



**NORTHLAND  
POWER**

# Empire Solar Project

## Draft Water Body Site Investigation Report

April 27, 2012



Northland Power Inc.  
on behalf of  
Northland Power Solar  
Empire L.P.  
Toronto, Ontario

DRAFT Water Body  
Site Investigation Report

Empire Solar Project

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Rev. 0

April 27, 2012

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Project Report

April 27, 2012

**Northland Power Inc.  
Empire Solar Project**

**DRAFT Water Body Site Investigation Report**

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## 1. Introduction

### 1.1 Project Description

Northland Power Solar Empire L.P. (hereinafter referred to as “Northland”) is proposing to develop a Class 3 10-megawatt (MW) ground mounted solar photovoltaic (Solar PV) facility in the Town of Cochrane. This Project, known as the Empire Solar Project, is hereafter referred to as “Empire” or the “Project.”

The Project location is comprised of two primary components. The first part of the Project is the location of the solar panels, including access roads, inverters, transformers, fencing, etc, and is hereafter referred to as the “solar panel Project location” The solar panel Project location approximately 122 hectares (ha) in size and located on Lots 17 and 18, Concession 7 of the Town of Cochrane. The solar panel Project location is situated on Glackmeyer Concession Road 7 (shown in Figure 1.1).

The second part of the Project is the approximately 20 km distribution line from the solar panel Project location to the connection point west of the Project location near Hunta, ON. This portion of the project is referred to as the distribution line Project location, with locations shown in Figures 1.2 and 1.3.

### 1.2 Legislative Requirements

Ontario Regulation (O. Reg.) 359/09 – *Renewable Energy Approvals Under Part V.0.1 of the Act*, (herein referred to as the REA Regulation) made under the *Environmental Protection Act* identifies the Renewable Energy Approval (REA) requirements for renewable energy projects in Ontario. Per Section 4 of the REA Regulation, ground mounted solar facilities with a name plate capacity greater than 12 kilowatts (kW) are classified as Class 3 solar facilities and require a REA.

Section 31 of the REA Regulation requires proponents of Class 3 solar projects to undertake a water site investigation for the purpose of determining

- a) whether the results of the analysis summarized in the *Water Body Records Review Report* prepared under Subsection 30(2) are correct or require correction, and identifying any required corrections
- b) whether any additional waterbodies exist, other than those that were identified in the *Water Body Records Review Report* prepared under Subsection 30(2)
- c) the boundaries, located within 120 m of the project location, of any water body that was identified in the records review or the site investigation; and
- d) the distance from the project location to the boundaries determined under clause (c).

The REA Regulation has specific requirements if designated lake trout lakes are present within 300 m of the Project area. These requirements were not deemed applicable to the Project as no such lakes were found during the records review (Hatch Ltd., 2012).

Waterbodies are defined in Section 1(1) of the REA Regulation to include a lake, a permanent stream, an intermittent stream or a seepage area, but does not include

- a) grassed waterways
- b) temporary channels for surface drainage, such as furrows, or shallow channels that can be tilled or driven through
- c) rock chutes and spillways
- d) roadside ditches that do not contain a permanent or intermittent stream
- e) temporarily ponded areas that are normally farmed
- f) dugout ponds, or
- g) artificial bodies of water intended for the storage, treatment or recirculation of runoff from farm animal yards, manure storage facilities and sites and outdoor confinement areas.

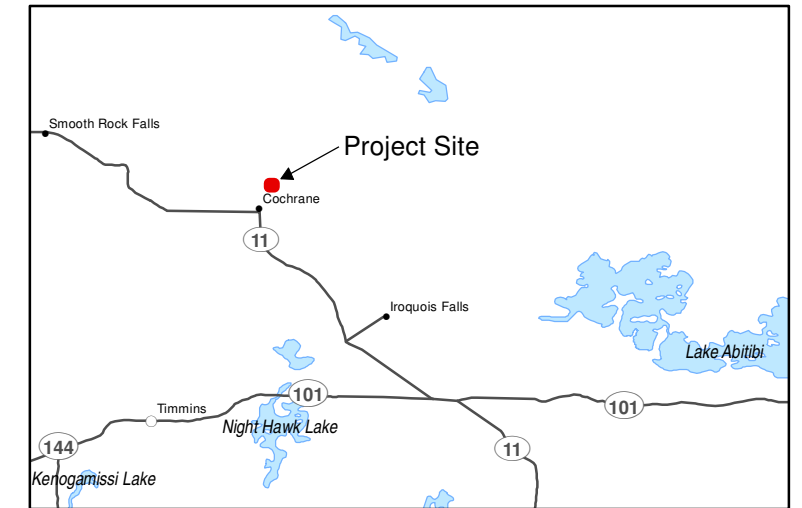
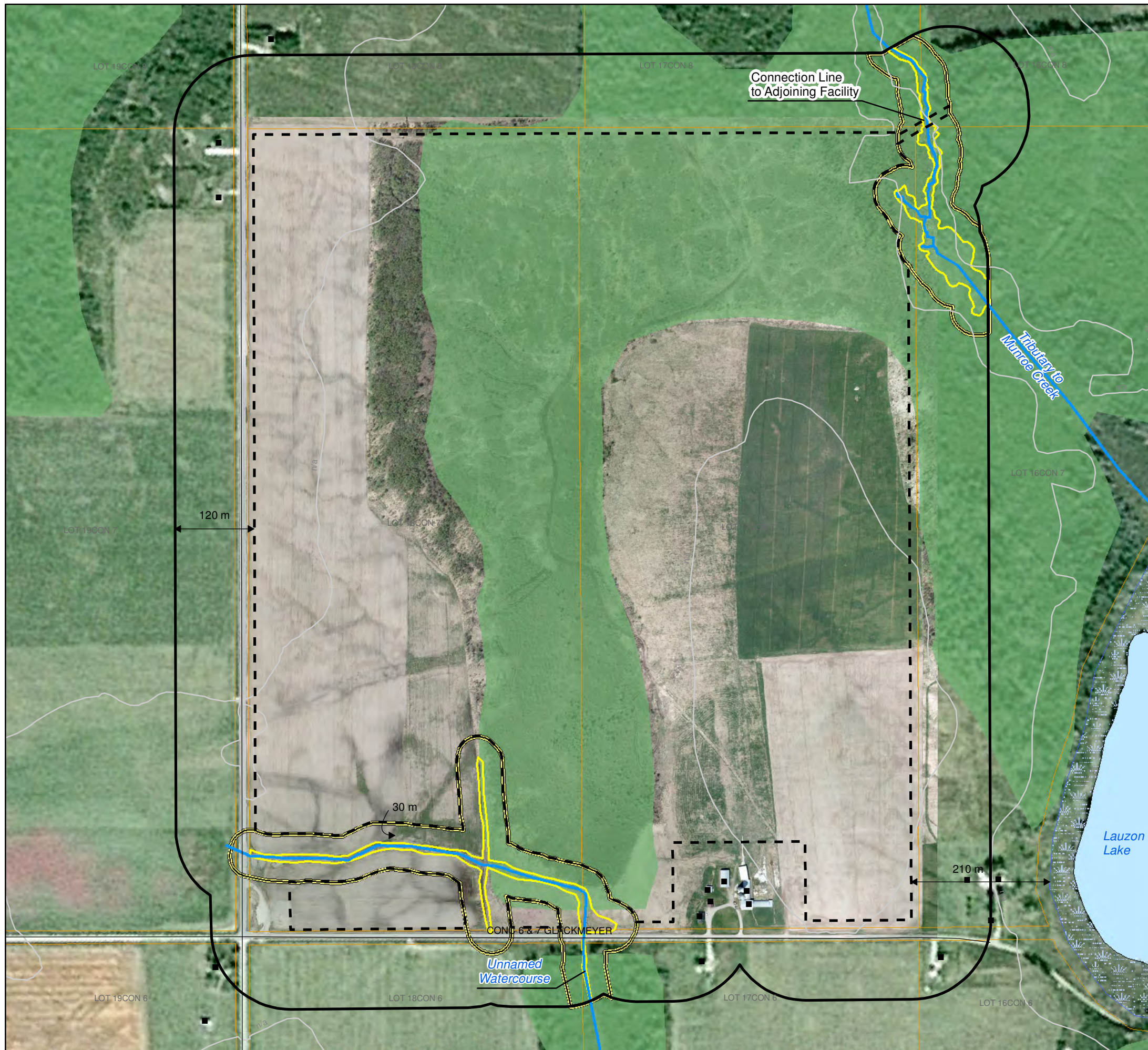
Further, intermittent streams are defined as “a natural or artificial channel, other than a dam, that carries water intermittently and does not have established vegetation within the bed of the channel, except vegetation dominated by plant communities that require or prefer the continuous presence of water or continuously saturated soils for their survival” (O. Reg. 359/09).

Seepage areas are defined as “a site of emergence of groundwater where the water table is present at the ground surface, including a spring” (O. Reg. 359/09).

Subsection 3 of Section 31 of the REA Regulation requires the proponent to prepare a report setting out the following:

1. A summary of any corrections to the *Water Body Records Review Report* prepared under Subsection 30(2) and the determinations made as a result of conducting the site investigations under Subsection (1).
2. Information relating to each water body identified in the records review and in the site investigations, including the type of water body, plant and animal composition and the ecosystem of the land and water investigated.
3. A map showing
  - i. the boundaries mentioned in clause (1) (c)
  - ii. the location and type of each water body identified in relation to the project location, and
  - iii. the distance mentioned in clause (1) (d).
4. The dates and times of the beginning and completion of the site investigation.
5. The duration of the site investigation.
6. The weather conditions during the site investigation.
7. A summary of methods used to make observations for the purposes of the site investigation.
8. The name and qualifications of any person conducting the site investigation.
9. Field notes kept by the person conducting the site investigation.

This *Water Body Site Investigation Report* has been prepared to meet these requirements.



**LEGEND**

- Building
- Road
- Topographic Contour (5m interval)
- Watercourse
- ▭ High Water Mark
- ▭ 30 m Setback from High Water Mark
- ▭ Parcel
- ▭ Waterbody
- ▭ Wetland Area
- ▭ Wooded Area

**Project Components**

- ▭ Project Location
- ▭ 120 m from Project Location

Notes:  
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 2. Spatial referencing UTM NAD 83.  
 3. Satellite imagery obtained from Google Earth Pro, captured 2003.

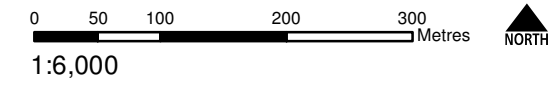
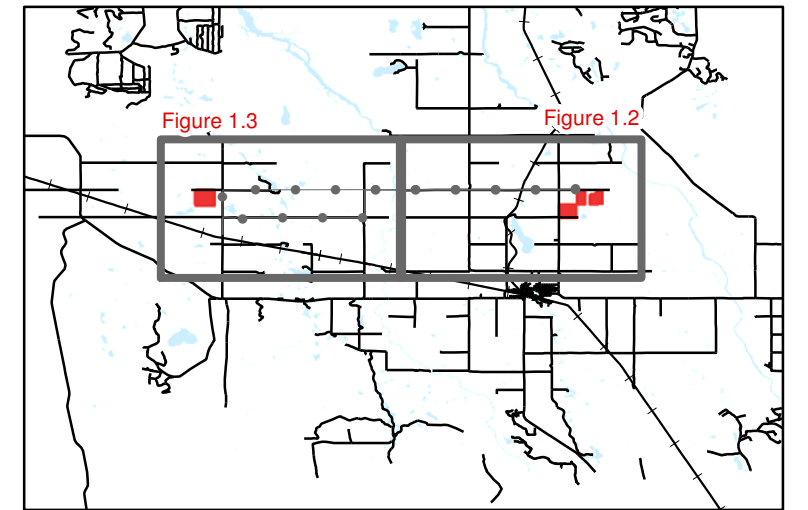
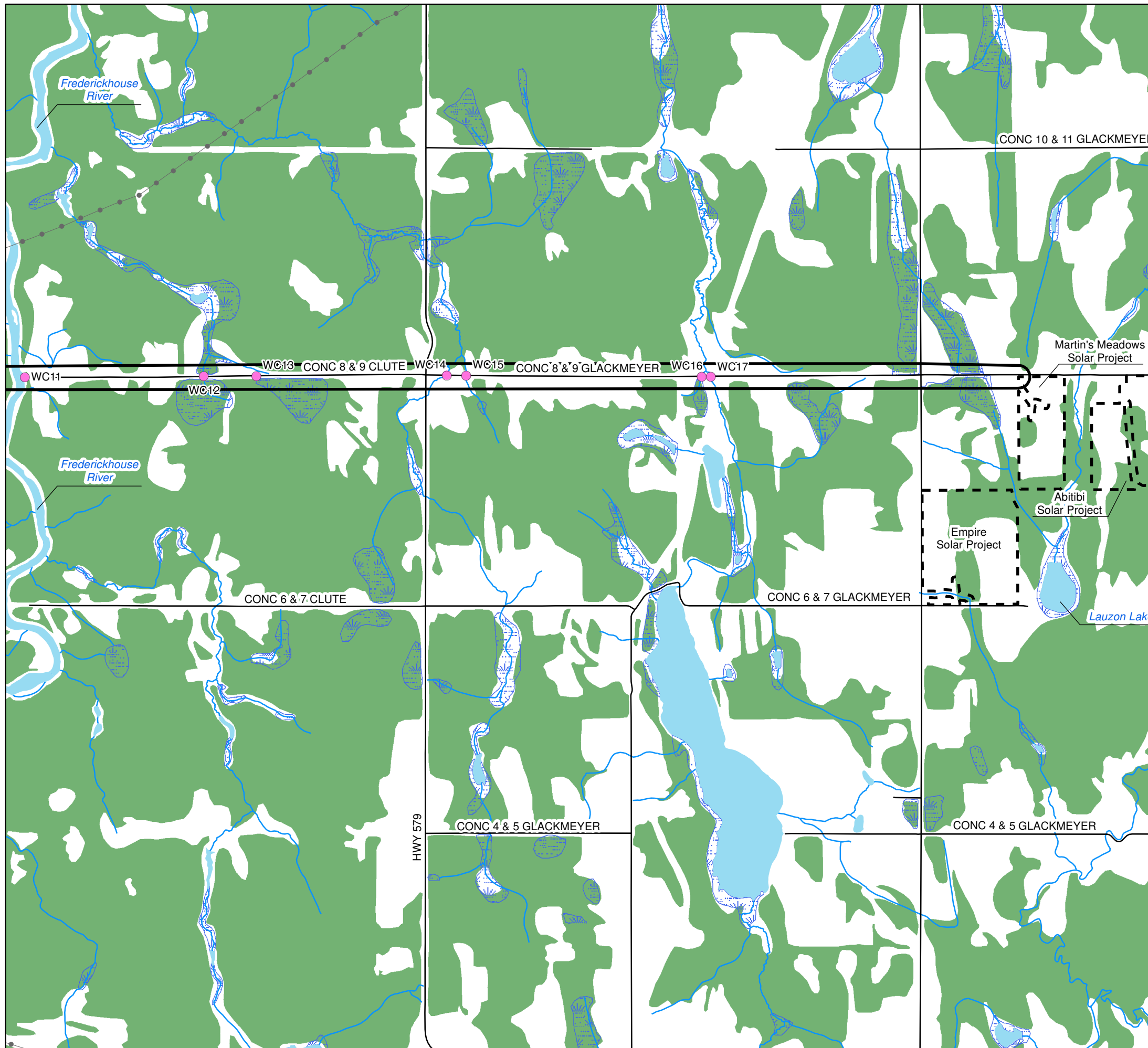


Figure 1.1  
 Northland Power Inc.  
**Empire Solar Project**  
**Water Body**  
**Site Investigation Results**

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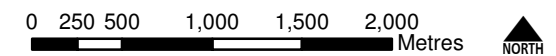




**Legend**

- Connection Point
  - Road
  - Utility Line
  - - - Northland Power Project Location
  - ▭ 120 m from Distribution Line
  - ▨ Wetland Area
  - Wooded Area
- Waterbody Feature**
- Watercrossing (Hatch)
  - Watercourse (LIO Mapping)
  - Waterbody

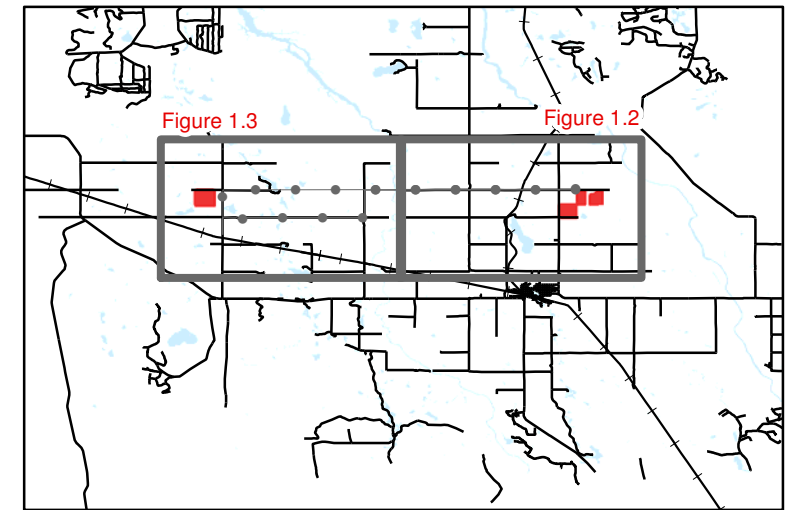
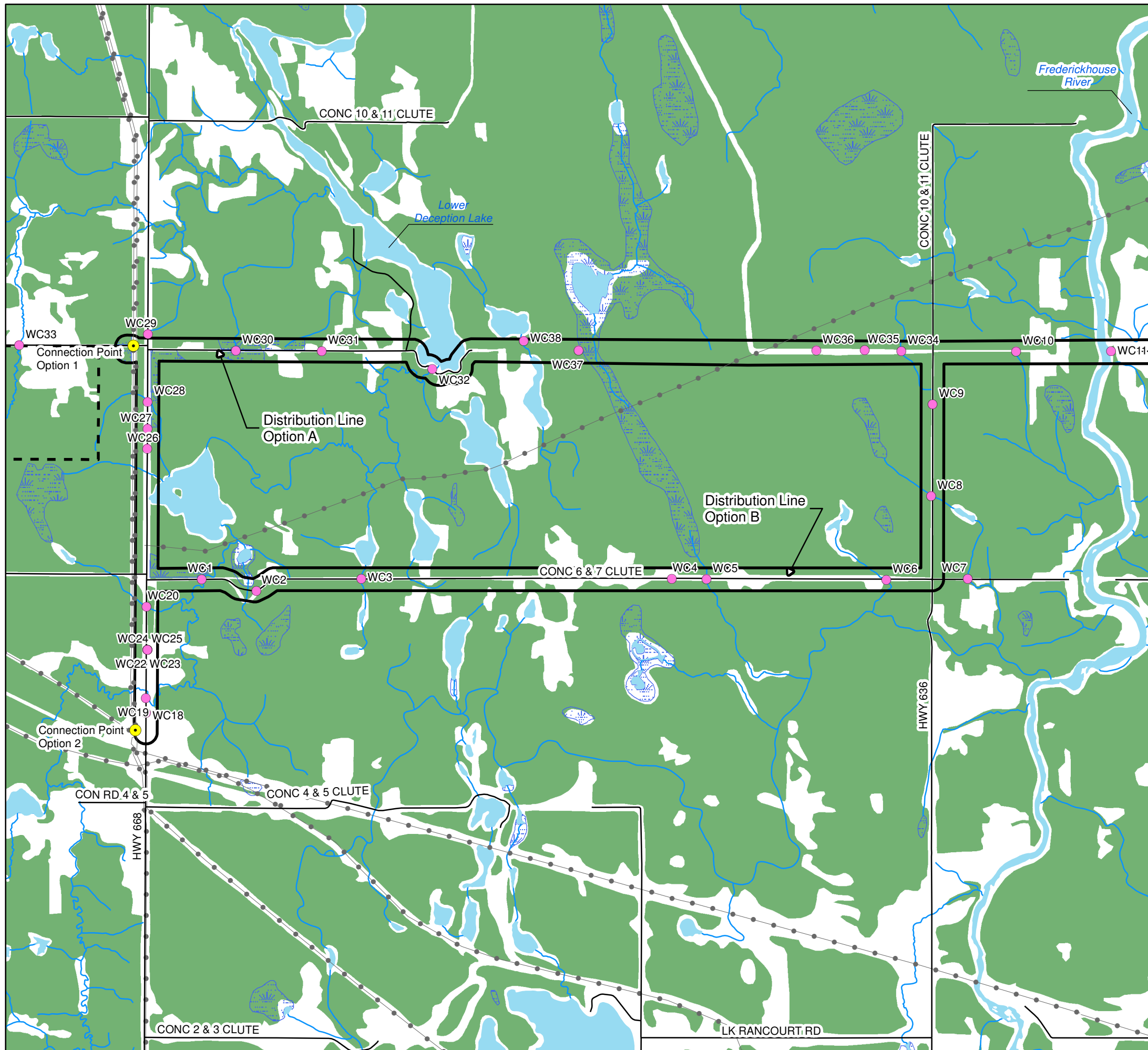
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 3. Satellite imagery from google Earth Pro, captured 2003 through 2004.



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Figure 1.2  
 Northland Power Inc.  
**Distribution Line Project Location  
 (Eastern Half) - Waterbody  
 Site Investigation Results**

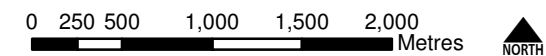
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**Legend**

- Connection Point
- Road
- Utility Line
- - - Northland Power Project Location
- ▭ 120 m from Distribution Line
- Wetland Area
- Wooded Area
- Waterbody Feature**
- Watercrossing (Hatch)
- Watercourse (LIO Mapping)
- Waterbody

Notes:  
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 2. Spatial referencing UTM NAD 83.  
 3. Satellite Imagery from google Earth Pro, captured 2003 through 2004.



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Figure 1.3  
 Northland Power Inc.  
**Distribution Line Project Location  
 (Western Half) - Waterbody  
 Site Investigation Results**



Back of figure

## 2. Summary of Water Body Records Review Results

Table 2.1 summarizes the results of the Water Body Records Review Report (Hatch Ltd., 2012).

**Table 2.1 Summary of Water Body Records Review Determinations**

Determination to be Made	Yes/No	Description
Is the Project in a water body?	Yes	There are no waterbodies on the solar Panel Project location, but the distribution line Project location will cross approximately 24 watercourses.
Is the Project within 120 m of the average annual high water mark of a lake, other than a lake trout lake that is at or above development capacity?	Yes	No lakes were identified within 120 m of the solar panel Project location. Lower Deception Lake is located along Distribution Line Option A.
Is the Project within 300 m of the average annual high water mark of a lake trout lake that is at or above development capacity?	No	No lake trout lakes were identified within 300 m of the solar panel or distribution line Project locations.
Is the Project within 120 m of the average annual high water mark of a permanent or intermittent stream?	Yes	Two waterbodies were identified on and within 120 m of the solar panel Project Location: Munroe Creek on the northeast corner and an unnamed watercourse on the southwest corner. There are 34 watercourses located within 120 m of the distribution line Project location.
Is the Project within 120 m of a seepage area?	No	No seepage areas were identified on or within 120 m of the Project Location.

Therefore, depending on the layout of the proposed Project, some components of the solar panel Project location could potentially be located within 120 m of the average annual high water mark of a tributary of Munroe Creek and/or an additional unnamed watercourse. The proposed distribution line may cross a total of 24 waterbodies (depending on the route selected) and may be located within 120 m of 10 additional waterbodies, including Lower Deception Lake, depending on the route selected.

## 3. Site Investigation Methodology

A number of different site investigation events were undertaken as part of the overall water body site investigation for the proposed Project. One site investigation was undertaken on the proposed solar panel Project, while six separate investigations were conducted along the proposed distribution line Project location. These various investigations are described in the following sections.

### 3.1 Solar Panel Project Location Site Investigation

#### 3.1.1 *Date, Time, and Duration of Site Investigation*

- Date: August 23, 2010
- Start Time: 0830
- Duration: 7 hours

#### 3.1.2 *Weather Conditions During Site Investigation*

- Temperature: °C
- Beaufort Wind:
- Cloud Cover: %

#### 3.1.3 *Name and Qualifications of Person Conducting Site Investigation*

The site investigation was completed by Martine Esraelian.

Martine Esraelian, B.Sc. is an Environmental Scientist specializing in species at risk and terrestrial ecosystems. She has a B.Sc. from Trent University where she specialized in Conservation Biology and Ecological Management and an Ecosystem Management Technician diploma from Sir Sandford Fleming College. During her time at Trent University, she completed a 1-yr internship with the Ministry of Natural Resources (MNR) which involved developing a genetic-based protocol for the extraction of DNA from unknown turtle eggshells to assist with species identification. The project entailed extensive molecular genetics research and intensive lab work to develop a protocol able to supplement existing conservation management practices.

She offers expertise across the full breadth of the field from environmental assessments and technical analysis of environmental data to conservation management, corporate and government consulting, and community outreach. Martine has liaised with all levels of government, the community, and a portfolio of clients that includes consulting firms, planners, and high-profile developers. She has both technical and hands-on experience conducting site investigations (terrestrial and aquatic), evaluations of significance, environmental and agricultural impact studies, constraint analyses, water quality and soil assessments, species at risk, wildlife management and fisheries studies to meet regulatory requirements.

Martine has a wide range of field experience related to terrestrial and aquatic ecosystems and species at risk. She has conducted reptile and amphibian surveys, small-mammal trapping, benthic invertebrate monitoring and fisheries inventories (seine netting and electrofishing). She has conducted detailed natural areas inventories which involve species identification of flora and fauna, vegetation community mapping, identifying rare vegetation communities and significant wildlife habitats.

Martine has project management and fieldwork experience for a number of species at risk monitoring projects. Some of the species she has been involved with include: fowler's toad, massasauga rattlesnake, gray ratsnake, Jefferson salamander, northern dusky and mountain alleghany dusky salamander, blanding's turtle, map turtle, spotted turtle, snapping turtle, queen snake, milksnake, eastern ribbonsnake, flowering dogwood, swamp rose mallow and spoon-leaved moss.

Martine is a certified Butternut Health Assessor (BHA) and also holds a certificate in the Ecological Land Classification (ELC) system.

### 3.1.4 Survey Methods

The entire site was searched by the observers on foot in order to document waterbodies. Photographs of the site were taken. Any observations of waterbodies, including the type of water body, in-stream habitat types, surrounding riparian areas, average annual high water mark and wildlife use were noted. Geographic coordinates at representative areas of the average annual high water mark for waterbodies on and within 120 m of the Project site were recorded using a sub-meter accuracy GPS for mapping purposes.

A copy of the field notes kept by the observers is provided in Appendix A.

### 3.2 Distribution Line Project Location Site Investigations

The purpose of these site investigations was to confirm waterbodies on and within 120 m of the distribution line Project location, including documentation of water body types, habitat features. Prior to these surveys, a map of the potential waterbodies was prepared through interpretation of satellite imagery as well as background records obtained from the Ministry of Natural Resources, Cochrane District. Presence of an average annual high water mark boundaries of the waterbodies along the roadside associated with the Project location were then confirmed through visual observation. A copy of the field notes kept by the observers is provided in Appendix A.

Site Investigations 5 through 10 were completed by Martine Esraelian and Joe Viscek. Martine is trained in the use of Ecological Land Classification, and has participated in several vegetation community surveys within Northeastern Ontario. Joe Viscek is an environmental technologist with experience in terrestrial and aquatic field studies in support of renewable energy projects throughout the province.

**Table 3.1 Dates, Times, Duration and Weather Conditions of Site Investigations 2 Through 10**

	Site Investigation 2	Site Investigation 3	Site Investigation 4	Site Investigation 5	Site Investigation 6	Site Investigation 7
<b>Date</b>	<b>29-09-2011</b>	<b>30-09-2011</b>	<b>01-10-2011</b>	<b>02-10-2011</b>	<b>10-11-2011</b>	<b>11-11-2011</b>
Start Time	1300h	0900h	0900h	0900h	0800h	0800h
End Time	1700h	1900h	1900h	1930h	1630h	1600h
Duration	4hrs	10hrs	10hr	10.5hrs	8.5hrs	8hrs
Temperature	19°C	15°C	5°C	16°C	1°C	-1°C
Beaufort Wind	1	1	1	1	3	2
Cloud Cover	100%	10%	40%	10%	100%	95%

## 4. Results of Site Investigation

This section documents the results of the site investigations on the solar panel and distribution line Project locations and discusses specific water features observed on and within 120 m of the Project location. Features noted in the following sections, including the proposed Project location and the average annual high water mark of watercourses on and within 120 m of the Project location, are shown in Figure 1.1 (Solar Panel Project Location) and Figures 1.2 and 1.3 (Distribution Line Project Location).

### 4.1 Solar Panel Project Location

The *Water Body Records Review Report* (Hatch Ltd., 2012) identified two watercourses within 120 m of the Solar Panel Project location (Unnamed Watercourse and Tributary of Munroe Creek). No lakes, seepage areas or other permanent or intermittent streams not noted during the records review were observed on or within 120 m of the Solar Panel Project Location. Each of those is discussed in the following sections.

#### 4.1.1 Unnamed Watercourse

The Land Information Ontario (LIO) mapping obtained for the *Water Body Records Review Report* (Hatch Ltd., 2012) indicated that the Unnamed Watercourse originates in the open field approximately 30 m west of the Project location and flows in an easterly direction through the property on which the Project is located. Along the western boundary of the property the watercourse is present as a defined channel, approximately 2 m wide. Little standing water was present within this portion of the watercourse during the August 2010 site investigation. A photograph of this portion of the watercourse is shown in Figure 4.1.

Continuing eastward the channel gradually becomes narrower reaching a minimum width of approximately 1 m. Standing water, vegetation and exposed bedrock was present within this portion of the watercourse. Depth of the channel remained fairly constant at approximately 1 m.

A tributary of the Unnamed Watercourse originates in the woodland in the centre of the Project Location. Once the watercourse reached the woodland in the middle of the project location it diffused out and the defined channel disappeared. This area was defined as a meadow marsh, a photo of which is provided in Figure 4.2.





**Figure 4.1** View of Western Portion of Unnamed Watercourse Facing East from Western Property Line



**Figure 4.2** View of Meadow Marsh Community on the Project Location

The woodland had at one point been cleared of all merchantable timber. Tracks left from the machinery cause pooling within the woodland. These features do not meet the definition of water body set out in the REA regulation. These tracks occurred throughout the woodland and were often covered in vegetation and downed vegetation and can be seen in Figure 4.3.



**Figure 4.3 View of Machinery Tracks Filled with Water Within the Woodland**

The Unnamed Watercourse flows south away from the Project location.

The average annual high water mark of the Unnamed Watercourse on the property was assessed during the site investigation and was found to be the top of banks of the channel for the western most portion of the watercourse and the limit of wet meadow vegetation adjacent to the channel area in the eastern portion of the watercourse. The surrounding vegetation is dominated by grasses, sedges and rushes which provide evidence of annual flooding during higher flow events. The average annual high water mark, associated 30-m setback limit and the proposed solar panel footprint boundary are shown in Figure 1.1. The proposed development footprint will be located between 30 and 120 m from the Unnamed Watercourse; therefore, an Environmental Impact Study (EIS) will be required.

#### **4.1.2 Tributary of Munroe Creek**

This tributary originates to the north of the solar panel Project location in an agricultural field and drains through a wooded area in the northeast corner of the property on which the Project is located, before draining into Lauzon Lake, approximately 350 m east of the Project location. White Pine, Trembling Aspen and Spruce dominate the woodland. The portion of the woodland that occurs on

the Project location has also been previously cleared of merchantable timber as described above. The tributary had a poorly defined channel and was not flowing during the August 2010 site investigation and it was determined to be an intermittent watercourse. The average annual high water mark was determined on the basis of the wetland meadow marsh community surrounding the general watercourse location.

As development will be located within 30 m of the average annual high water mark of this tributary, and it will be crossed by the connection line to the adjoining facility, an EIS will be required to assess potential effects and mitigation requirements.

#### **4.2 Distribution Line Project Location**

A total of 36 waterbodies were observed along the distribution line route options, as shown in Figures 1.2 and 1.3, and summarized in Table 4.1, which presents the watercourse identifier (as labelled in Figures 1.2 and 1.3), summary of watercourse observations (watercourse type, average width and depth, substrate, bank vegetation and other observations). There were 34 unnamed watercourses, the Frederickhouse River and Deception Creek. In addition, the proposed distribution line will pass within 120 m of Lower Deception Lake.

There were also several watercourses shown on LIO mapping that were not found during the Site Investigations. For the purposes of this report, it is assumed that the LIO mapping is correct, and that the watercourses are present.

Since the Project Distribution line will cross or run within 120 m of the watercourses noted in Table 4.1, as well as one lake (Lower Deception Lake), an EIS will be required.



**Table 4.1 Summary of Water Body Observations along Distribution Line Routes**

Watercourse Identifier	Water Body Type	Average Width	Average Depth	Substrate Type	Riparian Vegetation	Additional Notes
WC1	Permanent stream	5 m	1 m	N/A	Grasses, shrubs, thicket	Small bridge crossing
WC2	Permanent stream	2.5 m	1 m	N/A	Cattails, grasses, shrubs	Watercourse drains into large marsh to north; culvert under road
WC3	Intermittent stream	2 m	No open water present	N/A	Cattails, grasses	Intermittent stream coming from marsh to north; culvert under road (0.75 m diameter)
WC4	Intermittent stream	2 m	No open water present	N/A	Cattails, grasses	Intermittent stream with wetland; culvert under road (0.75 m diameter)
WC5	Intermittent stream	1.5 m	0.10 to 0.20 m	Sandy, muck	Grasses and thicket	Two culverts side by side under road (0.75 m diameter)
WC6	Permanent stream	2 m	0.30 m	Muck	Grasses, shrubs, thicket	Beaver dam on north side by road; water pools up behind dam (approximately 5 m wide); culvert under road (1.5 m diameter), channel extends with 15 to 20 m wide floodplain to south
WC7	Intermittent stream	2 m	0.20 m	Muck	Grasses	No water present in channel on north side; small wetland/ponded water to south; culvert under road (0.5 m diameter)
WC8	Intermittent stream	1 m	0.10 to 0.20	Muck	Grasses	Standing water near road; channel leads to large wetland/marsh to southeast; two culverts under road about 5 m apart (0.5 m diameter)
WC9	Intermittent stream	2.5 m	0.30 m	Muck	Grasses, trees, thicket	Watercourse enters ditch west of road; no flow; no culvert under road; water dries up in ditch after about 15 m
WC10	Intermittent stream	2 m	0.10 to 0.20 m	Muck	Grasses	Watercourse meets ditch to north; water dissipates in ditch to the west after passing through culvert under road (0.5 m diameter)
Frederick House River	Permanent stream	100 m	1 to 2 m	Cobble, boulder	Grasses, trees, thicket	Large river flowing north to south; existing transmission line crossing
WC11	Permanent stream	3 m	0.5 to 0.75 m	Pebble/cobble, sand	Grasses, thicket	Watercourse from north connects to wetland south of road via culvert (0.75 m diameter); moose tracks visible along banks
WC12	Intermittent stream	1 m	No open water present	Muck	Cattails, thicket	Wetland north of road connects to south with intermittent channel; culvert under road (0.75 m diameter)
WC13	Permanent stream	3 m	0.10 to 0.30 m	Muck, some cobble	Grasses, shrubs, thicket	Water gently flowing north; culvert under road (1.5 m diameter)

Watercourse Identifier	Water Body Type	Average Width	Average Depth	Substrate Type	Riparian Vegetation	Additional Notes
WC14	Intermittent stream	0.75 m	0.05 to 0.10 m	Muck	Grasses, shrubs, thicket	Water gently flowing north; culvert under road (1 m diameter); some water ponded on north side of road (about 0.5 to 1 m deep)
WC15	Intermittent stream	1.5 m	0.20 to 0.30 m	Muck, sand	Grasses, shrubs, thicket	Wetland to south with grassy emergent vegetation and some standing water; water very gently flowing north; large culvert under road (3 m diameter)
WC16	Permanent stream	3 m	0.30 to 0.75 m	Cobble, sand	Grasses	Associated wetlands to south and north; culvert under road
WC17	Intermittent stream	2 m	0 to 0.05 m	Muck, grass	Cattails, grasses	Culvert under road (0.75 m diameter)
Deception Creek	Permanent stream	3 to 5 m	0.5 to 1.5 m	N/A	Grasses, thicket, some trees	Large creek; water flows west under road bridge
WC18	Intermittent stream	2 m	0.10 to 0.20 m	Muck	Grasses	Culvert under road (0.75 m diameter)
WC19	Intermittent stream	1 m	0 to 0.10 m	Muck, grass	Grasses, thicket, trees	Intermittent ditch west of road; no culvert present
WC20	Intermittent stream	2 m	0 to 0.05 m	Muck, grass	Cattails, Grasses, shrubs, thicket	Channel extends from east to wetland-like ditches adjacent to road; culvert under road (0.30 m diameter)
WC21	Intermittent stream	1 m	0 to 0.05 m	Muck, grass	Grasses, thicket	Ditch-like channel extends west; no culvert present
WC22	Intermittent stream	1 m	No open water present	N/A	Grasses, cattails	Small, dry, ditch-like channels extending out on both sides of the road; no culvert present
WC23	Intermittent stream	1 m	0.10 m	Muck, sand	Trees, thicket, grasses, cattails	Water flows gently in valley-like depression to the east; culvert under road (0.75 m diameter)
WC24	Intermittent stream	1 m	0.05 m	Muck	Trees, thicket, grasses	Water flows gently in valley-like depression to the east; culvert under road (0.5 m diameter)
WC25	Intermittent stream	1 m	0 to 0.05 m	Muck, grass	Grasses, cattails, trees	Small channel with very shallow water flowing east; culvert under road (0.5 m diameter)
WC26	Intermittent stream	1.5 m	0.10 to 0.30 m	Muck	Grasses, thicket	Water flows gently east; culvert under road (0.75 m diameter)
WC27	Permanent stream	2.5 m	0.10 to 0.20 m	Muck	Short grasses, some thicket	Water flowing gently east; culvert under road (0.5 m diameter)
WC28	Permanent stream	3 m	0.20 to 0.30 m	Muck	Grasses, thicket, trees	Channel on north side of road only, with pooled water to south; water flows gently north; culvert under road (0.75 m diameter)
WC29	Intermittent stream	1 to 2 m	0 to 0.10 m	Muck, grass	Cattails, grasses, some thicket	Water flows gently north; culvert under road (0.5 m diameter)

Watercourse Identifier	Water Body Type	Average Width	Average Depth	Substrate Type	Riparian Vegetation	Additional Notes
WC30	Permanent stream	5 to 6 m	0.5 to 1 m	Muck, sand, pebbles	Grasses, thicket	Large creek with bridge crossing; drains north into small lake
WC31	Permanent stream	2 to 3 m	0.5 m	Muck	Grasses	Water flows north; large culvert under road (2.5 m diameter)
WC32	Intermittent stream	1.5 m	0.20 to 0.30 m	Muck	Grasses, cattails, thicket	Water gently flows north; wetland/swamp with grasses and small trees to south; two culverts under road, about 6 m apart (0.5 m diameter)
WC33	Intermittent stream	0.5 to 1 m	0 to 0.05 m	Muck	Thicket, trees	Very gentle flow north; little to no standing water (intermittent channel); culvert under road (0.5 m diameter)
WC34	Intermittent stream	1.5 m	0.20 m	Muck	Thicket, grasses	Channel visible on north side of road; water pooled in ditches to north and south of road; no visible flow or culvert
WC35	Permanent stream	2 m	0.30 m	Muck	Cattails, grasses, thicket	Irregular channel passing through large wetland complex (swamp/marsh mix); wetland area extends north; water flows north towards lake
WC36	Permanent stream	4 m	0.30 to 0.40 m	Muck	Grasses, thicket	Watercourse drains north into Deception Lake; wetland-like area (approximately 12 m wide) makes up floodplain zone





## 5. Conclusions

Based on the results of the site investigation discussed above, a correction to the results of the *Water Body Records Review Report* (Hatch Ltd., 2012) required. There are more watercourses along the proposed distribution line than were originally noted in the *Water Body Records Review Report* (Hatch Ltd., 2012). In addition, some of the watercourses along the distribution line noted in Hatch (2012) were not observed during the site investigations, but it is assumed that they are present.

Based on the results of the site investigation and the proposed Project components and boundaries shown in Figure 1.1, some components of the solar panel Project Location will be located between 30 and 120 m of the Unnamed Watercourse and the Tributary of Munroe Creek. In addition, the proposed distribution line Project location will cross or run within 120 m of approximately 38 waterbodies. Therefore, an EIS will be required to assess the potential effects of the Project and the required mitigation measures to prevent or minimize adverse effects on these waterbodies.

## 6. References

Hatch Ltd. 2012. Empire Solar Project – Water Body Records Review Report. Prepared for Northland Power Inc.

# Appendix A

## Site Investigation Field Notes

Project: Empire

Date: July 22, 2010

Time: 1300 - 1900

% C.C.: 100%

Wind: 1-2

- The city owns 1.8 ha along the southwest portion of property
- The Project site is used for the production of cash crops. Canola & hay are currently being grown on the Project site
- Up until 2008, the Project site was a beef operation & was converted into a cash crop operation in 2009
- Historically, the site was a dairy operation
- The western portion of the Project site is used for the production of canola while the eastern portion is used for hay.
- The agricultural buildings on the property are no longer being used to house livestock

No.....

Date.....

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- The surrounding agricultural fields are primarily used for the production of cash crops such as canola, hay, & grains.
- There are abandoned fields in the area that were previously used as livestock operations such as dairy & beef.

The areas that are not in agricultural production include waterways, scrubland & woodlands.

- There is a watercourse shown on the UO mapping that traverses through the southern portion of the project site. The UO mapping does not have this watercourse mapped correctly.

No.....

Date.....

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- The portion of the watercourse on the project site is mapped correctly.
- The portion of the watercourse located west of the project site is not mapped correctly.

No. ....

Date ..... Page .....

No. ....

Date ..... Page 43 .....

Project: Empire

Date: Aug. 23, 2010

Time: 0900 - 1500 (6.0)

% CO<sub>2</sub>: 0

Temp: 24°C

Wind: 2

cattle  
pen

• 2 silos, implement shed, residential house

Watercourse - South portion of property

- tile drained; flow east through the agricultural fields
- where the drain curves south, it is surrounded by shrubs, particularly the portion south of the project site where the shrubs are dense along both sides of the watercourse
- watercourse is ~ 5' wide & 6' high
- no in-stream vegetation
- there is little to no water present
- substrate consists of gravel & rocks
- sands/silt
- the watercourse has a well-defined channel with steep slopes
- the vegetation along the slope include bird foot trefoil, cow vetch, white clover, hairy wood, horsetail sp, tall tussock grasses, grasses, small shrub, burdock, etc, dock

5a No. ....

val Date: 10/10/10  
large hawkweed

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The culverts are galvanized steel

The watercourse changes as it moves through the Project site. The vegetation within the watercourse becomes dense with sedges

& some broad-leaved cattail. A few red-osier dogwood <sup>+ willow</sup> along the edge of within drain

- The bank becomes less steep along the south portion of watercourse. There is no bank along the northern portion.

scattered trees along the southern portion where it starts to curve south.

- tree sp. → balsam poplar

- Southern portion along Conc 6 & 7, the watercourse turns into wetland-type vegetation.

within watercourse sedges, algae

- broad-leaved cattail, sedges, grasses, jewelweed, willows, curly dock, wood grass

No. ....

Date: .....

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where the watercourse curves south & crosses under Conc. 6 & 7, it also continues north-south along the

the scrub area - dominated by willows & spangled-elder - appears to be multiple drainage channels. water is present in this area

- Follows along the fence line (lots owned)

- multiple drainage channels with wide floodplains

- area contains a mix of wetland & upland vegetation

- used raspberry

wild basel

note: sp

- high water mark / wetland area is the edge of the elder / willow thicket area

- followed jewelweed as indicator of H<sub>2</sub>O &

- south of elder thicket is a mix of wet & upland vegetation within field

No. ....

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back robert (field) ?

cuckoo spit

The drainage feature west of the  
aspen thicket along field does not  
have a defined channel - dominated  
by sedges (within drain) with willow  
& alders along east side of drain  
adjacent to thicket.

- some cattail

sensitive fern

red-spined dogwood  
sprinkled jar pygmyweed

No. ....

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Woodland / Phidiot swamp

lossing track observed

Spruce (R), tamarack (R)

- red-spined dogwood saplings (A)

- Willow (A)

- Alder (A)

- pile of downed debris

- standing water throughout

- mud soil

- dead standing trees

- balsam poplar (R) immature

- trembling aspen (R) immature

- white birch (R)

large open clearings - very disturbed  
site due to past logging activity  
fragment bedrock

Wood frog:

- shrubs: herbaceous dogwood, alder &  
willow saplings (R)

Trembling aspen - immature are  
are the dominant of woods in  
woodland to ground

- Italian flycatcher, wood thrush  
woodland 10 bird eggs

No.....

Date..... Page 48

selfhood

mountain ash

hebb's sedge

Trembling aspen (immature) became  
more dominant along Northern  
portion of woodlot.

coltsfoot

highbush cranberry

recommended to keep wooded area

west of barn as a visual barrier

You can see the farms/houses

west of ~~the~~ North Rd from back

field (NE portion of woodlot)

No.....

Date..... Page.....



N  
D

No.

No.

Date

Page

Date

Page

Sept. 30, 2011	Northland	364	1467 SW	Ag to woodland
start time 9am, 15°C wind 10, cloud 10%	(Cochrane site)		1468 W	
Transmission Line	Assessments		1469 N	Thicket
→ From car (conc. 6+7 from East-West)				
Assessing Water Crossing / Roadside	305		1470 NW	
wetlands + Vegetation Communities			1471 SW	
(Joe Vircek, Martin Esraelian - Hatch)	306		1472 S	
GPS			1473 SW	
B1	- non water body		1474 NW	
	- Farmers Ditch / swale, ~ 1/2 mile	307	1475 S	
	- grassy		1476 SW	
299	Photo	1458 W	1477 W	
		1459 SW	1478 N	
			1479 SW	
GPS	PHOTOS	308	1480 NW	house
300	1460 S	Ag Fields	1481 SW	woodland to Ag
301	1461 W	approaching road 309 to west	1482 NW	Thicket
			1483 N	
302	1462 N	woodland	1486 NE	
			1487 NW	Next to Lake
303	1463 S	Ag	1488 W	
	1464 W	woodland III	1489 SW	
	1465 NW	thicket	1490 S	
	1466 N	thicket III	1491 NW	

No. ....  
 Date ..... Page .....

No. ....  
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329 1543 SW  
 1544 W  
 330 1545 NE  
 1546 SE  
 331 1547 S  
 1548 W  
 1549 NW  
 332 1550 W  
 333 1551 NW  
 334 1552 S  
 335 1553 S  
 1554 SW  
 1555 NW  
 1556 N  
 336 1557 S  
 1558 W  
 1559 NW  
 1560 N  
 337 1561 NW  
 338 1562 W  
 339 1563 SW  
 1564 NW  
 340 1565/66 S  
 1567 W

1568 NW  
 1569 N  
 341 1570 SW  
 1571 NW  
 342 1572 NW  
 1573 S  
 343 1574 SW house  
 1575 W  
 1576 N  
 344 1577 NW  
 1578 W  
 1579 SW  
 1580 SE  
 345 1581 S  
 1582 SW  
 1583 W  
 1584 N  
 346 1585 N wetland/  
 1586 N watercourse  
 1587 SW  
 1588 NW culvert  
 1589 SW  
 347 1590 SE 1592 N  
 1591 S 1593 NW

369	1648	NE
	1649	S
	1650	SE

End Time 7am

Oct 1, 2011 Northland  
(Cochran sites)

5°C, Wind, Cloud 40%.

Cont'd Roadside Trans. Line Assoc.

(Joe Wisk, Martine Esraelian - Hatch)  
-starting from West (con. 6+7 corner), 9am

GPS  
370

Photo

1653 NW

1654 NE

1655 SE

1656 E

1657 E

1658 S

1659 NE

1660 SE

1661 NE

1662 SE

1663 NE 1664 SE

1665 E

375

1666 NE 1667 SE

1668 E

376 1673

1669 NE 1670 N

Watercourse

1671 S 1672 W 1673 W

Crossing

~ 7-8m wide, > 1m deep

(Bridge)

a.h.w. on top of bank

No. ....  
Date. .... Page .....

395 1722 NE 1723 SE  
396/1820 1724 N  
- Wetland / creek coming from  
marsh to N  
- ~0.75 m diam culvert under Road  
→ 1725 N 1726 S  
1727 E 1728 NE  
- no open water in creek (wetland)  
397 - clearing, ATV trail to N  
1729 N  
1730 SE 1731 NE  
398 732 E  
399/1814 1733 N - roadside wetland  
- no water present  
1734 SE 1735 NE  
400 1736 N 1737 NE, 1738 SE  
↳ driveway N side ↳ open fields  
401 1739 N - trailers, small lake to N  
1740 S, 1741 SW → open field  
402 1742 NW  
- depression (wetland), no water present  
1743 E  
403 1744 N 1745 - E  
↳ driveway on  
S side

No. ....  
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404 1746 N - trail to N  
1747 NE  
1748 SE - 2 trailers about 50m  
from road to S  
1749 S  
405 1750 NE 1751 SE  
406 1752 N - cattails, small wetland  
no water present  
407 1753 N 1754 E, 1755 S  
408 1757 N, 1758 N  
- Large Valley to N (steep  
embankment)  
1756 E  
409 1759 SE 1760 NE  
410 1761 NE 1762 SE - house  
to S  
411 1763 SE 1764 E  
↳ ag field, lower than  
1765 N - berries  
412 1766 NW (house), 1767 ag field,  
1768 E, 1769 SE, 1770 S  
(house)  
413 1771 NE 1772 SE 1773 SE  
414 1774 N, 1775 NE, 1776 SE  
1777 S → Barn

1834 SE - the water course  
 continues to S  
 - 3-4m wide channel, ~30cm deep  
 ~15-20m wetland floodplain  
 to S

429 - small roadside wetland  
 - cattails, no standing water  
 1835 N, 1836 E, 1837 S

430 1838 NE 1839 E 1840 SE

431 - corner Conc. 6+7 / Conc. 10+11  
 1841 NE, 1842 E, 1843 SE, 1844 S

432 - 1845 NE, 1846 E, 1847 SE

433 - 1848 S, 1849 E, 1850 NE

1851 S - (Trail) - Raptor stick nest 20m S of road

434 - culvert ~.5m wide 1852 N

- cattails in ditch

1853 E

435 1854 NE

water course/wetland culvert ~0.5m diam.

- long grasses 1855/57 N

- no water on N side, small wetland/  
 ponded water to S, ~20cm deep  
 ↳ 1856 S  
 1858 E

436 1859 SE 1860 NE, 1861 E

437 1862 N, 1863 S, 1864 E  
 small roadside wetland - wet, but no standing water

438 1865 SW (shack house 20m  
 from road)

1866 S - ag field

1867 SE - honor

1868 NE

439 1869 NE, 1870 SE, 1871 S  
 (field)

440 1872 N, 1873 E, 1874 SE  
 (field)

441 1875 E

442 1876 N, 1877 NE, 1878 E, 1879 SE

443 1880 NE (shack)

1881 E (near slope, by river)

1882 SE (roadway going S)

No. ....

Date. .... Page .....

463 3950 N, 3951 SE, 3952 E  
 464 3953 NE, 3954 SE  
 465 3955 N, 3956 E, 3957 SE  
 467 3958 NE, 3959 SE, 3960 E  
 468 watercourse meet ditch  
 ~ 2m wide 3961 N  
 ~ 0.5 m diam. culvert 3962 NE  
 water depth 10-20cm  
 3963 N  
 3964 SW  
 3965 W - disjoints in ditch  
 after culvert  
 469 - 3966 S - trail ~ 56m wide  
 470 - + railway to NE 3967  
 3968 E (road ends to east)  
 3969 SE (Large field)  
 471 - trunlay 3970 NW  
 - road ends 3971 E  
 - Field 3972 S  
 End Time 7 PM

No. ....

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Sun Oct. 2 2011 Northland  
 Corchano Site

Cont'd Trans Line Assessment  
 (Joe Viscek, Maritime Estuarine Lab)

Start Time 9:00am

Sunny 16°C, Wind 1, Cloud 10%

- conc. 8-9, east side of ditch

GPS

Photo

472 1891 W (river)

1892 N, 1893 S

473 1894 W

474 1895 W, 1896 SW, 1897 S

1898 NW, 1899 N

1900 W

475 1901 E, 1902 SE

1903 NE

476

1904 NE, 1905 SE

1906 W, 1907 SW, 1908 NW

479

ditch

1909 SW, 1910 W

No water within

~ 2m wide, cattails

little standing water, variable  
 mostly dry to < 10cm by culvert  
 - cattails 1983 N  
 1984 NE 1985 NW  
 - thickets to S 1986 S  
 1987 NW 1988 SW, 1989 E

500 1990 NE 1991 SE  
 501 1992 N 1993 NE, 1994 SE  
 1995 E  
 502 1996 N, 1997 NW, 1998 NE, 1999 SE  
 2000 SW

503 - cattails, end in ditch to N  
 2001 N, 2002 NE, 2003 SE  
 504 - 2004 NW  
 505 - 2005 NE 2006 SE  
 2007 N (ATU trap)

506 2008 NE 2009 SE (house, barn)  
 2010 S (barn) 2011 SW (house, barn)

507 2012 N, 2013 NE, 2014 SE, 2015 S  
 (house/barn)

508 2016 N 2017 NE 2018 S (house)  
 (front)

509 2019 N, 2020 NE, 2021 SE, 2022 S  
 2023 SW (house/barn)

510 2024/25 N, 2026 NE  
 2027 SE, 2028/29 E  
 - Hwy 579 intersection to E

511 - at Hwy 579 intersection  
 2030 NW 2031 N, 2032 NE  
 2033 E, 2034 SE, 2035 S, 2036 SW  
 2037 N, 2038 S

512 2039 N 2040 S, 2041 NE, 2042 SE  
 513 2043 N, 2044 NE, 2045 SE  
 514 2046 N, 2047 NE, 2048 SE, 2049 S  
 2050 SW

515 - Watercourse 2051 S  
 - 3-4 m wide, 9.6 m high bank  
 - 10-30 cm deep  
 - large culvert ~1.5 m diam.  
 2052 SE 2053 N, 2054 NE  
 - water gently flowing N  
 - 2055 NE  
 much substrate visible  
 2056 S - ponded water 10 m  
 2057 SW east of culvert  
 2058 E

No. ....

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- 530 2120 N, 2126 NE (barn to NE)  
2127 SE (house), 2128 S
- 531 2129 NW (house) 2130 SW (house)  
2131 N, 2132 NE, 2133 SE
- 532 2134 NW, 2135 NE, 2136 SE
- 533 2137 NE, 2138 E, 2139 SE, 2140 S
- 534 2141 N - ditch crossing w/ culvert
- 535 - Watercourse Crossing  
2142 S, 2143 SW, 2144 S  
~ 20-30 cm deep  
Wetland to scrub, grassy emergents  
- much sand substrate  
2145 N ~ 1.5 m wide channel  
a.b.w.m ~ 2 m across  
2146 E - culvert ~ 2.5 m diam.  
- very gently flowing N  
into Wetland 2147/48 N, 2149 NE
- 536 - Watercourse Crossing  
2150 S ~ 4-5 m wide  
associated wetland  
2151 SW 2152 SW  
2153 S 2154 S  
~ 30 cm - 0.75 m in depth  
- cobble with sand substrate

No. ....

Date. .... Page .....

- 2155 N, 2156 NW, 2157 W  
- connects to wetland in N
- 2158 SW - culvert, ~ 5 m diam  
(large)
- 537 - at Railway Crossing  
2159 NE, 2160 SE (house)  
2161 NW, 2162 SW (wetland complex)
- 538 - 2163 N, 2164 NE, 2165 SE  
(houses to NE)
- 539 - 2166 NE, 2167 SE, 2168 S
- 540 - 2169 NE, 2170 E, 2171 SE
- 541 - 2172 SE, 2173 NE, 2174 N  
2175 S
- 542 - Wetland to S 2176 S  
possible dugout pond/marsh  
~ 20-30 m diameter, ~ 15 m from road  
2177 N, 2178 NE, 2179 SE  
2180 SW (house)
- 543 2181 NW, 2182 NE, 2183 SE  
2186 SW
- 544 2187 NE, 2188 E, 2189 SE  
intersecting at Genier (North) Rd.



Northland - Cochrane Solar Sites  
Transmission Line Corridor Assessment

Thurs., Nov. 10 / 2011

Joe Viscek (Hatch)  
 with Martine Esraelian

Temp.: 4°C, light snow  
 Wind: 3  
 Cloud Cover: 100%

8:00 am Start time

HWY 668, West of river,  
 just past railway track, heading North.

GPS

Photo

Substation 2365 NW, 2366 N, 2367 NE  
 (substation to west, near railway tracks)

POI 001 Watercourse Crossing  
 0.75m<sup>diam.</sup> culvert, ~4m wide  
 < 5cm to no standing water  
 - cattails

- Photos

2368 S (culvert)  
 2369 NE, 2370 W, 2371 SW  
 2372 N

POI-002 - Watercourse crossing - bridge  
 (Watercourse) (Deception Creek)  
 1) ~ 3-6m wide, ~0.5-1.5m<sup>deep</sup>  
 - high banks ~ 2-6+ meters  
 - grassy riparian veg., flows W  
 2373 N, 2374 SE, 2375 N,  
 2376 N, 2377 S, 2378 NW  
 2379 NW

POI 003 - Watercourse Crossing  
 (Watercourse) - culvert ~ 0.5m diam  
 2) ~ 2m wide, 4m a.h.w.m  
 ~ 10cm - 20cm deep  
 grassy veg.

2380 SE, 2381 E, 2382 N,  
 2383 S, 2384 W,

POI 004 - ditch to West  
 (Watercourse) - pooled water by road, ~ < 10cm deep  
 x 1) 2385 N, 2386 E, 2387 SE, 2388 S W  
 2389 W, 2390 W

POI 005 2391 E, 2392 N, 2393 NE  
 (watercourse  
 x 2) 2394 S, 2395 E, 2396 N,  
 2397 W, 2398 N  
 culvert ~ 30 cm diam.  
 wetland / watercourse crossing  
 ~ 2 m wide, mostly no  
 standing water, some pooled  
 areas < 5 cm. Cattails + grasses

POI 006 ditch extending W, no  
 (Watercourse  
 x 3) culvert, some pooled,  
 standing water < 5 cm deep  
 2399 S, 2400 NE, 2401 N,  
 2402 SW, 2403 W, 2404 NW  
 - grassy veg., ~ 1 m wide

POI 007 before lake (Kennedy Lake)  
 (x 4) grassy, dry swale to West  
 2405 N, 2406 SE, 2407 SW,  
 2408 W, 2409 NW, 2410 N

POI 008 Kennedy Lake  
 2411 - 2417 (East)

POI 009 Creek on both sides  
 of road, no culvert  
 or standing water,  
 cattails near road  
 2418 NE, 2419 E, 2420 SE, 2421 NW,  
 2422 S, 2423 N

POI 010 Water Crossing  
 (Watercourse  
 3) ~ 0.75 m diam. culvert  
 channel ~ 1 m with  
 ~ 8 m a.h.w. mark  
 - grassy w/ cattails  
 - ~ 10 cm depth, visible  
 to E flowing E into  
 Kennedy Lake

2424 NE, 2425 NE, 2426 E,  
 2427 W, 2428 NW, 2429 N

POI 011 Water Crossing  
 ~ 0.5 m diam. culvert  
 < 5 cm depth, flowing East  
 ~ 1 m wide  
 wetland-like on W side  
 w/ grasses

2430 E, 2431 NE,  
2432 NW, 2433 N

POI 012 Small watercourse crossing  
(x7) culvert ~0.5 m diam  
2nd culvert ~ 10cm diam,  
~1 m wide channel  
< 5 cm depth, flowing E  
2434 E, 2435 E, 2436 N, 2437 W  
2438 NW

POI 013 watercourse crossing  
(Watercourse)  
4 - culvert ~0.75m diam  
~1-2m wide channel  
depth 10-30cm variable  
flowing E gently  
- grassy riparian veg.  
2439 N, 2440 NE, 2441 E,  
2442 W, 2443 NW, 2444 N

POI 014 Near HWY 668 / Conc. 8 and 9  
intersection  
2445 N, 2446 NE, 2447 SE,  
2448 SW, 2449 NW

POI 015 2450 E N  
At HWY 668 / Conc. 8+9  
intersection

POI 016 2451 N, 2452 W  
Conc. 8+9 backing W

POI 017 watercourse crossing  
(Watercourse)  
5 0.5 m culvert  
~3 m wide  
1.5 m high banks  
~10-20cm deep  
grass + some small tree  
riparian veg.  
2453 NE, 2454 NE, 2455 E,  
2456 S, 2457 E, 2458 NW  
2459 NW  
- gently flowing East

POI 018 2460 S, 2461 E, 2462 N

POI 019 2463 E, 2464 NE, 2465 NW,  
2466 W

POI 020 Watercourse Crossing  
(Watercourse 6) ~0.75 diam. culvert  
channel on N side only,  
pooled water on S side  
~ 3-4 m wide  
tree + grass rip. veg.  
~ 20-30 cm depth  
very gentle flow N  
muck veg. debris bottom  
2467 SE, 2468 S, 2469 E,  
2470 N, 2471 W, 2472 E

POI 021 Watercourse Crossing  
(X8) Culvert ~0.5 m diam.  
~ 1-2 m wide  
cattails + grasses  
< 10 cm deep to dry  
2473 SE, 2474 SE, 2475 NW  
2476 W, 2477 NE, 2478 E  
2479 NW, 2480 N  
- flowing gently N

POI 022 2481 E, 2482 SE,  
2483 S, 2484 W, 2485 NW

POI 023 Lake in view  
2486 E, 2487 SE,  
2488 SW, 2489 W, 2490 N  
2491 / 2492 E  
(Lower Deception Lake to E)

POI 024 2493 SE, 2494 E  
2495 NW, 2496 N, 2497 N,  
2498 SE, 2499 S  
- beginning to sound Lake

POI 025 2500 E, 2501 E, 2502 S  
2503 SE (just before bridge)

POI 026 Water Crossing  
- Bridge  
Stream ~ 5-6 m wide, 0.5-1 m deep  
draining N into Lake  
2504 S, 2505 W, 2506 W,  
2507 S, 2508 NE, 2509 NE  
2510 W, 2511 W,  
2512 NE, 2513 W, 2514 E

POI 027 2515 E, 2516 E,  
2517 NE, 2518 NE,  
2519 NW, 2520 W  
- Rounding Lake to SW  
2521 NW

POI 028 2522 E

POI 029 2523 E, 2524 N,  
2525 W  
heading E past Lake

POI 030 Road ends to E  
2526 E, 2527 S, 2528 SW  
Snowmobile/ATV trails continue to  
East/North 2529 E / 2530 N

POI 031 Watercourse Crossing  
near Long Lake site  
(Conc. 8+9)  
~ 2.5 m diam Culvert  
2-3 m wide stream  
Flowing North  
~ 0.5 m deep

- grassy riparian veg  
2531 S, 2532 S, 2533 N,  
2534 N, 2535 W, 2536 S

POI 032 Long Lake Site  
Photos for Computer  
Rendering

2537 E, 2538 SE, 2539 S  
2540 S, 2541 SW, 2542 W  
2543 SE, 2544 S  
2545 SE, 2546 SE,  
2547 W

Video taken at HWY 668 +  
Conc 8+9 Culvert

Finalized at 4:00 pm  
- proceeded to MNR office to  
obtain FRI maps.

Northland - Cochrane 4 solar Sites  
Transmission Corridor Assess.

Joe Viscok (Hatch)  
 with Martine Esraelian

Fri, Nov. 11 / 2011

Temp:  $-1^{\circ}\text{C}$

Wind: 2

Cloud Cover: 95%

Light snow, on and off

8:00 am start time  
 From Corner Conc. 10 + 11  
 and Conc. 8 + 9 Clute  
 (West of river)

GPS

Photo

POI 033      2549 SE, 2550 E,  
                   2551 NE, 2552 W  
 (intersection of  
 10/11 + 8/9)

POI 034      2553 SW, 2554 NW

POI 035      2555 SW, 2556 NW

POI 036      Water Crossing  
 (17)      2 x 0.5 m diam. culverts (6 m apart)  
 - wetland w/ ponded water  
 to south  
 - depth ~ 20-30 cm

(cattails - swampy w/ grasses + small trees  
 - gently flowing north  
 - channel width to north ~ 1.5 km  
 as water enters wetland area

2557 N, 2558 NW, 2559 SW,  
 2560 SW, 2561 SW, 2562 S,  
 2563 W

POI 037      2564 SW, 2565 NW

POI 038      2566 SW, 2567 NW, 2568 N

POI 039      2570 SW, 2571 NW

POI 040      2572 SW, 2573 NW

Culvert 0.5 m diam  
 < 5 cm water, gentle flow N  
 more wetland like than  
 watercourse, < 1 m wide

2574 NW, 2575 N, 2576 W,  
2577 SW

- probably an "intermittent stream"  
- thicket riparian veg.

POI 041 2578 SW, 2579 W, 2580 NW

POI 042 Pieces of bone / carcass found  
by road; possibly moose  
2581 SW, 2582 NW  
- detour road to North 2583 N

POI 043 2584 SW, 2585 NW, 2586 W

POI 044 2587 SW, 2588 NW, 2589 W

POI 045 2590 SW, 2591 W, 2592 NW

POI 046 2593 SW, 2594 NW

POI 047 Watercourse on N side of road  
(X9) pooled water in ditches  
to N and S, no culvert visible  
~ 1.5m wide channel extends N  
~ 20 cm deep  
rip veg.; grasses thicket,  
- no visible flow

2595 NW, 2596 N, 2597 SE,  
2598 NE, 2599 W

POI 048 2600 SW, 2601 NW

POI 049 2602 SW, 2603 NW

POI 050 2604 S - possible wetland  
to south  
(cattails visible)

2605 W, 2606 SW, 2607 NW

POI 051 Under Powerlines

2608 SW, 2609 W, 2610 NE

2611 NE, 2612 E, 2613 SW

POI 052

Road turns North,  
Trans. Line Corridor continues  
down bush trail

2614 W, 2615 NW, 2616 W

2617 - Animal skull

+ mandible found  
near trail (maybe Fox)

2618

## Bush trail - heading W

- POI 053 2619 W
- POI 054 2620 W
- POI 055 2621 W
- POI 056 2622 W - wetland area
- POI 057 2624 SW, 2626 E
- POI 057 2627 W
- POI 058 2628 / 2629 W  
Small wetland
- POI 059 2630 W, 2631 E
- POI 060 2632 W, 2633 E
- POI 061 2634 / 35 S, 2636 W, 2637 E
- POI 062 2638 W, 2639 NE, 2640 SE
- POI 063 2641 W, 2642 N, 2643 E, 2644 S  
Swampy-like patches along +  
adjacent to trail
- POI 064 2645 W, 2646 E
- POI 065 2647 W, 2648 S, 2649 E  
trail detour<sup>\*</sup> to south
- POI 066 2652 W, 2653 N, 2654 E  
Trail detour<sup>↑</sup> to N  
Wetland-like along trail  
for 25m W
- POI 067 2655 W, 2656 W, 2657 NW,  
2658 SW, 2659 E

- POI 068 2662 E, 2663 W  
wetland - patchy areas  
along path heading W
- POI 069 2664 W, 2665 E  
2666 - hoof track
- POI 070 - wetland along trail  
2667 W, 2668 W, 2669 E  
2670 E, 2671 W → shows wet  
areas along trail
- POI 071 - 2672 W, 2673 E
- POI 072 - Large Wetland Complex  
- swamp/marsh mix  
- cattails, grasses, thicket  
6674 W, 2675 E, 2676 W,  
2677 N - wetland extends N  
2678 W, 2679, 2680 S, 2681 W  
- flows North  
2682 E, 2683 W  
75m east → trail continues, wetland-like  
POI 073 → 2684 W, 2685 E, 2686 W
- POI 073 2687 E, 2688 W  
- trail continues to be wetland-  
like
- POI 074 - 2689 W, 2690 E
- Left site @ 4:30 pm



POI 075 2691 W, 2692 E

- very large poplars

POI 076 2693 E, 2694 W

POI 077 2695 N, 2696 W, 2697

- North/South trail detour

↳ no trail continues west

POI 078 - North detour on  
trail taken to hook at  
dead end.

2698 S, 2699 W

POI 079 - Watercourse

- drains into deception  
Lake

~4 m wide, 30-40 cm deep

2700 W, 2701 N, 2702 N,

2703 SW, 2704 N

- wetland ~ 12 m across

# Transmission Line Assessment

Location: Cochrane, ON

HWY 668 North, ~~to east~~  
Cnc. 8+9 Clute

Date: Nov. 10, 2011

Time: 0800 - 1600 (8.0 hrs)

% CC: 100

Temp: 9.2°C

Wind: 19 km/h SW

Precip. < 1 mm rain; < 1 mm snow  
light snow

- Muddy pole on east side Hwy 668

## Water Feature

① Deception Creek

- Water present
- Flow - East

② Water Feature

- present - yes (east + west); Flow - East
- water present: depth ~ 3-4"
- water feature <sup>on east</sup> does not have a defined bank (at least for the portion observed from the road)
- flows through a "meadow marsh" <sup>+ tall shrubs</sup> + wetland  
- sedges, cattail, speckled alder, grasses.
- (some, both sides of road)
- water flows east under road through a galvanized culvert ~ 6-7" wide.
- photos: 4348-4351 (west side, facing <sup>SW</sup>)
- duckweed, horned sp. on <sup>1m</sup> side <sup>east</sup>
- photos: 4352-4353 (east side, facing <sup>east</sup>)
- "municipal drain" on both sides of road are ~ 5m lower elevation from road + composed of cattail, sedges, grasses;
- the low-lying areas connect with ~~the~~ water feature ② + water feature ①
- low-lying area <sup>includes</sup> ~~includes~~ area in a defined bank (ie municipal drain) + areas that are low-lying ~~with~~ no bank or <sup>with slight</sup> slope. This area is intermittent.
- Changes in slope <sup>+ topography</sup>

"Rite in the Rain"

- ? suggest that water does not run off & flow one-way (i.e. ~~likely~~ drain into both) culverts throughout mean that there is no break between ① + ②

⑪

Drainage Feature  
- west of Hwy 668 @ cross from Huron Menonite Church / Conc. 6 + 7 Cuts.

- Photos  
- 4354 - West  
- 4355 - North  
- 4356 - South  
- 4357 - 4358 - vegetation - horsetails, (x) cattail, sedges in water

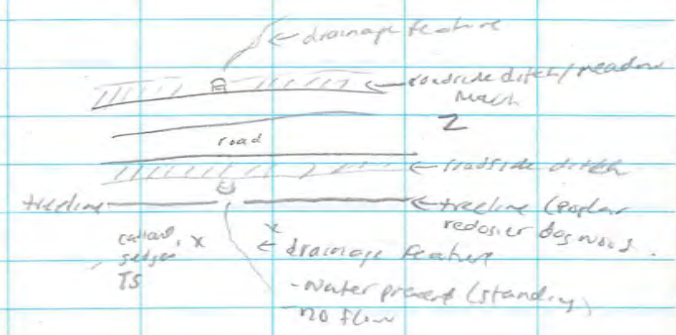
~ 3" standing water present

- drainage feature connected to roadside "ditch"  
- no flow present  
- slightly sloped bank - grasses / sedges

⑫

Drainage Feature / Wetland  
culvert under road - east & west

- west side - ~~no~~ defined bank, low-lying area / meadow-march - grasses, sedges, cattail



- East side

- drainage swale east into "meadow-march"  
- some pooled water present  
- no defined bank, TS swale into marsh (open muskeg)

⑬

Drainage feature -  
- west side only

4359

- photo 4360 - W  
4361 - N  
4362 - S } ditch w water present  
possibly flows North?

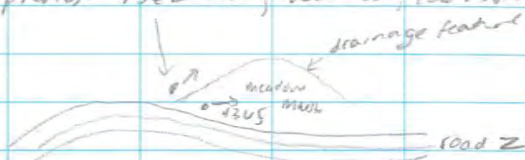
- drainage swale through 'open muskeg' sedges, grasses, cut through woodland - poplar, spruce

- width - 1-m' channel w  
- Bank - slight slope - Top ~ 3-m "kitten the rain"

(X4) drainage feature - not a waterbody

- naturally follows topography

photos: 4362-NW; 4363 NW; 4364 NW; 4365-W



- some standing water present c1cm

X4:1 - photo 4366-S  
4367-N

X5 Kennedy Lake - east  
Photos 4368-4374-S

X5 - west side 4375

- drainage swale cuts west through woodland

- grass, reeds, cattail

- no defined channel

X5-1 east side  
- drainage swale - no defined channel

photo 4376

(3) water feature - Culvert (large) under road

present - yes

photo 4378 - west side

- flow - east (water <sup>currently flowing</sup>)

3-1 - west side (photo 4379)

East side - <1 m channel  
defined bank

photo 4378

- bank depth - ~4.6"

- flow through trees/shrub + open  
mudflats

- trees - 19' (D) <sup>bulbous tree</sup> <sup>grasses</sup>

West side - open mudflats?  
- irregular shaped w no "real"  
defined bank

- grasses, sedges (D)

4380 - east

- immature poplar, red alder dominant

east/west side of road  
culvert - ~~photo~~

X6 - east side

East <sup>side</sup> photo 4381

water present, flow east through  
poplar/fir <sup>salix</sup> + open marshes  
- channel width < 1m; shallow bank

X6-1 north side - 4382

- open marshes,
- grasses, sedges,
- no defined bank, no water

X6-3 - west side - open marshes? 4383

X6-4 - east side - open marshes 4384

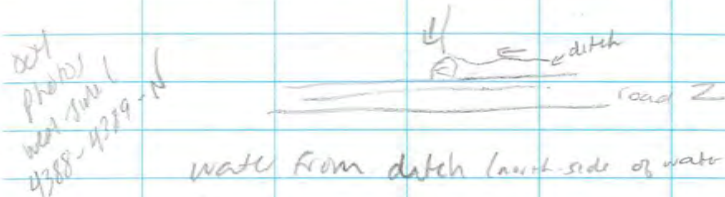
X7 - west side (culvert) 4385, 4387  
flow east drainage channel, <sup>some</sup> water

X7-1 - east side culvert (near pole) 4386

- no defined channel
- grasses/sedges sward through  
poplar & open meadow/marsh
- cattle ~~it~~

(4) Water Feature (Fower Creek?)

(4) west side 4390-4395



water from ditch (west side of water feature)  
flows south into water feature; water  
feature flows east

- water present - ~4" deep?
- channel width 1.5-2m
- shrubs, sedges & grasses along bank  
organic substrate

4-1 - east side 4396-4400

water present

ditch to the north flows south into  
water feature; water feature flows east

- channel width - ~2.3m
- depth - ~20cm (8")
- organic substrate; some gravel
- grass-tedge around bank &  
tall shrubs (alder)

GP1-005

conc. 8 + 5 chks

photo 4401 (west side) - transmission line  
photo 4402 (north)  
photo 4403 (east side) - transmission line

⑤ Water Feature (east side) 4404 ↓

4405 - East

4406 - SE

4407 - S

4408 - NE

4409 - NE

Electric fence  
east side (N-S)

- culvert -  
width - ~ 6 m wide

sloped bank - Top - 7m

- "cut" grass along bank

- Alder & poplar surrounding

- grasses / sedges <sup>marsh</sup> pockets

- depth - < 20cm (nearby @ bank full)

⑤-1 west side - 4410

- drainage small, no defined bank

- sedges, sedges

east/west  
- ditches are steep

conc. 8 + 9 Clute heady east

⑥ Water Feature (culvert under road)

⑥ north side 4411 - N, 4412 west

water present

- Alder / grasses / sedges <sup>N</sup> along bank; <sup>S</sup> siltation

- Black spruce surrounding

- channel width - 5-6 m

- depth - ~ 30cm (almost @ bank full)

muck substrate

⑥-1 south side - 4414

- pooled water! (doesn't go anywhere)

- might be water feature ⑥-2

North side of rd. culvert -

⑧ drainage Feature

Flow - North (flow present / water present)

4415

east side, sedges, grasses

- N -

alder, poplar

⑧-1 south side (culvert) drainage

ditch - water flows east & west

through from ditch <sup>through</sup> & flows north

4416  
silty <sup>east</sup>

through culvert

- sedges <sup>N</sup>, cattails

water present

"Rite in the Rain"

photo 4417 - 4418 towards Lower Deception Lake

photo 4419 - 4422 - Lower Deception Lake

(10) Water feature

- bridge crossing - 6m wide?

north side 4425<sup>N</sup> 4426<sup>W</sup> 4427<sup>E</sup>

South side 4428<sup>S</sup> 4429<sup>W</sup> 4430<sup>E</sup>

White  
Small stream

rock, cobble substrate; downed logs

TS riparian - alder, red-osier dogwood

- depth ~ 1m

- water present

POI 027

(11)  
- Trembling Aspen, Balsam Fir, White Birch,  
Hickory-Box  
Cedar along shoreline, Jack pine?

(35) Water feature (Long Lake)

Flow - north

photo 4433 - 4435 - north

photo 4436 - 4437 - south





(Y1) TS

- Alder 80 75  
Red-osier dogwood 40 05  
568  
705

Cattail / red-osier dogwood within ditch

(Y2) Photos 4442 - 4447

4442 - N  
4443 - NE  
4444 - E  
4445 - SE  
4446 - Facing west  
4447 - Facing west

4448 - 4449 - Willow sp

(X9) Water Feature

photo 4456 - E } adjacent  
4457 - N } woodland  
4458 - N }  
4459 - E } water feature  
4460 - W }

(South of Road (ditch)  
photo 4461 - 4464 - W)

- only on north side of road  
- width - ~ 2m  
depth 20-30 cm @ bank full  
organic substrate  
Riparian - sedge

Black spruce, Tamarack  
speckled alder

- connected to drainage ditch along  
the road. Drainage ditch is the  
same width/depth + comp.  
- No flow obs

Roadside ditch on the south side of  
road has standing water / no flow  
~ 2m wide  
~ 10cm depth of water / no flow  
- There is no culvert connecting the  
ditch to the water feature.

(43) west of X9  
presence of water begins + continues  
east. This is true for both  
ditches (north + south of Rd)

(44) south side of road  
photo - 4465 - S  
4466 - W  
- grasses (+)  
willow speckled alder present  
patch of cattail observed further  
south

(45) Photos  
4468 - NW  
4469 - W  
4470 - N

(16) Water Feature / Wetland  
- water present (permanent)

