same lek every year and waterfowl sought out sloughs and their immediate periphery for nesting.

This interest led to a serious concern about the pressures of farm viability forcing farmers to drain sloughs and remove bush to get the best returns from their lands, while the public good from wildlife and soil and water conservation was sacrificed. As a consequence, water now runs off fields faster, causing flooding downstream (the severity of recent floods can be traced in part to this); while birds, deer and other wildlife of interest and benefit to the general public, have lost their habitat. The complexity of these linkages within ecological systems became a life-long interest, and a factor throughout his career.

He is also a licensed pilot, and has flown over all of Manitoba, especially in northern areas, and most particularly those in the extreme north-west, those impacted by the Churchill-Nelson Project, the east side of Lake Winnipeg and along the Hudson Bay coast.

BERRIEN ASSOCIATES LTD.
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Analysis and Report to the Clean Environment Commission on Bipole III Route Selection Criteria, Routes, and Impacts.

Prepared for: Mr. Brian Meronek
D'Arcy & Deacon LLP
Counsel for The Bipole III Coalition

Prepared by: Robert A. Berrien, P.Ag., ARA, DAC, FRICS

Our File: 12-2597

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November 8, 2012

D'Arcy & Deacon LLP
2200 – One Lombard Place
Winnipeg, MB R3B 0X7

Attention: Mr. Brian J. Meronek, Q.C.

Dear Sir:

Re: Bipole III Project Our File 2597

Further to your instructions and my analysis, I am pleased to provide the attached report. In it I have reviewed the criteria for route selection through the agricultural and settled areas. The review is based upon tested criteria originating from different jurisdictions and numerous proceedings and applications dealing specifically with the issue of power line routing from over 30 plus years ago right up to the current time. Numerous citations will be provided to allow the Clean Environment Commission (CEC) to directly evaluate the criteria and findings by other administrative tribunals.

With that background, I have conducted a review and critique of the routing evaluation as set forth in the various documents provided by Manitoba Hydro dealing with this Bipole III project. Further, as part of that effort, I have rather extensively considered many of the matters outlined in the Agriculture Technical Report.

Following these sections, I have provided a series of findings, conclusions, and recommendations. In making these findings I will be specifically considering the Principles and Guidelines of Sustainable Development referenced by Minister Chomiak in his request to the CEC to hold the hearing.

I am happy to attend a hearing on this matter to discuss and defend the contents of this report.

Yours truly,

Robert A. Berrien, P.Ag., ARA, DAC, FRICS
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TABLE OF CONTENTS

LETTER OF TRANSMITTAL 2

TABLE OF CONTENTS 3

1.0 BACKGROUND 5

1.1 Purpose 5

1.2 Review of Previous Decisions, Applications, and Environmental Impact Statements ... 5

2.0 ANALYSIS AND DISCUSSION 6

2.1 Alberta Cases 6

2.2 Other Jurisdictions 21

2.3 Assessment of Canada Wide Routing Criteria 25

2.4 Understanding and Applying Routing Criteria 26

2.5 Application of Routing Criteria to the Manitoba Hydro Routing Process 28

3.0 EVALUATION OF THE MANITOBA HYDRO EIS AND ROUTE SELECTION PROCESS 29

3.1 Description of the Route Selection Process 29

3.2 Criteria Used in SSEA 29

3.3 Critique of the Route Selection Matrix Process Through the Agricultural Areas 32

3.4 Review and Critique of the Agricultural Impact Assessment as Presented in the Agriculture Technical Report 41

3.5 Review of Sustainability Assessment from the Agricultural Perspective 56

4.0 FINAL PREFERRED ROUTE (FPR) - ON THE GROUND REVIEW 59

5.0 SUGGESTIONS AND RECOMMENDATIONS TO THE CEC IN RESPECT OF THE ROUTING OF BIPOLE III 62

6.0 CERTIFICATION 63

Appendices (Due to the Sizing of the Document, these are Provided in a Separate Binder).

1. Resume of the Appraiser
2. Copy of an Extract from Decision 77-G, 240 kV Transmission Line, Calgary - Lethbridge
3. Copy of an Extract from Decision 80-A, 500 kV Transmission Line, Keephills – Ellerslie
4. Copy of an Extract from Decision 76-F, Environmental Evaluation by Alberta Environment
5. Copy of an Extract from Decision 81-D, 500 kV Transmission Line, Keephills – Ellerslie
6. Copy of an Extract from Decision 80-D, 599 kV Transmission Line, Langdon – Phillips Pass
7. Copy of an Extract from Decision 80-A, 500 kV Transmission Line, Keephills – Ellerslie
8. Copy of an Extract from the Edmonton – Calgary 500 kV Transmission Development, Need Application
9. Copy of SW Alberta 240 kV Transmission Development Application, 2007
10. Copy of an Extract from the Analysis and Report to the Alberta Energy and Utilities Board
11. Copy of an Extract from Decision 2009-049, Construct Updike Substation
12. Copy of an Extract from the Eastern Alberta DC Transmission Line Application, Volume 2
13. Copy of the Hydro Quebec Agreement on the Siting of Power Transmission Lines on Farms and in Woodlands, December 2000
14. A. Copy of the Report of the Solandt Commission, April 1975;
    B. Environmental Assessment Report – Bruce to Milton Transmission Reinforcement Project List of Study Area Criteria and Indicators;
    C. Supply to Essex County Transmission Reinforcement Project, Final Workshop Report, Nov 2009
15. A. Copy of the Poplar River to Pasqua 230 kV Transmission Line Environmental Impact Statement, SaskPower, April 2009;
    B. Reasons for Decision; Environmental Assessment Approval
    C. Saskatoon Area Reinforcement Projects, March 2012
16. Copy of an Extract from the Environmental Assessment Certificate Application, May 2006 Vancouver Island Transmission Reinforcement Project, British Columbia Transmission Corporation
17. Copies of Aerial Photos of Tower Placements
18. Extract from the Biopole III Transmission Project Aquatic Environmental Technical Report, North/South Consultants Inc, November 2011
19. Copy of an Extract from AltaLink, Western Alberta Transmission Line Project, Feb 2011; Extract from ATCO Electric Eastern Alberta DC Transmission Line Application, March 2011; Extract from AltaLink Heartland 500 kV Transmission Project, Sept. 2010
20. Copy of J & V Nielsen and Associates Ltd. Website Pages
21. Copy of a Report on Environmental Impacts of Transmission Lines, Public Service Commission of Wisconsin; Agricultural Impact Mitigation Plan, Cap X2020 345 kV Electric Transmission Projects in Minnesota, June 2009; Electric Transmission Line Construction Standards and Policies, Illinois Department of Agriculture (undated)
22. Examples of Aerial Photographs showing Alternate Transmission Line Routes
23. Extracts from the Agriculture Technical Report and Manitoba Hydro EIS, pg. 7-57, both describing Sec 13 of the Final Preferred Route
24. Copy of the AltaLink Western Alberta Transmission Line Compensation Guidelines, Feb 2011
25. Copy of the direction letter from Minister Chomiak and the Attached Terms of Reference
26. Copy of the Province of Manitoba 7 Principles and 6 Guidelines for Sustainable Development

1.0 BACKGROUND

1.1 Purpose

The purpose of the first portion of the review is to identify the key routing issues that have been addressed in previous applications for high voltage transmission lines (HVTL), and to characterize, as we read it, how the various review agencies or applicants have considered or weighted these issues after consultation or input from interveners. This analysis will assist us in our review of the Manitoba Hydro (MH) Bipole III route selection and evaluation process, and the impact assessment of the route alignment.

1.2 Review of Previous Decisions, Applications, and Environmental Impact Statements

As part of our ongoing work on HVTL route issues, we regularly review the practices from other jurisdictions, as well as Decisions related to HVTL applications, with a particular view to how the decision maker weighed or considered route alternatives presented.

The following sections of this report detail a number of examples from across Canada.

2.0 ANALYSIS AND DISCUSSION

2.1 Alberta Cases

Given our home base, we have the greatest direct familiarity with the cases from this jurisdiction. Therefore, they will constitute the first and largest component of this section on routing principles. In the following discussion, I use the term "the Board" to refer to any of a series of quasi-judicial panels that have dealt with these matters in Alberta over the years. It is worthwhile to note that the Alberta panels have the jurisdiction to approve, modify, or deny an application for a power line project or route.

2.1.1 Routing Principles – Detailed Discussions in Board Decisions

The earliest Decision we have located that attempted to specifically discuss *"routing principles"* was Decision 77-G (Appendix 2: 240 kV Transmission Line Proposed by Calgary Power Ltd., Between Calgary and Lethbridge). This discussion included a number of potential options regarding route and/or design, that might have reduced impacts. All decisions on power lines deal with the concept of impact evaluation, but here it was tackled head-on. The routing evaluation considered the four following issues. It is noteworthy that each of the four is an Existing Lineal Disturbance (ELD) of one type or another.

2.1.1.1. Use of Railway Lines

Locating HVTL Right of Way (ROW) along existing railway lines was an option. For the route considered, the Board found that there were numerous bends in the railway line route that made it less than a desirable linear route for a HVTL. They also noted that in the subject area there were a number of small towns located adjacent to the railway line that introduced a further issue. The railway ROW is generally 100 ft wide, so could not provide the entire ROW required for a 240 kV line. Furthermore, there may have been some issues with having the HVTL too close to the railway tracks. The Board acknowledged that additional ROW would have to be acquired even if the railway line ROW was considered.

In my view, if a railway ROW provides a straight alignment for any distance in a locale that follows the basic route of the HVTL under consideration, the railroad ROW may be an ELD that a transmission line could parallel. But it is a site specific situation.

2.1.1.2 Following Natural Severances

This Calgary Power proposal considered using river valleys, or other such physical or landscape characteristics to route HVTL. The Board was of the view that because of the meandering nature of rivers and major creeks, plus the environmental impacts associated with construction in river valleys (erosion, impact on habitat, slope stability, etc.) that this offered little opportunity. Furthermore, the Board recognized that recreational facilities were often located within or adjacent to rivers or in the river valley.

We agree that with the environmental sensitivity today, using a river valley as a route for a HVTL is not optimal. In today's routing practices, river valleys are typically crossed in the shortest and minimally impacting manner. The basis for considering natural severances is however, a sound one. Whenever an existing linear disturbance may be followed, it minimizes impact on adjacent land uses.

2.1.1.3 Adjacent to Existing HVTL

One route option considered at the hearing into the 240 kV transmission line proposed by Calgary Power Ltd., between Calgary and Lethbridge was to run the proposed line parallel to an existing 240 kV line for a portion of the route. The Board found that the amount of ROW required and the impacts on farming were similar to the proposed route, which was through "virgin" territory. Furthermore, the applicant (Calgary Power) stated that one reason supporting its proposed route was that it was not adjacent to an existing line, and therefore not vulnerable to the same storm damaging both lines. The Applicant indicated that a separation of 20 to 40 miles from the existing line was optimal.

A similar issue was raised in Decision 80-A (Appendix 3: 500 kV Transmission Lines Keephills – Ellerslie, Feb. 1980, Sec 5.0). Here again, the Applicant (Calgary Power) indicated that it was not desirable to locate the two proposed 500 kV lines in the same ROW, due to system reliability issues. Only within the Restricted Development Area (RDA), (now Transportation Utility Corridor (TUC), was this deemed to be acceptable.

In an earlier Decision (Appendix 4: In the Matter of 240 kV Transmission Line Facilities of Calgary Power Ltd. in the Calgary Area, ERCB Report 76-F, August 1976) the Board noted, with approval, the corridor concept. Indeed, their decision was based, in part, on not precluding a corridor that might arise. Multiple 240 kV, HVTLs were conceived as occupying the corridor. The issue of risks from close by lines did not arise in this hearing.

It is clear that the thinking in respect of existing Power Line Linear Disturbances (PLDs), has evolved largely due to the understanding of incremental versus new impacts. This issue can be viewed very differently depending on the risk presented to the electric system if both lines were to be taken down at the same time.

2.1.1.4 Unused Road Allowances

The fourth ELD considered in the Calgary to Lethbridge hearing dealt with unopened or undeveloped road allowances. For a number of reasons, it was not practical to situate large steel lattice HVTL's within road allowances which are typically only 66 feet wide. Road allowances are in place to provide public access. As a principle, this warranted no further consideration for lattice HVTL's, other than to acknowledge that placing towers within road allowances is not appropriate, whether the road allowance is developed or undeveloped. This issue of towers immediately beside road allowances was never canvassed at this hearing.

2.1.2 Implied Routing Principles

In addition to the specific discussions on routing principles in Decision 77-G set out above, the Board has addressed and opined on other "principles" in various other Decisions.

2.1.2.1 Conflict with Urban Lands

Again referencing Decision 80-A (See Appendix 3), the Board discussed at length the issue of Utility Corridors. The entire extract of their comments is appended to this Report.

To quote from that Decision, the Board noted the following at page 5-1:

"The Board agrees that utility corridors represent a desirable alternative where a well-defined need exists for utility services between two areas, such as the generating area at Wabamun and Keephills and the load centre in Edmonton. In this respect the Board uses the term "utility corridor" to mean a properly established and officially designated corridor that would properly protect the rights of landowners affected by it."

The Board was looking for true corridor status and actually urged the Government to establish such pathways (See pg. 8-1, Appendix 3). Notwithstanding this situation, one cannot help but see a preference for co-locating power lines when a line must be run from a generating site to a common load site. But again, the risk of losing multiple lines at the same time can govern how the corridor concept is viewed.

In Decision 81-D, (Appendix 5: 500 kV Transmission Lines Keephills to Ellerslie, April 1981, p. 11) the Board dealt with the corridor issue 31 years ago. A number of the Board's findings from that Decision will provide guidance on the issue of power lines in proximity to one another. A multipage extract from that Decision is appended to this Report so the reader may see an unedited version. In my view, the Board recognized that when lines were grouped together the impact could be reduced. What is not stated is the underlying basis for the description of "reduced" impacts – compared to what? In my view, it could only be a comparison to multiple power lines in different locations.

The Board, after some evaluation of matters specific to the Application before it, goes on to state at page 12:

"In several of its decision reports, the Board has indicated that it subscribes to the corridor concept and believes it to be in the long-term public interest for utilities such as transmission lines to be located in designated corridors whenever reasonable and practical, in order to reduce impact on residents."

In this Decision, the Board reaffirmed its preference for corridor development on linear facilities, and the use of existing corridors like the TUC's that exist around Edmonton and Calgary. These Decisions, both of which deal with the corridor concept, provide me with significant guidance that use of corridors, defined, or de facto, will generally generate lower impacts than greenfield, and obviously, multiple routings. To the extent that a corridor may also arise from other linear facilities, these must also be kept in mind as routing opportunities. Indeed, all the foregoing discussion around corridors is really just a refinement of the concept of using Existing Linear Disturbances (ELD) as a focus for routing, rather than creating new disturbances.

2.1.2.2 Conflict with Rural Residences

In virtually all its HVTL Decisions, the Board has had regard for the number of rural residences that are located proximal to the route. Through dry land agricultural areas, the convention has been to locate HVTLs through the middle of sections, to encounter as little property boundary area as possible adjacent to developed road allowances. Reducing the length of ROW beside a developed road minimizes the number of residences that may be encountered, as well as minimizing the potential conflict with future rural residential sites.

It is apparent that the Board acknowledges that it may be impossible and impractical to "thread" a HVTL through an area to avoid all conflict with existing rural residences, and has some tolerance for this conflict. However, there is no doubt that it remains one of its top priority routing considerations.

2.1.2.3 Public vs. Private Land Use

Following from the points above, if a suitable area of public land is available, the Board would prefer that be used. That said, the Board has not indicated that the use of public land is always the preferred routing option, unless the public land is designated for use as a transportation and utilities corridor. All other factors need to be considered.

In theory, using public land would avoid the potential of conflict with rural residences. That said, if the public land is used for the purpose of a developed recreation area, or designated as a natural area for environmental reasons, then use of public land is not an option. Furthermore, the Board has approved routes on private land, rather than on public land simply because the route on private land was shorter.

It appears that this is not an over-riding factor, except where a transportation and utility corridor exists. The policy appears to be, all else being equal, public land is preferred over private land.

2.1.2.4 Conflict with Irrigation Land Use

In Decision 77-G, (Appendix 2) the Board made a considerable effort to examine the conflict between HVTLs and irrigation operations. Needless to say, a great deal of detailed information is required about the irrigation development along prospective routes before these matters can be properly considered. It was deemed reasonable to place towers at the edge of fields to avoid compromising the pivot circle area.

2.1.2.5 Agricultural Impact – Dry Land

Most of the sub-factors under this category refer to items that form the basis for the amount of annual compensation for towers under the Alberta Surface Rights Act. For the purposes of relating this discussion to the Manitoba situation, we recognize that the compensation policy has been set under the Manitoba Expropriation Act, and that it is a single payment, based on capitalizing the annual impacts[1].

[1] There will be further discussion of compensation in Sec. 3.4.3.13

The Board recognizes that locating the route through an area with poor soils may result in reduced agricultural impacts, as that route would more likely be on pasture land as opposed to cultivated land.

However, the Board has not approved route alternatives that use poorer agricultural land or pasture lands, if that route alternative is significantly longer than a route through cultivated land. As in most such things, the proper balance is what the Board is seeking to achieve. In any event, when routing lines through agricultural lands, it is a priority that the structures be carefully placed to minimize their impacts. Such careful consideration of structure locations can frequently lead to route alteration. While the strip of land associated with the ROW has many impacts on land uses, it is the tower placements, and the towers themselves that, in my experience, invariably attract the most concern. This is of specific concern in the Bipole III situation.

2.1.2.6 Decrease of Property Values

This is a sub-factor under the “residential impact” category, but is raised over and over again by landowners. Generally speaking, on dry land agricultural property, based on our own analysis, we have not seen a measurable impact on land value because of the presence of a single or twin HVTL's. We are not aware of any study that has considered whether properties with an agricultural highest and best use with HVTL's take longer to sell. It is worthwhile to note that our study was in Alberta where there are annual payments for each transmission tower on the property. There may be differences in Manitoba where only a one time payment is available.

Work that we have done with pipelines and sour gas facilities indicates that land value may be impacted if the highest and best use of the property is not agriculture. Recent work in Alberta, in conjunction with the Critical Infrastructure power lines, has seen the same effect due to HVTLs. As well, land value may be impacted as a property moves out of agriculture into a higher use, such as a recreational or country residential property. HVTL ROWs restrict the amount of land that can be developed, as well as potentially affecting the development design and servicing costs.

With recreational or country residential properties, view can be a major factor in property value. For example, properties fetch a premium if they have a superior mountain or river valley view. If the location of the HVTL deteriorates the view, it would be logical to expect a decrease in property value.

2.1.2.7 Visual Impact

In Decision 77-G, the Board appears to be conflicted in their views on corridors. While expressing concern about the impacts of the second line in relation to the first lines impacts, they also recognized there can be benefits flowing from HVTLs in corridors or when placed beside an existing HVTL. By the 1980's the Board appears to have sorted out its views on multiple lines.

In Decision 80-D (Appendix 6: 500 kV Transmission Line Langdon – Phillips Pass, June 1980), the Board stated the following unequivocal view at page 6-19:

"Generally, the Board believes that a single transmission line on the prairies produces a moderate visual impact near the line which diminishes rapidly as the distance increases to 3 to 5 km. An advantage of paralleling an existing line is that the second line does not result in double visual impact."

In Decision 81-D (Appendix 5) the Board noted the following at page 11:

"Visual and aesthetic impact were also matters of concern to the interveners. The Board believes the judgment of visual impact to be somewhat subjective and the assigning of quantitative values to compare visual impact on residents difficult, particularly for future urban development. The Board, in its analysis of visual impact, considered such items as the length of line, its location with regard to existing residences, the configuration of the line (number of corners in the alignment), and conflict with future development."

The Board went on to compare two competing alignments that were all, to a greater or lesser degree, in an urban, or future urban setting. In this, as well as other situations, line length is an important consideration. The longer the line, the greater the overall visual impact. The pre-existing visual environment and the degree of change that will result from the new line are also important.

Another visual factor is scenic views. If there are superior views that would be adversely impacted by a HVTL route, these were a consideration.

In view of the foregoing, the guidance from the Board is that where one or two lines already exist, visual impacts will be less than in a situation where a new line is placed in a greenfield setting.

2.1.3 Listed Routing Criteria

There have been a number of power line cases before the Board where routing criteria have been listed with greater detail to help understand the components the Board may consider.

In both Decision 80-A and Decision 81-D, the Board included an Appendix that set out the "six major aspects" used to consider alternative routes, plus a "special constraints" factor. (See Appendices 5 and 7 for these extracts).

In these earlier decisions, these "major aspects" included the following:

1. Agricultural Impact

- *Shared use with other utilities and transmission lines.*
- *Loss of shelter belts.*
- *Loss of crops. This would include short-term loss caused by construction, longer-term losses possible from soil erosion, rutting, drainage disturbance, soil mixing, and permanent loss of crop under or adjacent to the tower base.*
- *Short-term disruption of farming and livestock grazing resulting from construction.*
- *Risk of collision with tower; damage to equipment, lost time, liability for damage to tower, and secondary liabilities.*
- *Visual impact – a daily fact of life, no choice of viewing it.*
- *Psychological impact of line.*
- *Restrictions on use of aircraft and high-pressure irrigation systems*
- *Impact of height restrictions on equipment during field operations.*
- *Reduced efficiency of field operations.*
- *Reduction in yield adjacent to towers due to overlapping farming operations and added soil compaction.*
- *Added cost and inconvenience of weed control under towers.*
- *Impact on tree farms*

2. Residential Impact

- *Decrease in property values.*
- *Visual impact, alteration of the visual character of the area.*
- *Loss of developable land, and constraints on development.*
- *Relocation or removal of residents.*
- *Psychological impact of line.*
- *Biological effects.*

- *Noise and T.V. interference.*
- *Windbreak and other vegetation removal.*
- *Conflict with recreation use of acreages.*

3. Environmental Impact

- *Increased public accessibility to wildlife areas.*
- *Reduction of habitat's winter carrying capacity due to depletion of cover and woody browse.*
- *Alteration of natural areas and sanctuaries and interferences with outdoor educational opportunities.*

4. Cost

- *The cost of each route is shown in Table 7.1 and discussed in section 7.2.1.*

5. Electrical Considerations

- *Separation of the two lines to ensure maximum reliability.*
- *Proximity of future substations.*
- *Ease of connection to future generating stations.*

6. Special Constraints

- *Electrical interferences with radio transmitting and receiving stations and satellite receiving stations.*
- *Physical conflict with private and commercial airstrips.*
- *Electrical/biological effects on The University of Alberta's research station.*
- *Inductive co-ordination with communication systems.*

In the Edmonton to Calgary - Needs Application (Appendix 8), the Alberta Electric System Operator set forth the following criteria.

"The assessment criteria found in the Board decision for the Keephills-Ellerslie-Genesee 500 kV lines and the Langdon to Phillips Pass 500 kV tie line were used for the high level corridor assessment. Under each of the primary criteria the EUB provided a list of evaluation factors it considered significant for each. The primary assessment criteria and the significant evaluation factors are summarized as follows:

a) *Agricultural Impact - Includes evaluation factors related to the effect on field operations, crop yield reduction, weed control, height restriction of equipment, risk of collision with towers, visual and psychological impact of lines, loss of shelter belts, and impacts on tree farms.*

b) *Residential Impact - Includes evaluation factors related to the decrease in property values, loss of or constraints to developable land, relocation or removal of residents, visual and psychological impact of lines, biological effects, noise and TV interference, removal of windbreak and other vegetation, conflict with recreational land use, and public versus private land.*

c) *Environmental Impact - Includes evaluation factors related to increased public access to wildlife areas, alteration of natural areas, erosion effects, unique ecological areas, use of restricted development areas, and reduction of habitat winter carrying capacity.*

d) *Cost - Includes evaluation factors related to construction and land acquisition costs.*

e) *Electrical Considerations - Includes evaluation factors related to ease of connection for future facilities, proximity to future substations, reliability, reparability, access for construction and maintenance, and separation of circuits.*

f) *Visual Impact - Includes evaluation factors related to visual impacts of tree removal, dispersed recreational users, and towers and lines seen from residences, farms, roads, and recreational installations.*

g) *Special Constraints - Includes evaluation factors related to electrical interference, conflict with private and commercial airstrips, inductive interference, conflict with historical sites, effects on recreational installations, and electrical/biological effects on research stations.*

These factors are the precursor to the current criteria, which are now termed “major factors” and employed by all Alberta Transmission Facility Operators (TFO’s).

In its recent application for the Western Alberta Transmission Line, the TFO, AltaLink, set out (at pg. 126) of its Application, what they termed "*AUC (Alberta Utilities Commission) Rule 007 also provide guidance on route selection".* In paragraph S15 they listed the items, and called them "comparative metrics". They are quoted below.

AUC Rule 007

NID12) In those cases where ISO is identifying, as part of its application, a particular area in which the TFO should attempt to ultimately locate the proposed transmission facilities (e.g. a preferred "corridor"), ISO is expected to examine alternatives, and elaborate on the rationale for recommending the preferred option, having regard for the following major aspects, where applicable:

1. *Agricultural Impact*

   a) *Loss of crops. This would include short-term loss caused by construction; longer-term losses possible from soil erosion, rutting, drainage, disturbance, and soil mixing; and permanent loss of crop under or adjacent to the tower base.*
   b) *Short-term disruption of farming and livestock grazing resulting from construction.*
   c) *Reduced efficiency of field operations.*
   d) *Restrictions on use or aircraft and high-pressure irrigation systems.*
   e) *Risk of collision with tower; damage to equipment, lost time, liability for damage to tower and secondary liabilities.*
   f) *Reduction in yield adjacent to towers due to overlapping farming operations and added soil compaction.*
   g) *Added cost and inconvenience of weed control under towers.*
   h) *Impact of height restrictions on equipment during field operations.*
   i) *Psychological impact of line.*
   j) *Loss of shelter belts.*
   k) *Shared use with other utilities and transmission lines.*
   l) *Interference with citizen band radios.*

2. *Residential Impact*

   a) *Decrease of property values.*
   b) *Loss of developable lands and constraints on development.*
   c) *Relocation or removal of residence.*
   d) *Psychological impact of line.*
   e) *Noise and TV interference.*
   f) *Windbreak and other vegetation removal.*
   g) *Conflict with recreational use of land holdings.*
   h) *Public versus private land.*

3. *Environmental Impact*

   a) *Increased public accessibility to wildlife areas.*
   b) *Alteration of natural areas and interference with outdoor educational opportunities.*
   c) *Use of the Restricted Development Area.*
   d) *Effect on erosion.*
   e) *Unique ecological areas.*

4. *Cost*

   a) *Construction cost.*
   b) *Land acquisition costs.*

5. *Electrical Considerations*

   a) *Ease of connections to future load areas.*
   b) *Reliability and reparability of the line.*
   c) *Access for construction and maintenance of the line.*

6. *Visual Impact*

   a) *Visual impact of tree removal as seen from roads and recreational installations.*
   b) *Visual impact on dispersed recreational users such as hikers, fishermen, hunters, scenic viewers, and cross country skiers.*
   c) *Visual impact of towers and lines as seen from residences, farms, roads and recreational installations.*

7. *Special Constraints*

   a) *Electrical interference with radio transmitting stations, and other telecommunication equipment etc.*

The consistency of these criteria is apparent, even with 30 years of intervening events. In other proceedings, a simple listing without elaboration has been put forward.

AltaLink, an Alberta TFO, in an August 2007 Application for a 240 kV line between Pincher Creek and Lethbridge, (Appendix 9: Southwest Alberta 240 kV Transmission Development), modified and expanded these factors, and proposed the following routing criteria.

- *Follow existing linear disturbances (existing transmission line, railway, highways) as much as possible.*
- *Allow sufficient separation from other facilities such as existing 138 kV transmission lines and developed roads and well sites to maintain safe operations of all facilities in the area.*
- *Avoid or minimize effect on residences.*
- *Minimize effects on existing agricultural land uses.*
- *Minimize environmental effects.*
- *Avoid conflict with existing distribution lines.*
- *Minimize conflict with Telus facilities and pipelines to a level that can be reasonably mitigated.*
- *Avoid paralleling steep slopes and unstable areas.*
- *Minimize cost as much as practical by minimizing line length and reducing angles.*

In my own routing efforts, (Appendix 10, August 2007) I employed the following criteria in the Montana Alberta Tie Line hearing.

- *Minimize proximity to human habitation.*
- *Minimize interference with established irrigation system.*
- *Minimize line length.*
- *Minimize the number of 90° and 45° deflection structures required to build the line.*
- *Avoid urban areas.*
- *Avoid wetlands.*
- *Follow existing linear disturbances (i.e. roads and canals) where this would yield a benefit to the adjacent landowners and MATL.*
- *Keep access for maintenance as a consideration.*
- *Avoid splitting sections if possible, on land with irrigation or irrigation potential.*
- *Cross natural water bodies on the perpendicular.*

In Decision 2009-049 (Appendix 11: ATCO Electric Ltd., Construct Updike Substation 886S and 144 kV Transmission Line 7L34), the Board noted that ATCO Electric had cited the following criteria for route selection in 2008. ATCO's criteria are set out below.

- *Minimize impacts with other land uses such as residences, built-up areas and oil and gas facilities;*
- *Utilize existing linear disturbances to minimize new disturbances and clearing, following existing power lines where possible;*
- *Follow road allowances where possible, for access, to reduce new clearing and to avoid impacts to agriculture;*
- *Keep routes as straight as possible, to reduce the line length; and*
- *Avoid environmentally sensitive areas such as watercourses, recreation areas, parks, campgrounds and wildlife habitat; and*
- *Avoid wet areas and steep slopes for better access and to reduce environmental impacts.*

In its most recent application to the AUC for approval of its Critical Infrastructure Eastern Alberta Transmission Line (EATL), ATCO Electric set out the following routing criteria (See Appendix 12).

Transmission Line Routing Criteria

General criteria taken into consideration throughout the route selection process included:

- *Minimizing impacts with other land uses such as residences, built-up areas and oil and gas facilities;*
- *Utilizing existing linear disturbances to minimize new disturbance and clearing, following existing transmission lines where practical;*
- *Keeping routes reasonably straight to reduce line length and avoid costly corner structures;*
- *Minimizing length across environmentally sensitive areas such as watercourses, recreation areas, parks, campgrounds, and wildlife habitat to the extent feasible; and*
- *Minimizing length through wet areas and steep slopes for better access and to reduce environmental impacts.*

2.1.4 Public Input Criteria

In the few occasions we could locate where the public in Alberta near a proposed development was specifically asked for their views, they hit many of the same factors.

AltaLink, in its public consultation efforts on the earlier noted Pincher Creek - Lethbridge 240 kV line, identified the criteria put forth by the affected landowner's criteria. They note:

Throughout the consultation process, AltaLink has listened to and worked with landowners and attempted to select a route which has the least overall effect and which best addresses their concerns. The general feedback from landowners was to:

- *Minimize effects to farm operations including irrigation systems.*
- *Stay as far as possible from residences.*
- *Follow existing corridors and/or power lines.*

In a further effort to define the criteria to be used for routing in an application to the Board, ATCO submitted its findings from a questionnaire answered by those landowners it consulted during the route evaluation phase for a line proposed in Northwestern Alberta. They provided 12 prospective criteria, and asked the landowners to rate the importance of the various factors on a scale of 5 (most important) down to 1 (least important).

Upon consolidation of these criteria in descending order of importance, the landowners provided the following guidance.

1. Avoid Residences and Building Sites
2. Follow ELD's
3. Minimize Cost
4. Minimize Environmental Impacts and Habitat Loss
5. Avoid Tree Clearing
6. Minimize Agricultural Impacts

The foregoing decisions, rules, lists, and public view point's represent a wide review of routing criteria, with enough repetition of certain criteria to clearly understand the priorities of the various factors.

2.1.5 Route Assessment in Alberta

2.1.5.1 Final Selection of Criteria

Upon consideration of all the foregoing, it is my view that in Alberta the following criteria, divided into 2 tiers, should be applied to the evaluation of the routing alternatives, and route segment alternatives in agricultural areas. Tier 1 includes the more important criteria, while Tier 2 are important, but less compelling criteria. I should note these are the same criteria I put forth in route assessments that I completed dealing with the AltaLink Heartland Application, and the AltaLink Western Alberta Transmission Line Application.

Tier 1

- Avoid home sites.
- Follow existing linear disturbances. (ELD)
- Minimize line length and costs.

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Tier 2

- Private versus Public Land. (Utility Corridors)
- Minimize agricultural impacts.
- Minimize environmental impacts.
- Avoid tree clearing.
- Minimize visual impacts.
- Avoid impacts on future development.
- Avoid conflicts with other power lines.
- Maintain ease of access.

2.2 Other Jurisdictions

We have conducted an internet search to find the nature of, and priority of (if possible), the routing criteria use across Canada. The objective was to see if there were recurring or common elements that would provide broad based objective guidelines against which we might compare the Manitoba Hydro route selection process. Our review will go from East to West.

2.2.1 Quebec

We were fortunate to locate a very useful document that outlined the agreement between Hydro Quebec and the Quebec Farmers Association. This document is titled Agreement on the Siting of Power Transmission Lines on Farms and Woodlands, Dec 2000. (See Appendix 13). This document identifies the impacts that the parties agree will occur, as well as the Siting Criteria Applicable to Farmland (pg. 26 of the document in Appendix 13).

The agreement notes the *"criteria are not listed in order of importance. Their application shall vary from one region to another depending on the nature of the project and the site (existing and foreseeable)."*

The factors are set out below.

- *Favor the siting of substations or power lines on the boundaries of or outside agricultural zones protected under the Act respecting the preservation of agricultural land and agricultural activities.*
- *Favor siting on agricultural land with the lowest potential in the study area, according to maps of potential prepared by the ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (Québec department of agriculture, fisheries and food, or MAPAQ).*
- *Protect sugar bushes, orchards, plantations, woodlands under development, windbreaks and other high- and average-quality woodlands in the study area, bearing in mind however that a right-of-way in this type of woodland could be developed for uses other than a right-of-way.*
- *Favor siting in poor-quality woodlands rather than on cultivated land.*
- *Where possible, favor orientation along lot, concession or any other cadastral lines and avoid running power lines diagonally across crops.*
- *Limit the number of support structures on cultivated land. Instead endeavor to locate them in residual spaces, groves or strips of woodland.*
- *Protect lands that have underground drainage or will have it in the short or medium term according to data available from the MAPAQ.*
- *Install infrastructure away from farm buildings and fish breeding ponds.*
- *Follow existing line corridors when they meet the criteria set forth above.*
- *Avoid areas subject to erosion.*

2.2.2 Ontario

We have located 3 different sets of information. One is an older (1975) report to the Ontario government on the process used to route a transmission line between Lennox and Oshawa. (Report of the Solandt Commission, April, 1975 Appendix 14A). In the context of the overall review, the report notes the criteria that were reviewed in the route selection process. The factors selected were:

a) *Minimize damage to natural systems;*
b) *Minimize conflict with existing land uses;*
c) *Minimize conflict with proposed land uses;*
d) *Minimize conflict with culturally significant features;*
e) *Maximize potential for right-of-way sharing;*

f) *Minimize conflict with capability analysis (proposed transmission facility should avoid those areas of high land capability as designated by the Canada Land Inventory).*

Objective f) was to minimize visual exposure but in the final analysis this was considered to be part of objective b).

The variables that were considered were topography, surface hydrology, existing land use, existing road ways, communications and utilities, proposed land use, unique features, outdoor recreation capabilities, average soil capability for agriculture and capability for water fowl.

We noted that of the many issues canvassed in the report, one item merited specific mention (see pg 18 of the original in Appendix 14A). That factor was to, when possible, place the line "*along back lot lines".*

We also found a List of Study Area Criteria that was applicable to the Bruce to Milton Transmission Reinforcement Project that was undertaken in 2007. The criteria are shown in Appendix 14B. There was no indication of priority, however, we note there were 14 Environmental criteria, 16 Socio-Economic criteria, and 7 more criteria related to Agriculture.

Finally, we located a Hydro One workshop report relating to the Essex County Transmission Reinforcement Project (2009). (See Appendix 14C). This is notable as it reflects direct input from the affected landowners. The factors considered most important were noted as:

a. *Landscape and Visual Assessment,*
b. *Proximity to Residential Dwellings, and*
c. *Impact on Health / Noise from Transmission lines.*

These were the top considerations among the 11 factors listed. Notable was the preference to have the line *"in their backyard",* as opposed to up by the road in *"front"* of their house, and *"as far as possible from residences".* (See pg. 7 in Appendix 14C). It was also interesting to note that the only factors noted by the landowners related to Socio-Economic (i.e. residential issues) or Agricultural factors.

2.2.3 Saskatchewan

We located a number of documents that provide insight into the route (or corridor) selection process in Saskatchewan. It seems that Sask Power receives approval for a 1 mile wide corridor when it seeks to site a transmission line. Two documents reference a recent 160 km, 230 kV transmission line from Poplar River to Pasqua in southwestern Saskatchewan. The first is a portion of the Environmental Impact Statement proposed by Sask Power in April 2009. (See Appendix 15A). On page iv of the document, the corridor concept is noted. The Executive Summary further notes the comparison process entailed setting the route out on detailed satellite imagery maps so the most recent land use could be noted. Further extracts note that on this relatively short line, 253 individuals attended the open houses in the 4 locales where they were held. Those individuals provided feedback that helped guide the evaluation process. (see pgs. 84 and 85 of the document) Mitigation options were also devised in line with recommendations, especially in agricultural areas. Pages 193, 194, 210 and 211 of the document note the preferences for quarter section line placement of the double pole structures to be used on this line. A number of other measures are also cited as a means to get the structures out of the fields.

The second document is the approval by the Minister of the Environment of the line. (See Appendix 15B). Notable on pgs. 3 and 4 of the document is that the route with the least agricultural impact was selected. Further, the Public Consultation process revealed this was the *"principal issue"* raised. Hence, we can be sure that structure placement on field boundaries was a very important component in the overall process of reducing impacts to agriculture.

Finally, we found a Sask Power bulletin describing several projects. (March 2012, Appendix 15C). It is notable that they emphasize their preference for existing linear disturbance (ELDs), most notably quarter section lines.

2.2.4 British Columbia

The only information we could locate that concerned agricultural criteria in BC was related to the small agricultural areas traversed by the Vancouver Island Transmission Reinforcement Project, May 2006. (See Appendix 16). The key issues in route assessment were noted as:

- *Disturbance to agricultural land uses, including grazing and crop production during construction and operational activities;*
- *Soil disturbance and compaction during construction;*
- *Loss of crops due to construction activities on and access to the ROW; and*

- *Effects on farm worker safety during construction and operation of facilities including the potential for induced or stray voltage in wire trellis systems used to support crops.*

Given that 16 km in total of agricultural lands were affected, the document might be expected to be slim. However, 18 pages of detailed evaluation is set out in the larger Application document. A review of this section reveals that the nature of farming in these small areas is so different that the criteria were essentially inapplicable to the Manitoba situation. A short excerpt of the Application has been included to allow the reader to see the situation.

2.3 Assessment of Canada Wide Routing Criteria

2.3.1 Routing Criteria

Set forth above there are samples of the criteria used to choose, compare, and select between potential transmission line routes in 5 other provinces of Canada. These are included in this report in order for the CEC to have a baseline to compare the quality and content of the routing efforts by Manitoba Hydro Application for the Bipole III Project.

Across Canada the transmission facility operators (TFOs) appear to agree on a number of routing concepts in relation to routing through agricultural areas. The most common and repeated criteria include:

- Avoid residences, yards, and farm buildings sites;
- Cause the least possible inconvenience to farmers;
- Use boundary or cadastral lines as the favored alignment, which is a subset of the larger goal of following Existing Linear Disturbances (ELDs); and
- Avoid high quality agricultural soils or zones.
- Avoid or minimize impacts to irrigation.

2.3.2 Routing Criteria Selection and Applicability

It is noteworthy that Quebec and Ontario specifically note that the criteria used to evaluate a route be locationally specific, while other provinces appear to choose location specific comparison criteria without stating it is an objective. Said another way, the criteria used to evaluate a route or route segment should be chosen based on the characteristics of the area through which the line will pass.

The environmental impacts are not ignored in the criteria dealing with agricultural areas. However, in the settled agricultural areas, environmental factors are most definitely weighted lower than the agricultural, human, or socio-economic factors.

In our view, this is a correct and reasonable approach considering the human influenced nature of the *"environment"* in agricultural areas, giving that word its broadest possible meaning.

2.4 Understanding and Applying Routing Criteria

In my opinion, it is extremely important to understand that a ranking exists in the selection of applicable routing criteria, as various competing aspects may be in play on any given segment or between similar route alternatives. If, for example, two relatively similar and technically comparable routes are in competition, but one is directly in front of a rural home site, and the other is, say a bit more costly and through cultivated land, the greater impact to be avoided, (i.e. home sites) would push the routing preference to the more expensive route through cultivated land.

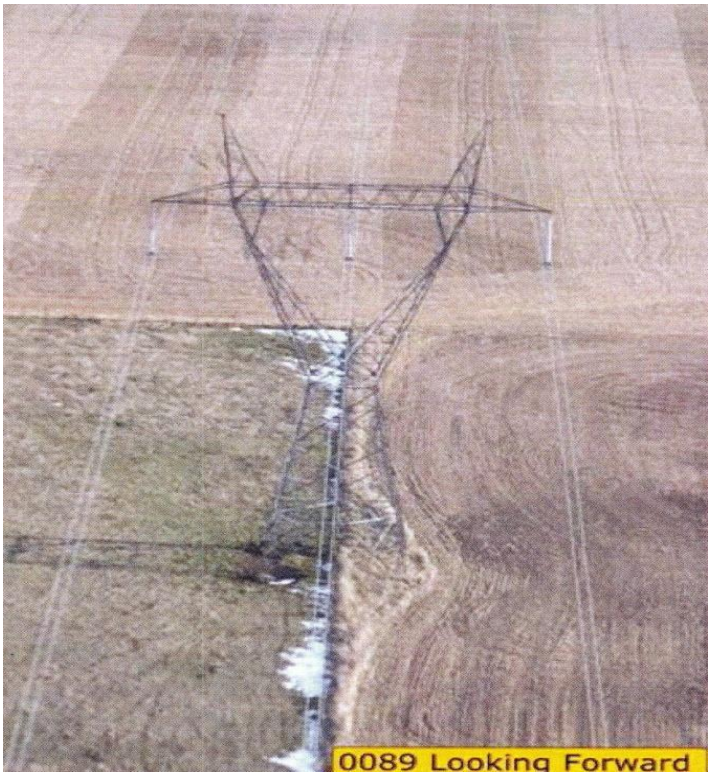
The task when applying routing criteria is to thoroughly understand not only the names of the impacts, and the concepts, but to weigh them. Then, with full understanding, selectively employ them to devise an alignment that, on an overall, as well as specific basis, is the "superior route".

Further, and this is an important concept, the routing of transmission lines includes not only the route of the conductors in the air, but the placement of the towers that will carry those conductors.

The need for a thorough understanding of routing impacts extends to the selection of tower placements in agricultural land. With the policy of Manitoba Hydro to do "tower spotting" in the field, after approval, but before construction, the understanding of this aspect takes a heightened level of importance. The CEC can make recommendations that hopefully would guide Manitoba Hydro when they get to that point in the Bipole III project.

With over 30 years of power line compensation evaluation as part of my background, I have come to know that there are four possible settings. The uncultivated (UNC) or pasture setting is least problematic. This placement, as well as the others noted below, are all captured in a series of aerial photographs contained in Appendix 17. (See Photo 1 in Appendix 17 for an example of a UNC tower).

The headland (HL) is the next most desirable, with two legs on either side of a property line. The photo[2] below illustrates the minimal impact of this placement. (See Photos 2 and 3 in Appendix 17 for other examples.)



The operator farms "by" such an obstacle, on the first pass around a field, then, with some minimal overlap, is generally able to resume straight alignments in his equipment operations. The next most desirable would see a structure in a field, but near the fence, termed headland-one side (HL-OS). (See photos 4, 5, and 6 in Appendix 17). A tower five or ten meters into a field is generally similar in impact to an HL tower. Most operations still go "by" because it is generally not possible to farm "around" a tower, or between the tower and the edge of the field in this location. But the placement of an HL-OS that is 20 m to 40 m deep into a field, is much more problematic. With much of today's larger equipment, there is not enough room to get "around" the tower base. The 42 m placement distance into the field is specifically noted in the Bipole III routing to deal with this issue.

These deeper HL-OS tower placements create a missed area in the field that is very large and that affects the farming pattern in a substantial way. This placement generates the largest Loss of Use of any tower placement.

[2] Source: AltaLink Application; Western Alberta Transmission Line, Feb 28, 2011, p. 134

The Midfield (MF) placement, (See photo 7 in Appendix 17) which creates the largest negative farming impacts (called Adverse Effect) of any tower placement, is an obstacle that can be approached on all sides with adequate turning room. While nobody likes to have a tower in a MF position, the overall impact is nearly the same as an HL-OS with a wide separation to the fence line.

If these impacts are not well understood, the route planner may create an alignment that sacrifices linearity, adds costs, and creates significant farming impacts, all because they perceive the priority is to stay as close to an ELD as possible. In this case, a fixed distance of 42 m away from the edge of the field was the selected alignment.

In our experience, if a structure is HL-OS between 20 m to 40 m out into the field, but it cannot be farmed "around" the agricultural impacts are getting to be similar to a MF tower. The only time a tower placement near an ELD would be a more desirable situation is if it is within 20 m or less (preferably much less) of the ELD, a property line in this agricultural example. And, as must be obvious, in cultivated areas, the HL placement is far and away the lowest impact placement location for an HVTL. With the foregoing understandings, a balancing of routing priorities may be achieved that result in a better route.

2.5 Application of Routing Criteria to the Manitoba Hydro Routing Process

With the foregoing discussion and routing criteria in mind, I will provide my evaluation of the routing criteria, route evaluation process, and tower placements contained within the Manitoba Hydro Application for Bipole III.

3.0 EVALUATION OF THE MANITOBA HYDRO EIS AND ROUTE SELECTION PROCESS

3.1 Description of the Route Selection Process

The route selection process that Manitoba Hydro (MH) purportedly followed is set out in Chapter 7 of the EIS. The following extracts from Sec 7.0 of that chapter set forth the intended Site Selection and Environmental Assessment (SSEA) process.

"The alternative route/site selection processes used regional and site-specific biophysical, socio-economic and cultural features to identify and evaluate alternative routes/sites and to select preferred route/sites for the Bipole III line and other project components.

Careful routing and siting of transmission facilities is critical to avoidance and minimization of potentially adverse effects associated with their development. As such, the process of identification and comparison/evaluation of alternative routes (as outlined in this chapter) is based on generic criteria related to environmental issues and concerns, project-specific criteria identified during the course of Project Study Area delineation and characterization, including initial consultation, and on the technical and economic feasibility requirements of the transmission facilities. Amongst the various economic criteria identified, line length was used for the comparison of alternative routes within the context of the study area established for the Project.

The range of issues/concerns and related impacts will vary for the different Project components (e.g., Bipole III transmission line, northern and southern converter stations, and associated ground electrodes, and ac transmission connections to Manitoba Hydro's northern collector system) and for the specific areas being studied (i.e., northern resource areas versus southern agricultural areas; undeveloped lands versus more intensively developed lands, etc). The SSEA process is tailored to match the particular requirements of the Project components and the corresponding issues."

3.2 Criteria Used in SSEA

The first and continuing step in the SSEA process is indicated to have been the identification of biophysical, socio-economic, and technical routing criteria. A list of such criteria would identify both constraints and opportunities. These are listed in Table 7.2-1, and reproduced on the following page. Following the process through, the 27 identified criteria were mapped and alternate route possibilities were plotted and evaluated. Setting aside for a moment the interim steps of multiple smaller potential route segment analysis, three whole route alternates were eventually determined; A, B, and C.

We note that there is only one agricultural factor (Intensive Agricultural Operations) identified as a constraint. We will deal with this in greater detail in a later section of this report.

Table 7.2-1: Bipole III Line: Regional Features/Constraints Considered in Alternative Routes Identification

Biophysical and Socio-Economic Features/Constraints:
Park Reserves, Ecological Reserves, Designated Protected Areas
National Parks/Provincial Wilderness Parks
Areas of Special Interest, high and moderate priority areas (Protected Areas Initiative [PAI])
Other Provincial Parks, Provincial Forests, Provincial Wildlife Management Areas
Conservation Program/Project Sites (Manitoba Habitat Heritage Corporation [MHHC], Manitoba Wildlife Federation (MWF))
Critical Habitat (e.g., caribou calving areas)
Important bird habitat (e.g., major wetlands, waterfowl hot spots (Ducks Unlimited Canada [DUC])
Species at Risk – areas of concern, rare plant species and communities
First Nation Reserves/Treaty Land Entitlement Selections/Northern Flood Agreement Hold Areas
Existing Towns, Villages and settlements (including areas designated for future urban development)
Municipal parks/other recreation areas and facilities
Military Land Reserves/Department of National Defence (DND) Bases
Intensive agricultural operations (e.g., row cropping, irrigation, organic farms)
Mineral interests, aggregate deposits, quarries and pits
Communication towers/facilities
Airports/Aerodromes and Airfields
Technical (Engineering) Constraints:
Large waterbodies (e.g., greater than 500 m in width)
Ares of steep terrain
Widespread permafrost/deep peatland areas
Transmission line crossings
Proximity to Bipoles I and II HVdc transmission lines and other major transmission line rights-of-way
Number of Heavy Angle structures
Line Length
Potential Routing Opportunities:
Existing occupied/abandoned transmission line rights-of-way
Other Linear Rights-of-Way (provincial highways, roads, railways)
Pasture lands/marginal agricultural lands
Unoccupied Crown lands

The 3 routes selected (A, B, and C) that were prospectively the lowest impact alternatives, were evaluated on the basis of the criteria listed above. The comparative basis was a linear measurement of distance traversed.

For clarity, this means that if, for example, critical habitat (e.g. caribou calving areas) was avoided, it did not show up at all in Table 7.2-2, which (with the one exception being the number of major river/creek crossings), sets out the kilometers traversed of each of the alternate routes. This is the last we see of this form of breakdown. The A, B, and C alternates were presented in the first 3 rounds of consultation.

As discussed in Sec 7.3.1, the next step involved devising a process where *"the initial alternates were evaluated and compared on a segment by segment basis by section."*

Manitoba Hydro describes the next steps in some detail in Sec 7.3.1. Effectively, the route evaluation team employed a pre-established list of 27 criteria to rate and compare the route segments. While there are some similarities in the list, these 27 criteria used for the RSM evaluation are not the same 27 Features/Constraints noted in Table 7.2-1 This process was implemented using a Route Selection Matrix (RSM) for comparison purposes (as set out in the multiple 7A-1 Tables), and it led to an initial preferred route.

As discussed in Sec 7.3.3, this initial RSM based route selection was, at the end of the day, the basis for the majority of the final route selected. We say this based on the last few sentences in Sec 7.3.3. After further review and consultation, the initial preferred route was adjusted in various locations. Out of all the segments within each section, and within all 3 alternate routes, 16 new segments were identified. These component segments were not considered *"until an initial route selection had been made as the issues were usually site specific and would not apply to all of the alternatives".* The result was that, except for the 16 adjustments, the initial preferred route became the Final Preferred Route.

The 16 adjusted segments were listed in Table 7.3-1 (pg. 7-45) and these 16 segments were then inserted into the exact same RSM, as set out in Table 7A-2, which follows the 13 RSM tables in 7A-1.

Based on the discussion in Chapter 7, and the restatement of the general process in Appendix 7A, the RSM would appear to have played the largest role in the route selection process.

Given that situation, it is incumbent upon us to carefully vet the inputs, process, and results of the RSM process.

3.3 Critique of the Route Selection Matrix Process Through the Agricultural Areas

3.3.1 Introductory Comments

First, let us note that while we have a passing familiarity with a number of biophysical environmental factors, we are not experts in that area, and we will confine our comments to only the most general issues and to matters which a layman would identify. The same may be said of the technical issues. However, we are very experienced in agricultural matters, as well as the routing process, and it is largely from that perspective that this critique will originate.

3.3.2 Criteria Used in the RSM Process

The EIS notes 27 criteria divided into 4 or 5 categories, depending on how they are organized. The ones we see are set out below.

Biophysical	Socio-Economic	Land Use	Technical	Response
1. Vegetation	1. Population Density	1. Land Use	1. Foundation	1. Aboriginal Communities
2. Forestry	2. Culture - Heritage	2. PAI-ASI	2. Angle Towers	2. Municipalities
3. Birds	3. Resource Use	3. TLE	3. Construction Access	3. Stakeholder Groups
4. Mammals	4. Lodge - Tourism	4. Agriculture	4. Separation	4. General Public
5. Caribou			5. Line Length	
6. Core-Communities				
7. Fragmentation				
8. Soils & Terrain				
9. Aquatics				
10. Amphibians & Reptiles				

The method utilized was to assign a rating to each criteria that carried a value of Low = 0, Medium = 1, High = 3 for most criteria and Very High = 5 for a few specified criteria. The process of setting the ratings was not transparent from the various EIS Sections describing or discussing the route selection/RSM process. Presumably it involved the committees of discipline specialists noted on pg. 7-32.

However, when it came to the agricultural issues, and the routing decisions through Sec 7 to Sec 13, clearly the Manitoba Hydro staff dictated the final choices, over-ruling the recommendations of their agricultural specialists, J & V Nielson and Associates. (See pg. 27, Sec 6.1 of the Agriculture Technical Report concerning tower placement, and Sec 6.7 and Table 6, where Nielson sees Route B as the Final Preferred Route, while Manitoba Hydro selected Route A over his recommendations).

Given this situation, the first critical observation is that the experts in a given technical discipline were not given any priority in the decision making process. Hence, we may expect to see other areas where the Manitoba Hydro staff direct the outcome, while discounting sound technical advice.

The second critical observation is that any impacts rising within the agricultural category, which occupies fully half the route, could only contribute 1/27 of the rating outcome.

The third, and perhaps most critical comment is that the RSM may have been a method to review and evaluate a route, but it was not the basis for the initial selection of the route. In his direct evidence, Mr. Nielsen described how he picked out various routes, and then subjected them to a criteria review. Mr. Nielsen advised in his testimony (at transcript pages 2417 – 2472) that they tried to avoid the obvious, as he termed them, “impediments” of irrigation pivots, farmyards, and intensive livestock areas. However, it is clear from the process he described that rather than identifying the constraints before they went to the field, it was the “ground truthing“ in the field that alerted them to the impediments. Further, other non-visible impediments, were identified by a Mr. Krawchuk on the routes that were already picked out.

The picture that emerges is that the routing process, did not begin with a clear idea of the appropriate criteria that would guide the routes selection. Rather, routes were picked, and then tweeked, moved, or otherwise changed when “impediments” were uncovered. This is a completely backward way of picking routes when compared to the way it is done across Canada.

3.3.3 Rating Process Generally

The assignment of ratings for 23 of the 27 criteria in the RSM would appear to be totally subjective. The occasional note highlights the rationale for the H or VH ratings, but what is not clear is how the ratings overall are indicative of the entire segment. By this we mean, that for lengthy Segments or entire Sections (the complete route is broken in 13 Sections), the entire gamut of possible issues and impacts within that criteria are reduced to a single rating of H, M, or L. It would help to see the total Section lengths of the Final Preferred Route to appreciate this issue. We are only dealing with Sections 7 – 13 which contain agricultural land.

Section Length – Final Preferred Route		
Section No.	Km	Miles
Sec 7	112	69
Sec 8	156	97
Sec 9	168	104
Sec 10	76	47
Sec 11	42	26
Sec 12	35	22
Sec 13	50	31

An example will best serve to illustrate the problem we see with this over simplification. In Sec 11, Segments A20 and C28, (see EIS, Table 7A-1, pg. 12 of 14) which are between 20 to 40 km long, both carry an H rating for a single point of potential impact, being possible bird strikes of the conductors over the Red River.

While dealing with this point focus issue, we also noted that Segment C28 has the same eastern terminus as Segment B26.

The logical conclusion, we would suggest, is that B26 also crosses the Red River. However we do not see this similar H rating for Birds until Sec 13, where route segment B28 carries the H rating for Birds for the same reason. Hence, the numerical sum of the impact comparison between segments is skewed. If a given factor (i.e. Crossing the Red River), is deemed to create a high impact for a given criteria (i.e. H = 3 for Birds), and that factor is identical for all 3 routes, it will affect the RSM outcome if that factor is included in different segments. The ratings should show the impact within the Section where a comparison between segments is alleged to be taking place.

Another problem we see in the RSM process is illustrated in Sec 11. To get from the west end to the east end, 2 segments are identified within the same Sec 11; C27 and C28. Yet each of these segments is given its own rating. The effect is to either minimize the total impact rating of each sub-segment within that Section, or to double the rating if the two are combined to get from one end of the Section area to the other.

An example will serve to illustrate this point. The ratings for both agriculture and angle towers criteria in Segment C27 are H, which contributes 6 points to the total of 11 for that segment. If we were to use the approach of setting a rating for the highest single point impact, (i.e., If Segment C27 for Agriculture is rated H, and Segment C28 is M, the H would prevail), the rating of a blended C27 plus C28 segment would see the following rankings for all of the criteria that were ranked higher than the rating of L (= 0 points) for both sub-segments.

Birds	H	3
Aquatics	M	1
Culture	M	1
Land Use	M	1
Agriculture	H	3
Foundations	M	1
Angle Towers	H	3
Separation	M	1
Line Length	M	1
Total		15

Individually the segments rank 11 for Segment C27 and 10 for Segment C28, while combined they rank 21. So what is the RSM generated rating Route for Section II? Such a process is evidently not transparent or a reliable indicator of predicted impact.

To further examine this ranking process, we considered the assertions in Chapter 7 of the EIS that the criteria most applicable to the Section would be most important in the RSM analysis. However, there is no indication at all that this process was actually followed.

The dash (-) (see pg. 7A-2) that was noted to indicate a criteria was not applicable, is only used for the caribou criteria in Sections 7 to 13, the agriculture criteria in Sections 1 to 6, and the forestry criteria once in Section 11, Segment C27. The logical conclusion that should follow is that all the remaining non-dash criteria were applicable.

Looking in detail at Forestry, when we retrieved the Google Earth aerials that covered the Final Preferred Route through Sections 11, 12 and 13, we did not see any forests, nor are any noted on Map 6-2500-06. In Appendix 7A, the criteria labeled Forestry (pg. 7A-2) is noted to be concerned with commercial forestry values. Hence, we see this criteria as totally inapplicable to the most southern sections. Yet it is assigned a rank for 29 out of 30 segments in Sections 7 – 13. How can this be?

Likewise we found Resource Use to be a contributor to the rankings with many M (1 point) ratings. Yet the emphasis noted for this criteria in Appendix 7A (pg. 7A-6) is trap lines, and Game Hunting Areas (GHAs) intersected by one of the alternate routes. Map 6-34 shows no Registered Trap Lines south of Dauphin Lake, while the entire province is broken down in GHAs (Map 6-36). Hence, again, we see a criteria with no apparent applicability to the most southern sections is involved in the RSM process and conclusions.

The list of non-applicable criteria contributing to the ranking scores goes on. For example, Aquatics is ranked L (=0) in only 3 of 30 total segments ranked in Sections 7 through 13. This means that there are 27 segments with 1 or 3 units adding to the total numerical impact rating. Given the resultant very high contribution to the impact evaluation (a total of 38 points in the combined Section ratings), one might presume that the Aquatic environment would be subject to many significant impacts from the various line segments. Yet, with a 159 page main report with 13 Appendices running hundreds of pages more, the net result of the Bipole III transmission line is summed up in the 7th paragraph of the Executive Summary (pg.iii of the Aquatic Environmental Technical Report; see Appendix 18) as *"low risk,"* and *"no measurable effect of surface water quality and fish habitat."* This disconnect between rating and potential impact represents a serious problem with the matrix rating system process. This is especially so in the agricultural areas of the route.

Another criteria that appears to be measuring non-existent impacts is labeled TLE. Tracking the routes on the Aboriginal Lands maps 6-2600-04, 05, and 06, the only TLE lands that are seen between Sections 7 – 13 are in Seg B18 in Section 7. There are no TLE lands marked on these maps anywhere near Sections 8 through 13. Yet we find 5 H ranks, and 4 M ranks with all the rest rated L. There is no apparent rationale for those ratings, as TLE lands are not found in these sections. Indeed, Mr. Nielsen noted in his testimony that if they hit a TLE parcel with their preliminary routing, they moved the line. (Transcript pgs. 2471-2). Hence the criteria should have a consistent dash (-) symbol.

A final observation on the RSM process concerns the "Response" category. These are the other 4 criteria to bring the total number of criteria to the 27 set out in the Table 7A-1. The EACP process is the basis for this rating, with the notation on pg. 7A-1 setting out the basis as follows:

"A three-tiered ranking system (fair, good, or poor routing option) for the EACP responses was based on numeric counts of comments."

In respect of the agricultural areas, the written comments would have been (presumably) the Land Owner Information Centre Forms turned in that were noted in the EIS Chapter 5, being either 319 forms (pg 5 – 36) or 298 forms (pg 5 – 51). There is no way to know if these 300± landowners were actually on a route or just nearby. The Executive Summary notes there are 750 landowners (pg. vi) directly affected in terms of easements being required. There will also be more close-by properties impacted, but without actual right of way on their property. Hence, the landowners who provided feedback may only represent a small fraction of the affected landowner group, but in no case could they be more than 40% of the owners on the line. (300/750 = 40%).

A further aspect of the EACP process brings into question the likelihood of the consultation being an accurate reflection of opinions of the agricultural producers near one of the alternate routes. In our view, the timing of the consultation efforts was very problematic. According to Sec 5.3.3 (pg 5 – 12) the Landowner Information Centers were open for two months between late August to late October, 2010. These dates display a high degree of insensitivity to the nature of the agricultural business being conducted in the area of the ROW.

In our experience, it would not be possible to pick a time when active farmers would be less inclined to leave their farm to attend an Open House. Harvest would either be just ahead, or underway. Equipment needs to be prepared, repaired, or maintained. Fall field work and hauling of produce needs to be done. A year's worth of income is on the line during this time. Yet, this is when Manitoba Hydro goes out for Round 4 to the community that will host fully half of this Bipole III transmission line.

In our view, the consultation efforts of Manitoba Hydro to fully apprise the agricultural community of the project and to receive meaningful feedback on the Preliminary Preferred Route would not be considered adequate. In other jurisdictions, the TFO goes to the landowner, to their farm, to be sure they get feedback. The consultation process can extend over many months.

Here, Manitoba Hydro is effectively saying, "Mr. Farmer, if you want to know more about our project or convey your concerns to us, you shut down your combine and get yourself to town where we are waiting to meet with you". Is it any wonder the level of response was so low?

The final aspect of our difficulty with this Response Category is the element of pure number counting to generate the good, fair or poor ratings. Clearly the sample size is small, the profile of the responders is unknown, the response of the landowners is subjective interpretation, and in any event, power line transmission routing is not a popularity contest. Individual preferences, likes or dislikes should not overrule good route planning principles. While consultation is useful and important to gain knowledge about impacts, final routing decisions should largely be based on objective characteristics.

In view of the foregoing examples, it is clear that the SSEA process did not *"match the particular requirements of the project components and the corresponding issues."* In turn, this indicates that the route impact assessment was likewise flawed.

3.3.4 Missing Criteria

The discussion so far has focused on the RSM process set out and employed by Manitoba Hydro in their route selection process. As we noted earlier, a Canada wide review identified a number of criteria deemed important in a route selection process in agricultural areas. For convenience these are repeated below.

- Avoid residences, yards and farm building sites;
- Cause the least possible inconvenience to farmers;
- Use boundary or cadastral lines as the favored alignment, which is a subset of the larger goal of following Existing Linear Disturbances (ELDs);
- Avoid high quality agricultural soils or zones.

What is evident from the foregoing review of the criteria that was included and rated in the segment by segment RSM process, is that not only is there the inclusion of multiple irrelevant criteria, there is an absence of relevant and important criteria.

To demonstrate the shallow analysis that was performed one need only look at Chapter 8, Effects Assessment and Mitigation. It contains 366 pages, 21 Tables, 1 Figure, and 8 Maps. The agricultural community criteria important across Canada are relegated to a notation in Table 8.3-1 (pg. 8–248) and some discussion and description in 8 pages in Sec 8.3.1.3, pgs 8–223 to 8–226, and 8–236 to 8–239.

What is particularly conspicuous by its absence is any type of analysis or comparison between route alternative A, B, and C relative to the Cross-Canada criteria dealing with the agricultural community. The most important criteria of avoiding residential sites is dispensed with only 3(!) sentences on pg. 8-224 (reproduced below), and with absolutely no comparative metrics for the alternate routes.

The final preferred route was selected to avoid displacing or passing within close proximity to rural residences (i.e., within 100 m) to the maximum extent possible. One rural residence is located within 100 m from the final preferred route for the Bipole III line (SW 16-39-24WPM). An additional 18 rural dwellings are located between 101 and 200 m of the final preferred route, while an additional 12 are located between 201 and 270 m.

To illustrate how such metrics may be formatted and displayed, we have provided 3 sample metric comparison sheets in Appendix 19 from recent proceedings in Alberta. The purpose is not to say, “do it like this.” Rather, the intent is to demonstrate the lack of transparency in the route selection process as it relates to comparison of either whole routes or possible alternate routing segments or Sections.

The comparison is obvious by looking at Appendix 19 side by side with any of the RSM tables 7A-1. While the final preferred route is within 100 m of only 1 home (and this is laudable), the CEC has no residential proximity information on the other possible alternative routes, sections, or segments.

This lack of transparency or comparative metrics continues with the absence of any information on the possible alternate ROW placements. This especially relates to the placement of 231 km (See ATR, p. 51) of the final preferred route (FPR) in the field. This is nearly 40% of the routing through the 585 km of line in agricultural areas.

Not only is this route placement in direct violation of the criteria noted above from across Canada, it ignores the advice of Manitoba Hydro's own agricultural expert, and the input from farmers. Hence, when Manitoba Hydro states on pg. 8-237 that the FPR *"tower placement has the lowest impact on agriculture*" it is categorically wrong. As we noted earlier, MF placements create the highest levels of adverse effect of the possible tower locations. They also, obviously, do not follow any ELD, another of the cross Canada criteria appropriate for agricultural areas.

3.3.5 Summary and Conclusions Regarding the RSM and Manitoba Hydro Route Selection Process

At this point it would be appropriate to review the espoused basis for the ratings. In the EIS Appendix 7A, pg. 7A-1, third paragraph, the following sentence is found.

> *"Biophysical, socio-economic and land use ratings were based on the degree to which the factor was potentially affected."*

As well, we note the statement on pg. 7A-2, second paragraph

> *"Several biophysical factors (e.g., caribou, forestry) and land use (e.g. TLE, agriculture) were not applicable in all sections and were not rated in sections where these factors were not a consideration."*

A review of the foregoing statements, together with our analysis of the criteria ratings in the RSM sheets appears to indicate a number of issues or failures in this process. These are:

1. Within Sections 7 – 13, which is overwhelmingly agricultural, the RSM process is set up so that agricultural issues make up a tiny percentage of the routing criteria or ratings.

2. The RSM system, with its dependence on a numbers based method, leaves little room for judgment and discretion in routing selection.

3. The EIS reflects an enormous imbalance in its impact identification and evaluation. While unquestionably important, the natural environment parameters overwhelm the EIS, while the agricultural impacts are relegated to 1 technical study, and a few pages (literally) in a number of chapters. The dearth of information is a major shortcoming in the EIS and routing exercise, and the issues we have identified later in this report in respect of the routing through the agricultural areas reflect this.

4. Criteria that do not exist within a Section, or have virtually no prospect of being impacted, are identified and given ratings which contribute to the overall numerical rating of a segment. As such, the stated process of analysis of *"factor(*s*)…potentially affected*" was not followed.

5. Because of the number or ranking based system in the RSM, segments of varying lengths within a Section are not evaluated and compared to each other in a rational way that allows a true comparison to be made. Further, the process of Section by Section analysis supposedly generated a series of lowest impact components. However, the route segments were not continuous. That required new cross connections to be devised. This resulted in more ROW, more corners, and more impacts.

6. The rating system is so coarse that a point impact can drive the rating for a Section many kilometers in length.

7. The arbitrary breakdown, or multiple segments within a Section, distort the impact comparison by doubling or tripling the total ratings of segments within a Section, when compared to an alternate route with say only one Segment in the same Section (see Section 8, Table 7A-1, 9 of 14 as an example).

Combined, these problems and flaws in the RSM process render the use of the numerical impact assessment and opinion survey ratings in the RSM process unreliable. If the results are unreliable, then a route judged by the RSM process to have a lower or greater impact cannot be considered to have been accurately assessed in comparison to other potential routes. This is fatal to an exercise where the goal is to identify a superior route.

3.4 Review and Critique of the Agricultural Impact Assessment as Presented in The Agriculture Technical Report

3.4.1 Introductory Comments

As noted earlier, a number of critical recommendations generated in the Agriculture Technical Report (ATR), were ignored, over-ruled, or otherwise not implemented. On the face of it, this minimizes the prospective utility of the ATR in the route selection process. At the same time, it raises the question of why have an ATR if the recommendations by the sector specialist are not followed? This is even more important when, as appears to be the case, the only routes evaluated were selected by this agricultural specialist.

Notwithstanding this rather significant issue, the ATR explores a number of important issues, including the criteria for routing, compensation, irrigation, homesites, and others. The Commission should have the input of other experienced professionals in order to determine the appropriate recommendations to the Minister. With our experience and expertise in matters of agriculture and power line routing, we are capable of providing such input to the CEC.

3.4.2 The ATR Overall Review

The initial comment we have relates to the ATR author, the corporate entity J & V Nielson and Associates Ltd. With no resume or identified principal author, we sought out the website for the company. (See Appendix 20). It appears to indicate that the focus of the company is environmental consulting to the oil and gas industry. There is no appraisal expertise indicated, and the only reference to transmission lines is in the context of Environmental Impact Assessments, as opposed to say, routing of power lines through agricultural areas. Given this background, one is likely to encounter a report that relies heavily on published material, rather than experience, or analytical approaches that are created for the purpose of the report, rather than tested and accepted methods. These techniques are not automatically inferior. However, it does mean that they need to be carefully vetted to ensure they properly and accurately deal with the issues under review.

3.4.3 Section by Section Commentary and Critique

The following section is organized in a fashion to follow the ATR through in the order presented. We will reference a Section by name and page reference, and provide our comments, as well as any critical discussion. Where appropriate, we will include material to assist the Commission in evaluation of our work as it may be contrasted to the ATR. Only the Sections where we have a comment or critique will be noted.

3.4.3.1 Preface (pg i)

Comment: The initial discussion appears to be a restatement of the Manitoba Hydro statements about the SSEA and RSM processes. This is especially apparent when the 28 (should be 27) factors are noted.

Critique: The final sentence in the Preface is demonstrably wrong. The ATR (p. ii) states" *"From an agricultural perspective the most favourable line routing was chosen."* Mr. Nielsen may have picked a most favourable route, but Manitoba Hydro picked a less favourable one.

A quick look at p. 39, Table 8, and the accompanying text reveals that the ATR found that in the southern segment of Sec 9, Secs 10, 11, 12, and 13, Route B was most favourable. However, Manitoba Hydro chose Route A. Hence, for a major portion of the route through the agricultural land area, the statement is simply not so.

3.4.3.2 Introduction (pg. 3)

Comment: The first portion is simply descriptive. However, on pg. 5, first paragraph, the reader is advised of an issue that plagues the ATR throughout – Manitoba Hydro over-ruling the recommendation of its agricultural expert. This is the first place this issue is noted, but, as will become apparent in later sections, it compromises the analytical process that is at the core of the ATR findings and recommendations.

Critique: The discussion on pg. 5 highlights the progressive errors in tower placement (and routing) that are found in this project in the agricultural areas. The initial assumption by Nielson that half mile (HL) placements should be used was changed (for reasons never made apparent) to beside a road allowance. This meant, presumably, tight to the roadway, another HL placement.

Further consideration lead to the conclusion that such placements would be vulnerable to vehicle collisions and overhang issues. So, rather than go back to the quarter line, Manitoba Hydro decided to go into the field, at first only 20 m or so (a larger HL-OS). Following receipt of the obvious concerns of farmers during Round 4 that these placements were too close to farm between, Manitoba Hydro, rather than getting the towers out of the field and out of danger, responded to these concerns and compounded the error, by pushing the towers 33 m or 42 m into the field (MF).

One might observe that this is an instance of being careful what you wish for. On a serious note, however, as will be seen, this decision dramatically increased the impacts of the route and affected the review by the ATR team.

3.4.3.3 Literature Review (pg. 7)

Comment: The ATR reviews a number of publications in its efforts to identify transmission line concerns. The three papers most extensively reviewed (Webb, 1992; Hanus, 1979: and Rumsey, 1993) are all roughly 30 years old.

Critique: Most notably, the data from Hanus dealing with financial impacts is unreliable as it relies on Bank of Canada inflation multiples rather than current cost components. Further, the area impacted by farming around the towers (which leads directly to the costs to farm around those towers) is based on the typical sizes of equipment used in that era. (This may be why the Manitoba Hydro compensation model uses only 40 ft of equipment width). Things have changed considerably over the last 30 years in respect of not only equipment size, but farming techniques. All these factors self-evidently weaken any conclusions drawn from such aged resources.

The three U.S. publications noted (from Wisconsin, Minnesota, and Illinois) are cited for recommendations on mitigation, routing, or structure placement. We recovered all three publications, and they all reference single pole (wood or steel) or double pole structures. (See Appendix 21).

These are clearly different in respect of the flexibility of structure placement, most notably with regard to placing them at the edge of road allowances. The Bipole III project involves free standing lattice-structures typically 7.85 m (25 ft 10 in) square.

When even a modest buffer zone is noted, the area impacted is 10 m square. As such, one must take any guidance or "*mitigation measures*" (as the ATR refers to routing or structure placement) with a great deal of caution. One over-riding lesson is clear from the literature: put the structure, no matter what kind or size, at the edge of the field.

3.4.3.4 Irrigation (pg. 10)

Comment: The ATR provides a good review of this issue. The major conclusions are that irrigation systems and transmission lines can co-exist, but they cannot (obviously) occupy the same space. Measures are possible to allow the irrigation systems to work. Most typically, the power line should be at the edge of the field.

Critique: After such a good review, it is curious why the ATR would set out in Sec 15 Summary and Conclusions, pg. 110, third bullet, that there should be a study to determine if a transmission line can be placed 42 m into the field, while still allowing the circular pivot to operate up to the edge. This would self evidently prioritize the power line route and tower placements to the eternal detriment of the farmer trying to irrigate the land. Unless there is an overwhelmingly compelling rationale for the infield placement, the power line should be at the field edge. And the ATR should say so, not try to set up a scenario where the infield route is approved, and some study (that is doomed from the start) is made a condition or recommendation.

We have no hesitation in offering the expert opinion that in actual or potentially irrigable areas, power lines should be located on the quarter line, unless site specific reasons exist to do otherwise.

3.4.3.5 Methods and Procedures (pg. 14)

Comment: The criteria noted to be utilized are both reasonable and comprehensive. But we must note that the entire exercise was a look back, to review lines already picked, rather than using the criteria to guide the initial route selection.

Critique: The ATR notes the criteria are in order of importance. We agree with the first listing priority. However, despite the earlier literature review, and the clear understanding that towers on the edge of a field are less problematic than infield placements (see text, pg. 33, top of page), the ATR lists the highest priority as *"Route on or adjacent* (presumably 33 m or 42 m) *to road allowance."* The authors of the ATR unquestionably know the third bullet, "*Route along the half mile…"* is a lower impact placement, so one must conclude the list is out of order.

This is an important issue that we see has compromised the later work of route impact analysis. Common sense, and any level of farming experience at all, will unequivocally lead to the conclusion that an object placed some distance into a farmed field will have more impacts than the same object at the edge. If the authors of the ATR do not start from this premise, then their conclusions will be compromised.

3.4.3.6 An Agricultural Description of the Study Area (pg. 17)

Comment: This helps lay the groundwork for the route selection work to come in the later portion of the report. It is thorough and on point with respect to the relevant considerations.

3.4.3.7 Development of Route Alternatives from Nov 2007 to March 2009 (pg. 21)

Comment: The opening paragraph references the source material as Google Earth images and older aerial photography, and Etopo maps. Greater detail was required and aerial photography that was no newer than 2005 was then employed. Ten different Sections were identified, with multiple routes through each one. One segment required "new" aerial photography to develop routes across the Red and Seine Rivers. The text also notes a route around a community pasture was planned in order to avoid passing through Federally owned land.

Critique: With a project of this size, and the importance of the routing exercise, it is incomprehensible that Manitoba Hydro did not generate and provide the ATR team with up to date aerial photography of the study area. Aerial photographs represent one of the greatest possible tools for route planning. For comparison purposes, we have provided four different routing maps, with alternates, plotted on aerial photography so the CEC can see the nature of the raw material that should be available for route planning. (Appendix 22). This is also the kind of evidence that the CEC should have in order to conduct a comprehensive review.

The purposeful avoidance of Federal land would not appear to be a typical or listed routing criteria. Indeed, community pasture land is eminently suitable for a power line. However, if Federal land is avoided, the project is not subject to the same scrutiny in a Provincial review as it would if Federal guidelines were required to be met. This is a poor routing trade off.

3.4.3.8 Soil Capability, Present Agricultural Use and Routing Opportunities (pg. 24)

Comment: The agriculture areas were split by the ATR team in 7 general categories depending on land use, cropping, and productivity. These are shown on Maps 6-3100-04, 05, and 06. The poorer areas, in terms of productivity, were deemed routing opportunities, while the better land areas were noted to be avoided, if possible.

Critique: The exercise in classing the land areas by use and so forth is worthwhile. However, the attempt to use class and productivity of such wide areas as a basis for devising a route is not an achievable goal. There were too many system imperatives set down by the Government (i.e., West Side Route) and Manitoba Hydro (i.e., East Side of Winnipeg), to allow for any wide scope routing flexibility. The result is that the Summary on pg. 26 provides no useful routing direction at all. It simply indicates the obvious increasing potential impacts that may arise from a transmission tower on farm land.

3.4.3.9 Routing Methodology (pg. 27)

Comment: The first line of the second paragraph indicates that the ATR team recognized the impacts of tower placement would be minimized if the towers were on the interior quarter section boundaries. But for reasons not disclosed, the ATR notes Manitoba Hydro went to the infield tower placement. (We discussed this thoroughly in an earlier section of this report and we will not repeat that here).

The ATR notes they settled on three alternate routes - A, B, and C. A was most easterly, crossed irrigation land, and was longest through more productive agricultural land. The ATR notes it was not selected as the preferred route. Route B is the most westerly across the Seine River, and *"has by far the least impact on productive agricultural lands."* It was the ATR teams preferred route. Route C has more impact than B, but less than A.

It is evident that the ATR team saw Route B as the most favorable. Up to this point, we do not have enough comparative information to critique that selection.

3.4.3.10 Routing Methodology (pg. 30)

Comment: The entire section that follows in the report was a new creation by Mr. Neilsen at the request of Mr. McGarry (Transcript pg. 2472). As such, it has not been subjected to any previous evaluation or analysis. This Bipole III review is its maiden voyage. Unfortunately, as will be seen, it will hit some rough seas.

The method used in this section of the ATR uses two features to judge routing quality. Following generally the notion set out earlier in Soil Categories, this time the ATR team identified eight Agricultural Impact Rating (AIR) Categories. Then within each category, they considered the potential impact of tower placements. Like golf scores, a lower rating reflects the lowest impact. The eight AIR Categories are set out on pg. 31 of the ATR.

Tower Placements are next set out, again with a rating system devised by the ATR team. As may be expected in AIR Categories 1 and 2, with essentially no cropping activity, tower placements did not matter, and all Tower Placement Ratings (TPR) were a base line level of 1.

In AIR Category area 3, with cropping and mixed farming activity, the TPR show a gradation. The TPRs allocated were as follows.

Rating	Route Alignments
1	edge of road or ditch
3	half mile line or quarter mile line
3	diagonal alignment

Both of the TPRs with a rating of 3 indicate a management unit split.

For AIR Categories 4, 5, 6, and 7 further TPRs distinctions were devised. These include the following.

Rating	Route Alignments
1	edge of road or ditch
3	half mile line (with a notation of a Management Unit Split)
4	quarter mile or other distances infield (with a notation of a Management Unit Split)
5	diagonal (with Management Unit Split)

In AIR Category 8, which is any area with active irrigation, all TPRs are rated 10.

With this rating system in place, each of the multiple routes noted above that were devised by the ATR team were measured and rated. The ATR team concluded that the Route they devised and identified as Route B was best from all perspectives. Overall, using their rating system, Route B had less than half the impacts as Route A (1783/3959 = .45).

Critique: As must be evident from our earlier discussions, the ATR analysis lives or dies on the accuracy of the scoring or rating system. In our view, the TPRs are out of kilter with reality. The ATR team's earlier recommendations, routing choices, farming expertise, and comments in the report are all at odds with their TPRs. For example, starting at the bottom of pg. 32 with respect to any MF placement (42 m or more in the field) they note,

A tower placed in the middle of the field impedes operation and creates a Management Unit Split. This changes the farmer's ability to manage production activities including aerial spraying. The towers impact equipment movement throughout the field and increase the difficulty and the hazards related to operating the machines. Thus the land owner or operator may have to divide the field into smaller management units. Towers placed on the road allowance or on the edge of a drainage ditch have less impact on the land use.

Then, immediately below this, on pg. 33, they state the obvious contrasting comment with respect to quarter section, or half mile (HL) tower placements.

Most agricultural land is divided in half sections and therefore towers placed on the half section line interfere less with cropping compared to in field placement. Towers placed on the quarter mile or in the field have more impact. Towers placed on a diagonal line have the greatest impact on agricultural production activities. Towers placed in the field or on the diagonal have a major impact on aerial spraying.

Later in the ATR, in Sec 8, pg. 64, we also find the following statement.

Locating structures next to the road allowance is favored for ease of agricultural machine operation (the farmer can swing the machine out and past the pole and the impact is eliminated in two or three machine passes; the same is true for half mile line placement where the line does not split a management unit). Where the transmission line will split management units, placing structures 42 m or more from the nearest impediment, where possible, will help to facilitate the movement of machinery, such as field sprayers, around structures.

Now any rational analysis would see the MF placement (i.e. 42 m into the field) as most problematic. HL-OS beside a road or drainage ditch (which while proximal to an ELD, is still in the field), would create lower impacts. And as stated, the half mile placement right on the boundary, with only half a tower on each side (HL) would have the least impact. Yet shown below are the TPRs assigned by the ATR team for AIR Categories 4, 5, 6, and 7.

Table 4. Agricultural Impact of Categories 4-7 Tower Placement

Rating	Rating Description
1	Tower placement on or on the edge of the road allowance.
1	Tower placement on the edge of a drainage ditch.
3	Tower placement on the half mile line (some Management Unit Splits will be created).
4	Tower placement on the quarter mile line, 33-50 m into the field, or various distances in field (each field will create a Management Unit Split).
5	Tower placement on the diagonal (each field will create a Management Unit Split).

The order, and then obviously the ratings, of the first 3 TPR values are self evidently wrong.

With this fundamental conflict in the Tower Placement Ratings, the scoring system and its results set out in the following sections of the ATR are compromised. What is never made clear in any discussion is the rationale for the seemingly random switching back and forth between road side (which in reality is 42 m into the field) and half mile placement along different segments of the same section.

With the understanding that the ATR route selection process is unreliable, what remains is the inescapable fact that the ATR team selected Route B (see pg. 34 and 35). Manitoba Hydro ignored this recommendation, and as noted in Chapter 7, pg 7-49, through Section 10, 11, 12, and 13, selected Route A with a longer route and more impacts.

In our view, the CEC cannot have any possible confidence in a route selected in the foregoing described manner. In our view, the most egregious issue is the in field placement. As described on pg. 51 of the ATR, the majority of this line is placed in the two worst possible tower placement locations, as noted on the next page.

Total length	586.5 km	
Line of ½ mile	104.0 km	17.7% (Best)
Line Infield	231.0 km	39.4% (Poor)
Line Diagonal	251.0 km	42.8% (Worst)

There is no point in any further discussion of Sec 7 of the ATR, as the values and totals are unreliable, as are any conclusions drawn from them.

3.4.3.11 Issues with Transmission Line Analysis (pg. 53)

Comment: The second paragraph notes that initial routing analysis was made under the assumption that the route would be beside a road or drainage ditch. The rest of the Section details the specific characteristics of Sections 5 through 13.

Critique: On page 5 of the ATR, the top line notes *"The initial routing had the Bipole III line placed on the one half mile line where feasible".* The two statements are very obviously in conflict. It really doesn't matter as neither one of these lower impact tower placements recommended by the ATR were utilized to any degree by Manitoba Hydro in their Final Preferred Route.

3.4.3.12 Line Section Analysis (pg. 53)

Comment: This portion of the ATR contains specific descriptions of the relevant agricultural and residential characteristics of each Section. However, given that Manitoba Hydro did not follow the ATR recommendations, there is no point in reviewing these in any detail.

Critique: While the ATR descriptions are only notes on what might have been the case if Route B was chosen, we do see a value in pointing out how the FPR was described in the ATR, compared to the Manitoba Hydro description in Chapter 7.

While comparative metrics from the other alternates were not available, the value of a display of the quantitative attributes is worthwhile. The two formats that are in the documents are displayed in Appendix 23. The ATR data is found on pgs. 53 and 54, while the Manitoba Hydro description is seen at pg. 7-57. Indeed, there is no evidence that Manitoba Hydro has the data that would allow such a format to be shown. If so, we have not found it in the EIS.

3.4.3.13 Environmental Effects and Mitigation Measures (pg. 64)

Comment: The first seven subsections of the ATR make frequent and important references to compensation. The ATR team notes that many situations and impacts will merit compensation.

Clearly the aspect of compensation is important, as Manitoba Hydro can resort to expropriation if a voluntary settlement cannot be reached. As such, appropriate compensation is a factor in impact analysis, as insufficient compensation can result in greater impacts to the agricultural community.

Critique The CEC has almost no information on compensation practices. Other than Mr. McLeod's presentation to the Commission on October 29th, 2012 and the published protocol for 150% of assessed value for the easement, and a maximum of 60% of fair market value for disturbances, no detail is provided. Examples of the one time payment amounts are shown in the Landowner Compensation Information Brochure, but the components are not available. Constant reference is made to data from the Manitoba Department of Agriculture, but we have never seen any details, other than example calculations. This lack of transparency makes it impossible to assess the adequacy of the compensation protocol being proposed.

In other jurisdictions, this issue is laid out in detail so that all will be informed. (See an example in Appendix 24).

The final portion of this Section, Table 27 (pg. 67) outlines three pages of impacts on agriculture *"that will need consideration when discussing line placement with landowners and the impacts that should be considered when compensation levels are determined and discussed."*

Such a lengthy list clearly indicates the importance of this issue, and the level of difficulty the CEC will have assessing this aspect in the absence of more fulsome information on compensation.

We note that in an exchange at the Niverville hearings on October 29th, 2012 that Mr. Glenn Gray, in reply to a question from Mr. Kaplan (at Transcript pg. 1950) appeared to indicate that annual payments were possible. This "offer" appears to have been rescinded at the October 30th, 2012 hearing by Mr. Gray (Transcript pg. 2516-17). Given this, as well as other oft repeated concerns by landowners, it would appear appropriate for this issue to be high on the list of concerns that the CEC might address in their report.

3.4.3.14 Effects of the Project on Agriculture (pg. 69)

Comment: This section discusses the land removed from agricultural production, noting the loss is negligible. This is the aspect termed *"Loss of Use"* in the parlance of estimating compensation. The next subsection discusses the elements that make up what is termed *"adverse effect."* These categories or components are universally recognized.

Critique The numbers cited in paragraph two on pg. 71 are completely out of step with current impact estimates (See Appendix 24). The use of such low values tends to create the impression that the issue is so small it is not worth considering. The next step would be to conclude it does not matter where a tower goes as the impact is so small. That would be an exceedingly inaccurate conclusion.

3.4.3.15 Aerial Application (pg. 72)

Comment: This section discusses the impacts of the transmission line on aerial application of chemicals in field crops. The ATR team has done a good job of determining and describing the nature and type of impacts that would result.

Critique: The ATR team has noted the problems, but not quantified the area impacted. For example, on a road-parallel tower placement 42 m in from the road allowance, the entire 66 m ROW, plus the 9 m between the road side of the easement and the edge of the road allowance will all be unsprayable due to the safety requirements of the aerial application. This generates a ½ mile strip of at least 75 m (nearly 250 ft) of impacted area. On a typical quarter section, this is equal to just under 15 acres in one field.

Further, there are many possible solutions, (such as ground spraying) discussed, but none adequately addresses the issue of taller crops, or flooded, wet lands. This is a major actual, undeniable, and unresolvable agricultural impact. It is very difficult to see how this impact can be adequately compensated when the frequency of occurrence, crop choices, yields, and prices are all unknown. It is relegated to the category of Ancillary Damage Compensation. Again, the issue of a one time versus a first year plus annual compensation arises when this issue is considered.

3.4.3.16 Irrigation Issues (pg. 74)

Comment: The use of pivot irrigation systems is noted to be complicated by the presence of transmission towers.

Critique: Land may be irrigated with pivot systems if the towers are placed on the ½ mile line. The recommendation from the ATR team is clear and unequivocal on this point.

While the 488 m average span of the Bipole III towers, and the 13.2 m minimum clearance could possibly accommodate a ¼ mile, 8 tower pivot if the towers are strategically placed on an alignment 42 m into the field, that tower placement would compromise any future use of corner systems. Typical pivots irrigate 130 to 132 acres. As such, the placement of towers anywhere but on the ½ mile line would negatively impact the future irrigation potential on those lands. Towers in the wrong place in the field will effectively prevent pivot irrigation.

3.4.3.17 Monitoring (pg. 100)

Comment: The ATR team has done a good job of identifying issues that have the potential to be significant issues in the agricultural area of the route. These actually provide the CEC with something of a format for their recommendations.

3.4.3.18 Cumulative Effects (pg. 105)

Comment: The ATR team has listed in one place the impacts of the line, and then noted if they are cumulative or not. We do not disagree with their assessment.

3.4.4 Overall Comments on the ATR

The ATR team appears to have understood the major impacts that would arise from an HVTL across the highly productive agricultural areas of southern Manitoba. However, due to the instructions or directions from Manitoba Hydro, their initial conclusions were set aside. It appears this contaminated their route review process. Finally, much of the ATR report is rendered of little value as it characterizes the attributes and metrics of the ATR team's best route, B, while Manitoba Hydro selected Route A. Thus, at the end of the day, the CEC has no metrics at all as only the characteristics of Route B are noted in the ATR.

We can state this with some confidence based on a comparison of the lengths of Sections of the Neilsen team's Preferred Route (ATR, pg. 52), compared to the Manitoba Hydro FPR descriptions (pg. 7-56, 7-47). The differences are set out below for the agricultural sections of the route.

Section	ATR Route (km)	MH FPR Route (km)
13	47.2	50
12	31.6	35
11	59.0	42
10	56.2	76
9	157.1	168
8	131.0	156
Total	482.1	527

3.4.5 Overall Implications to the Route Selection Process

The foregoing discussions highlight the disconnect between an allegedly structured impact evaluation route selection process, and the actual, after the fact, minimally evaluated Final Preferred Route. The CEC has no tools at all to analyze the characteristics and quality of the FPR through the agricultural areas, and certainly not enough information to do any sort of comparative analysis.

While Manitoba Hydro will undoubtedly claim their FPR produces the lowest impact, the work of the ATR and the lack of comparative data clearly demonstrates this is an unsupported assertion.

Indeed, the ATR makes it clear that the FPR through much of the agricultural areas will generate high impacts.

The CEC has been left without adequate evidence on which it can recommend the routing put forward by Manitoba Hydro through Sections 8 to 13.

3.5 Review of Sustainability Assessment from the Agricultural Perspective

Chapter 10 of the EIS deals with Manitoba Hydro's views of this compliance with the issues that are outlined in the Principles of Sustainable Development and Guidance of Sustainable Development. We have reviewed the assertions of Manitoba Hydro in Chapter 10 with respect to our area of expertise in agricultural impacts from HVTLs. These are criteria specifically noted in the Attached Terms of Reference that accompanied the direction letter from Minister of Conservation, Dave Chomiak (See Appendix 25).

There are 7 Principles and 6 Guidelines (See Appendix 26), and our review will only reference those principles or guidelines that touch agricultural issues.

Principle

1. Integration of Environmental and Economic Decisions.

   Manitoba Hydro states in their EIS on pg. 10-4, *"The ultimate goal of the process was to select a route that was technically feasible, had the least impact on the environment and communities, and was the most cost effective of the alternatives."*

Manitoba Hydro is assuming and implying that the EIS, RSM, and Final Preferred Route indeed adhere to this Principle. From the earlier analysis of the RSM process we can state that there is no way to know if the route has the *"least impact"* within the agricultural sections of the route.

Further, we know that the ATR team (which must be considered, for the purposes of agricultural impact assessment, to have more expertise than the Manitoba Hydro engineers), recommended alternative Route B as having the lowest impacts for the route in Sections 10, 11, 12, and 13. Manitoba Hydro over-ruled them and selected alternate Route A. Further, Route B was shorter than A (see ATR, pg. 45, A – 693.2 km, B – 560.8 km) by 133± km. The $800,000/km cost we are advised Manitoba Hydro has put forth, is equal to an additional $106,400,000. And finally, the ATR notes the ½ mile (HL) placement has the least impacts, while Manitoba Hydro selected hundreds of kilometers of midfield (MF) routings.

Given these undeniable characteristics of the route, Manitoba Hydro's Bipole III application fails to meet even the first of the Principles the Minister advises should be considered in the review.

Guideline

2. Public Participation.

   Manitoba Hydro discusses in their EIS on pg. 10-11, *"extensive four round consultation program".* They specifically note

   "Input received was critical in making adjustments to the route alternatives and ultimately selecting the preferred route (e.g., limiting diagonal crossing through cultivated lands to accommodate concerns raised by the agriculture community."

This example of limiting diagonal routing is cited as an example of how well Manitoba Hydro responded to the concerns set forth by the agricultural community. As we noted earlier, Round 4 was very poorly scheduled, and the format was not likely to lead to high or meaningful participation. But more importantly, the avoidance of diagonal routing was identified at the initial stages of route planning by the ATR team, (see last sentence, ATR, pg. 4 and pg. 21).

Further, the roadside tower placements (HL-OS) that raised concerns from a few individuals (See ATR, pg. 5) in Round 4, resulted in the worst possible response, moving the tower placement to a MF placement 42 m into the field.

Given this background, we can say that the diagonal routes would have raised concern at any stage of farmer public participation, but it appears the assertion is that it took until Round 4 for Manitoba Hydro to respond. Further, if appropriate pre-routing criteria had been in place, such routings would never have been proposed. And finally, the farmers would never have conveyed to Manitoba Hydro that in response to an HL-OS tower placement beside a road that the best response would be to move the tower to a MF position when an HL on the ½ mile line was also a possibility.

As we see it, claiming the diagonal route changes are evidence of an effective public participation process in Round 4 is really demonstrating that Manitoba Hydro was not hearing their Ag experts, or the farmers, in Rounds 1, 2, and 3. And only a very curious interpretation could translate the complaints of a few farmers about working around a tower 20 ± m into a field into the notion that it should be moved to a MF position some 42 m into the field.

Conclusion (pg. 10-16)

The foregoing examples would lead us to conclude that contrary to the Manitoba Hydro assertion, social effects have not been avoided nor meaningful consultation achieved. As such, Manitoba Hydro cannot claim to have adhered to all the element of a sustainable project.

4.0 FINAL PREFERRED ROUTE (FPR) - ON THE GROUND REVIEW

We toured the FPR from Riel to Langruth by car on August 26th and 27th, 2012 following beside or up to ½ mile or so away, along the closest parallel road. Toward the north end, near Langruth, there were stretches when no close ground access was possible, and we could not view them.

In the sections below, we will offer a commentary based on more than 25 years of route planning and evaluation. Not all of the route will be noted, only specific areas where, in our opinion, there is an aspect worthy of comment. We will proceed in a direction from Riel to Langruth. Each area commented on will be identified by the map number from the Map Folio – 50K Map Series. As well, legal descriptions will be provided.

Map 94/93 SW 25-10-4-E to SE 30-10-6-E

This eight mile stretch will parallel an existing HVTL. The tower locations are not specified. It would be an appropriate measure to match the tower spacing so there is a parallel alignment N to S, to minimize impacts or field operations.

Map 93 SW 20-10-6-E to SW 11-10-6-E

The route is shown parallel to an existing R49R twin pole power line. However, that line is parallel to, and on the northeastern side of a large drain. The Bipole line appears to be on the southwestern side. Again, the specifics of tower placement are not set out. We would note that the drain has a wide grass swale on the southeast side which can easily accommodate the towers. At the very least, the towers should be an HL placement, with two legs in the grassed area.

Map 92 SE 34-8-6-E to Sec 36-8-6-E

Here the route follows the road 42 m north into the field. It turns south at the ¼ mile mark in the SW 36 to run straight south. An alternative exists to route the line on the ½ mile line through Sections 34, 33, 32 and the E½ of 31. The line could then turn south to the existing FPR route. This will generate lower agricultural impacts.

Map 92/91 NW 25-8-5-E to SW 13-7-5-E

The route passes through a very densely settled area where there are very few routing options. The FPR appears to get close to a number of yards, especially in the NW 1-8-5-E. *"Threading"* through such areas is sometimes inevitable.

We are advised by others that the Alternate Route B traversed a much lower population density area. However, without equally detailed mapping, we cannot comment on this. We might note that the CEC will likewise be unable to make such a comparison.

Tourond Adjustment N½ 7-7-5-E to E½ 4-7-3-E

The route runs on the ½ mile line down to the south side of Sec 6-7-5-E. Here it turns west to run on the north side of Hwy. No. 52. The route picks up a large drain ditch on the west side of Hwy. No. 59. We urge the CEC to recommend the towers be tight to the drains north side to minimize tower placements in the field. Given that the drain lies between the road and the route, the issues of collision risk and clearance violations do not exist. Hence, a tight placement is warranted.

Map 88 Sec 7-7-1-E to Sec 36-7-1-W

Through this four mile stretch the route is plotted to run on the east side of the north-south road west of Sec 7-7-1-E. A careful inspection reveals that there are no impediments to a routing that would turn north ½ mile to the west of the existing north turn on the west side of Sec 7. If the route were to proceed ½ mile further west into the middle of Sec 12-7-1-W, and then run north on the ½ mile line to mid-section 36-7-1-W, there would be lower agricultural impacts than a midfield alignment 42 m into the field.

Map 87 NW 33-7-2-W to NW 35-7-3-W

The route follows the north side of the east-west road, parallel to the 11-A Drain. However, it jumps to the north side of the road at the NW 33, while the drain lies on the south side. There are no homes on this stretch, the land is level, and the only ELD is the grassy swale on the south side of the drain. The route should follow tight to the drain on the south side until the drain crosses to the north side in the NE 34-7-3-W. The FPR on this four mile stretch will create unnecessary agricultural impacts that could be avoided by a continuation of the HL placement beside the drain.

Map 86 Sec 3-8-4-W

Our only concern is the point of deflection in Sec 3-8-4-W. The FPR is on the west side, against the road. A ½ mile line placement will leave all the towers against the road on the boundary, rather than in the field.

Map 85/84 W½ 6-8-6-W to Sec 2-8-8-W

By our inspection, the turn west in Sec 6 could occur at the ½ mile line in Sec 6, rather than what appears to be 200± m to the north of the east-west half section line. The FPR alignment creates 7½ miles of MF tower placements. A careful inspection reveals that this part of the route could be on the ½ mile line between the north and south halves of Sections 1, 2, 3, 4, 5, and 6 in 8-7-W and Sec 1 and the E½ 2-8-8-W. The only close residence is in the SW 5, approximately 150 m south of the ½ mile line, but very heavily shielded to the north by thick tree growth. This alignment would produce lower agricultural impacts.

Map 83

The route follows a road, but nearly all of it is in bush, with undeveloped road allowances. Route placement on this alignment is not problematic. We note a yardsite in the N½ 2-10-9-W, where a house appears to have burnt to the ground. The route passes directly over it. We assume this site has been obtained by Manitoba Hydro.

Map 80/79 Sec 7-13-8-W to Sec 12-13-10-W to Sec 13-14-10-W to Sec 36-14-10-W

This portion of the route is all beside roads. A careful inspection shows it could all be on the ½ mile line without getting close to any residences. If the route were to turn west in mid-section 7-13-8-W, it could run west on the mid-section line to the middle of Sec 12-13-10-W. Then, with a 90º turn north, it could run right off Map 80, on the ½ mile alignment, crossing Sec 13-14-10-W. Continuing on Map 79, the ½ mile alignment could run up to Hwy. No. 567, in Sec 36-14-10-W. At this point it could return to the FPR.

This alignment would avoid many midfield impacts, increase separation from the large Hutterite Colony in SE 31-13-9-W, and generally be a lower impact route.

Our review did not proceed further north than the vicinity of Langruth, and we have no other site specific comments on the route.

5.0 SUGGESTIONS AND RECOMMENDATIONS TO THE CEC IN RESPECT OF THE ROUTING OF BIPOLE III

After review of the foregoing sections of this report, Counsel for the Coalition has asked me to provide specific suggestions and recommendations that the CEC might consider when they draft their final report to the Minister. Most of these are obvious and they follow or relate to specific weaknesses, omissions, errors, or other problems noted or outlined in the earlier sections of this report.

1. Because the Manitoba Hydro EIS failed to generate or supply meaningful aerial maps, or comparative metrics on routing alternatives, with the result that the CEC only has the assertion, rather than the evidence, that the FPR has the lowest impact, the CEC should recommend that the SSEA process be repeated with the condition that comparative data be included and displayed that will allow for a meaningful comparison of alternative routes. Route sections should likewise be truly comparable to one another, and link up with adjacent sections.

2. As part of the SSEA process, the CEC should stipulate that the agriculture area be studied in significantly greater detail. Further, the agricultural sections (7 through 13) include at least the Canada wide criteria (or some CEC specified version of it), in their FPR selection process. Further, if an RSM process is to be used, as the starting point for the routing exercise, the CEC should specify that it include an overall balance and blend of criteria appropriate to an agricultural area.

3. As part of the Agricultural Impact evaluation, indicate the CEC's preference for routing and tower placement that generates the lowest possible agriculture impact (i.e. HL) unless clear and compelling reasons exist to depart from such routing.

4. As part of the CEC routing recommendations, indicate a clear preference for routing and tower placements through current or potential irrigation areas along internal quarter section boundaries.

5. If routing is deemed to be best beside drainways, the CEC should seek to have those tower placements into or immediately adjacent to the grass swales along the field side of the drains.

6. If the routing is beside an existing HVTL, to the extent possible, the CEC should express a desire to see tower matching to minimize agricultural impacts.

7. If the CEC, in its wisdom, decides not to recommend a re-do of the EIS, with appropriate attention to agriculture and true alternate route evaluation, they should consider recommending that Manitoba Hydro implement the on-the-ground recommendations included in Section 4 of this report to minimize agricultural impacts.

6.0 CERTIFICATION

I, the undersigned appraiser, certify that the subject routes were viewed on August 26th and 27th, 2012. The effective date of this evaluation is late Summer and early Fall, 2012.

I further certify that neither the assignment to do this evaluation, nor the fee, is contingent on the findings herein. I have no undisclosed interest, either present or contemplated, in the routes assessed. The facts contained in this report, upon which the analysis and conclusions are based, are believed to be correct, however, accuracy and validity cannot be guaranteed.

This route evaluation is made under the Code of Ethics of the Alberta Institute of Agrologists, and the American Society of Farm Managers and Rural Appraisers.

Respectfully submitted,

BERRIEN ASSOCIATES LTD.

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