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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
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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,

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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.

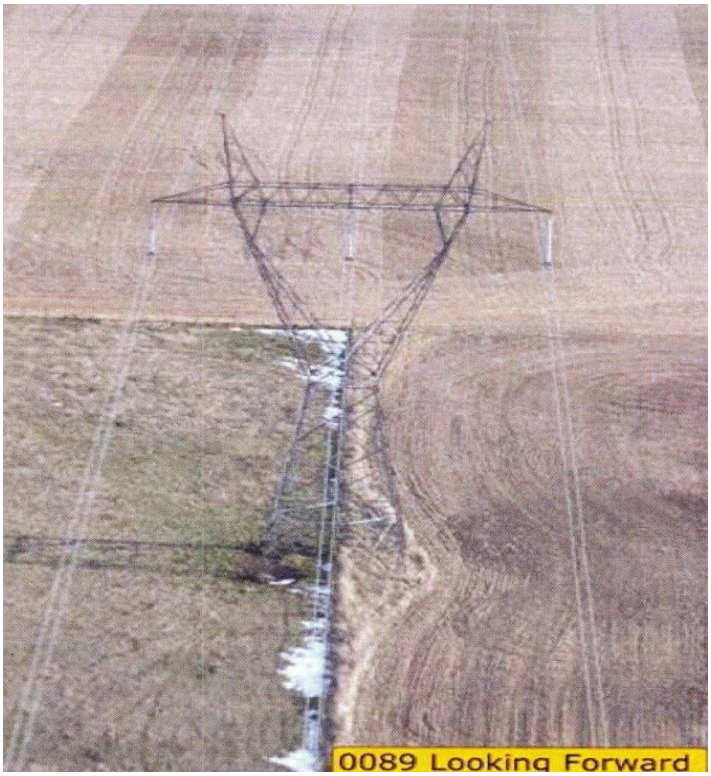
The task when applying routing criteria is to thoroughly understand not only the names of the impacts, and the concepts, but to weigh them. Then, with full understanding, selectively employ them to devise an alignment that, on an overall, as well as specific basis, is the "superior route".

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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