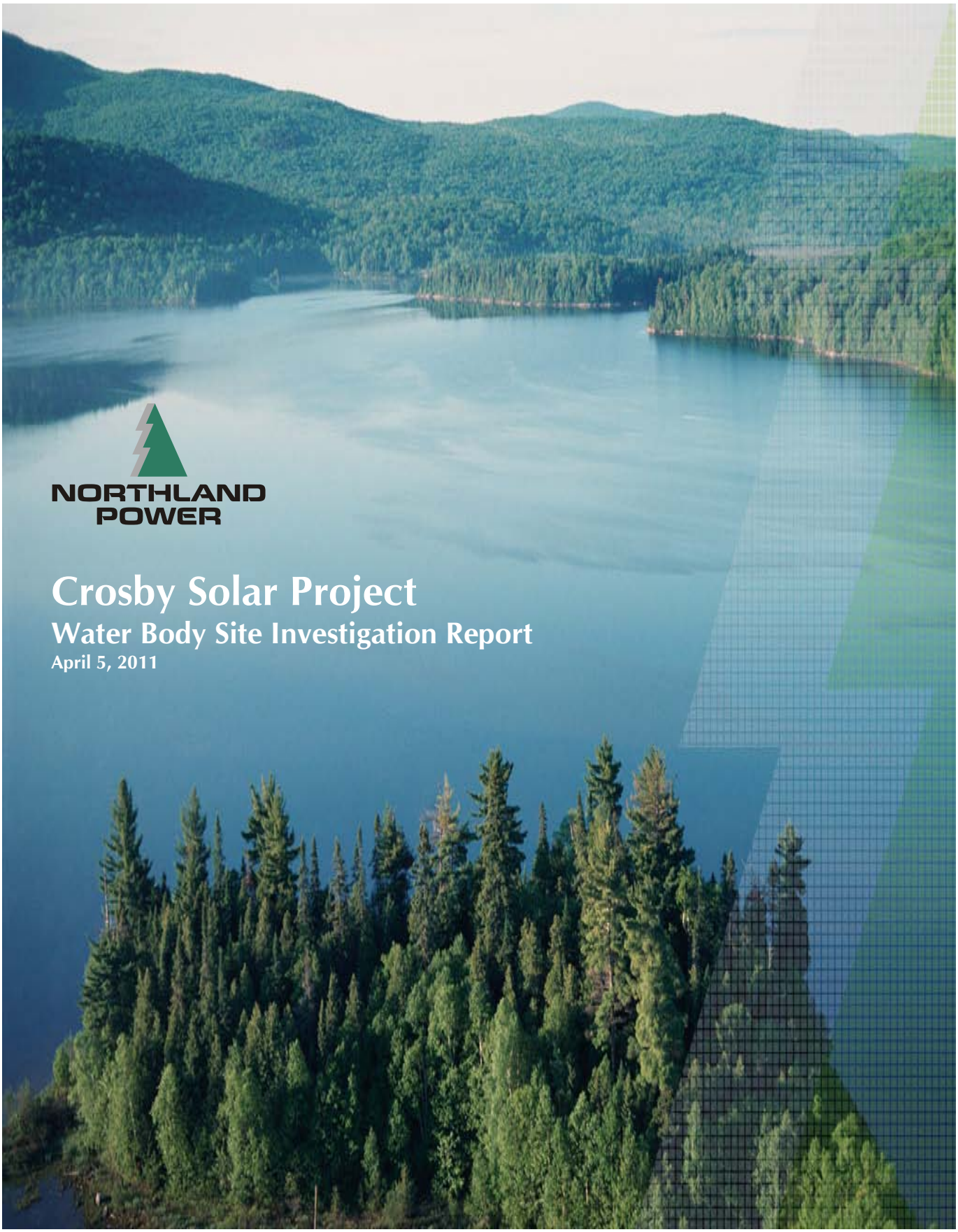

NORTHLAND POWER

Crosby Solar Project

Water Body Site Investigation Report

April 5, 2011

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

Water Body Site Investigation Report

Crosby Solar Project

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April 5, 2011

Project Report

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Northland Power Inc.
Crosby Solar Project

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1. Introduction

1.1 Project Description

Northland Power Solar Crosby L.P. (hereinafter referred to as "Northland") is proposing to develop a 10-megawatts (MW) solar photovoltaic project titled Crosby Solar Project (hereinafter referred to as the "Project"). The Project site will be located on approximately 52 hectares (ha) of land, located at 249 Little Rideau Lake Road in the Township of Rideau Lakes, within the United Counties of Leeds and Grenville.

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 10 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 Water Body Records Review (Hatch Ltd., 2010).

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.

2. Summary of Water Body Records Review Results

Table 2.1 summarizes the results of the Water Body Records Review (Hatch Ltd., 2010).

Table 2.1 Summary of Water Body Records Review Determinations

Determination to be Made	Yes/No	Description
Is the Project in a water body?	No	The Project will not be constructed in a water body.
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?	No	No lakes are present within 120 m of the Project site.
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 are present within 300 m of the Project site.
Is the Project within 120 m of the average annual high water mark of a permanent or intermittent stream?	Yes	There is one watercourse located within 120 m of the Project site.
Is the Project within 120 m of a seepage area?	No	No seepage areas were identified within the Project area.

Therefore, depending on the layout of the proposed solar facility, some components could potentially be located within 120 m of the average annual high water mark of one permanent watercourse (Watercourse B in Figure 4.1).

3. Site Investigation Methodology

3.1 Date, Time, and Duration of Site Investigation

- Date: June 15, 2010
- Start Time: 0800 hours
- Duration: 10.0 hours

3.2 Weather Conditions During Site Investigation

- Temperature: 18ºC
- Beaufort Wind: 3
- Cloud Cover: 100%

3.3 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.

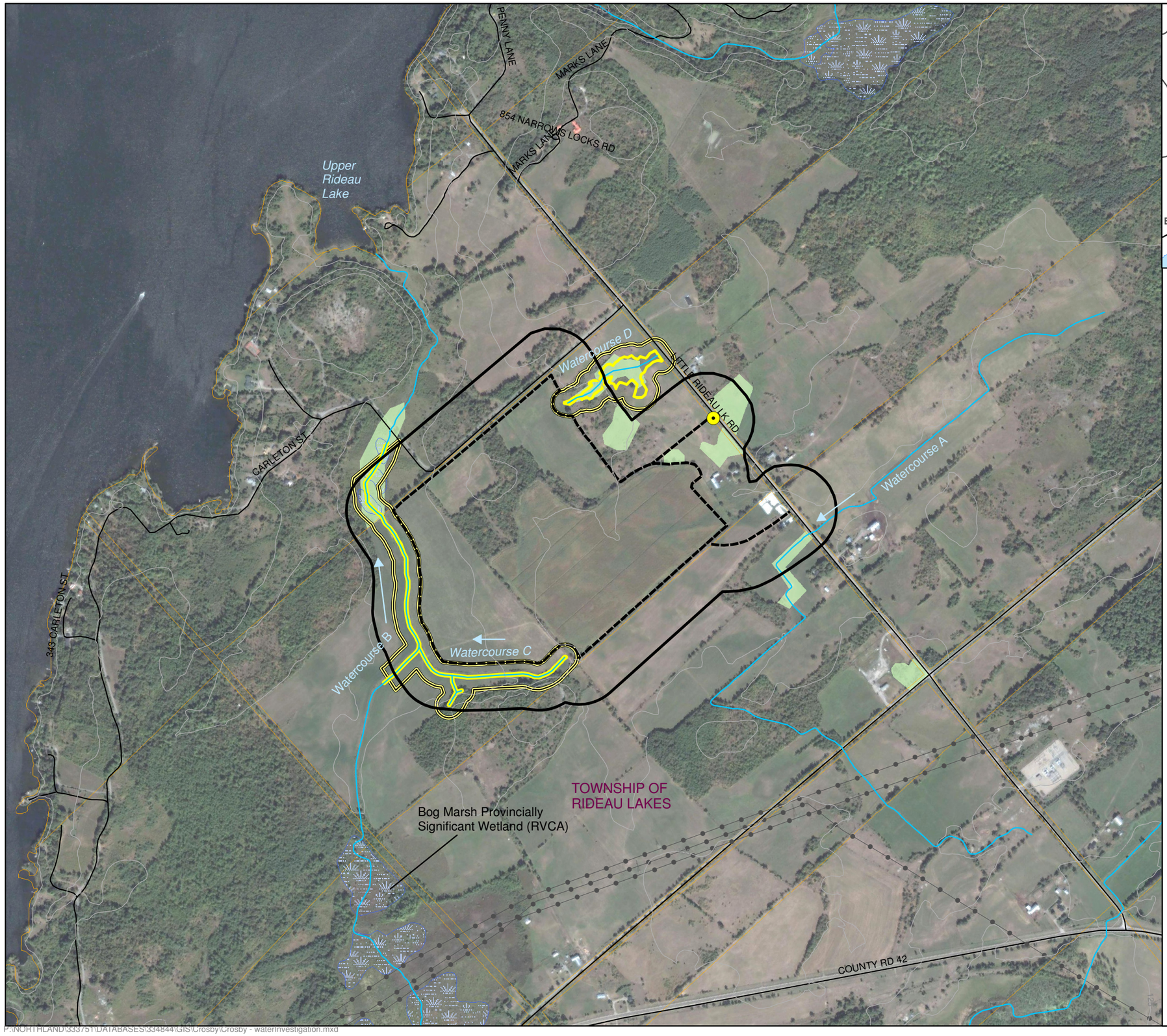
3.4 Survey Methods

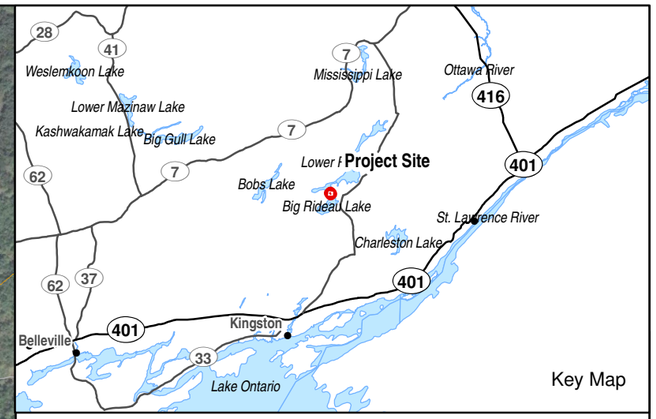
The entire site was searched by the observer on foot in order to document waterbodies. Photographs of the site were taken. Any observations of waterbodies, including the type of water body, instream habitat types, surrounding riparian areas, average annual high water mark and wildlife use were noted. 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 observer is provided in Appendix A.

4. Results of Site Investigation

This section documents the results of the site investigation and discusses specific water features observed on and adjacent to the Project site. Features noted in the following sections, including the proposed Project footprint boundary and the average annual high water mark of watercourses on and within 120 m of the Project site, are shown in Figure 4.1. There were no lakes or seepage areas identified during the site investigation.





Legend

- Roads
- Transmission Line
- Topographic Contour (5m interval)
- Watercourse
- Average Annual High Water Mark
- 30m Setback From High Water Mark
- Parcels
- Wetland
- Evaluated Non-Provincially Significant Wetland

Project Components

- Connection Point With Distribution Line
- Project Location
- 120m from Project Location

Notes:
1.OBM and NRVIS data downloaded from LIO, with permission.
2. Spatial referencing UTM NAD 83.
3. Satellite imagery from Google Earth Pro

0 100 200 400 Metres

1:10,000

NORTH

Figure 4.1
Northland Power Inc.
Crosby Solar Energy Project
Water Body and Project Boundaries

HATCH™

P:\NORTHLAND\333751\DATABASES\334844\GIS\Crosby\Crosby - waterinvestigation.mxd

back

4.1 Permanent or Intermittent Streams

The Water Body Records Review (Hatch Ltd., 2010) identified one watercourse within 120 m of the Project area (Watercourse B) and one Watercourse just outside the 120 m study area (Watercourse A). The site investigation identified two additional watercourses on and within 120 m of the Project site (Watercourses C and D). Each of those is discussed in the following sections.

4.1.1 Watercourse A

Watercourse A originates approximately 1.1 km east of the Project site and flows in a southwesterly direction toward the eastern Project boundary in a linear, channelized, drainage feature through open agricultural fields toward Little Rideau Lake Road. On the west side of Little Rideau Lake Road, it continues to run in a channelized drainage ditch through open fields toward the Project boundary. It then diverges from the Project site and runs south through a series of woodlots and open agricultural fields, toward an unnamed tributary of Newboro Lake. However, mapping from the MNR and the Rideau Valley Conservation Authority (RVCA) both indicated that this watercourse does not have a direct hydrological linkage with the tributary and this area was not assessed during the site investigation since it is located on private property not associated with the Project.

The site investigation has confirmed that the average annual high water mark of Watercourse A does not exceed the top of bank level of the excavated drainage ditch. Therefore, this average annual high water mark is greater than 120 m from the Project site boundary. Therefore, no Environmental Impact Study (EIS) is required since the setbacks specified in the REA Regulation are met.

4.1.2 Watercourse B

Watercourse B originates approximately 1.6 km southwest of the Project site. It flows in an excavated linear drainage channel through the agricultural field adjacent to the western boundary of the Project site. It then flows through a shrub and meadow wetland and field area before draining into Stedman's Bay on Upper Rideau Lake, approximately 600 m north of the Project site.

The portion of the watercourse that flows east through the agricultural field is dominated by grasses, sedges, rushes, herbs and isolated patches of shrubs. Water was observed throughout this watercourse. Where shrub species were absent, in-stream vegetation was dominated by common cattail. A photograph of the watercourse is provided in Figure 4.2.

The watercourse becomes wider where it converges with Watercourse C (see Section 4.1.3), flowing north before discharging into Stedman's Bay on Upper Rideau Lake. This portion of the watercourse is approximately 2 to 3 m wide and consists of emergent (floating arrowhead, pondweeds), submergent and floating (e.g., lesser duckweed) aquatic vegetation. The riparian vegetation is similar to the rest of the watercourse, consisting of grasses, sedges, herbs and shrubs. The depth of water observed within this portion of the watercourse was approximately 0.3 to 1.0 m and was nearly at bankfull height. A small, drilled artesian, created during a previous geological investigation on the Project site, is located adjacent to the watercourse and does supply a small amount of groundwater directly to the stream. Several green frogs (*Rana clamitans*) and northern leopard frogs (*Rana pipiens*) were observed, and a muskrat (*Ondatra zibethicus*) den was observed at the northern portion of this watercourse along the fence line.

Figure 4.2 View of the Northern Portion of Watercourse B

The site investigation has confirmed that Watercourse B is a permanent stream. The average annual high water mark was assessed during the site investigation as the top of bank of the excavated drainage channel in the upstream reaches, but as the extent of vegetation tolerant of annual inundation in the lower gradient wetland reaches (Figure 4.1).

As shown in Figure 4.1, the Project footprint boundary is between 30 and 120 m from the average annual high water mark. Therefore, an EIS will be required to assess the potential for adverse effects and mitigation measures required to prevent/minimize these adverse effects.

4.1.3 Watercourse C

Watercourse C consists of an excavated linear drainage ditch commencing in the southwestern portion of the Project site, where it flows west for approximately 400 m and then curves north where it converges with Watercourse B (Figure 4.1). This watercourse is intermittent as it receives flow from a tile drainage outlet that discharges water collected from the agricultural fields to the east. It consists of a narrow, shallow, excavated channel (<1.5 m wide) that flows through a vegetated corridor (approximately 5 m wide) surrounded by the adjacent agricultural fields.

The substrate consisted of shallow soils with areas of exposed bedrock at the surface. There was little to no water present within the watercourse at the time of the site investigation. The vegetated

corridor is dominated by grasses and herbs such as cow vetch (*Viccia cracca*), birds-foot trefoil (*Lotus corniculatus*), clovers (*Trifolium sp.*), ox-eye daisy (*Leucnthemum vulgare*), and aster species. Tree and shrub species were also observed along the watercourse and consisted of ash (*Fraxinus sp.*) and willow species (*Salix sp.*). These trees and shrubs provide 100% canopy cover throughout the majority of the lower reach of the watercourse. A photograph of Watercourse C is provided in Figure 4.3.

The site investigation confirmed that Watercourse C is an intermittent stream. The average annual high water mark was determined to be the edge of the naturally vegetated riparian corridor through the surrounding agricultural fields, as shown in Figure 4.1. The proposed development area will occur within 30 to 120 m of the average annual high water mark of Watercourse C (Figure 4.1), therefore, an EIS will be required to assess potential adverse effects and mitigation and monitoring measures.

Figure 4.3 View of the Eastern Portion of Watercourse C, Facing West

4.1.4 Watercourse D

Watercourse D meanders west-east through the northeastern portion of the Project site and appears to be man-made as it originates in the middle of the agricultural field, west of the Project site. This is an intermittent watercourse that receives flow after heavy precipitation events and is dry the remaining months of the year. It is less than 1 m in width and follows a natural contour before draining into a catch basin located along the eastern boundary of the Project site. This watercourse flows southeast through the agricultural field through a naturally cut channel as it moves downstream. This watercourse is surrounded by a wet meadow marsh community that is dominated by grasses, sedges, rushes, herbs and shrubs. The soils in this area are shallow and areas of exposed bedrock were observed throughout. This area is also used as cattle pasture and a majority of this area is tilled.

Figure 4.4 View of a Flooded Portion of Watercourse D

The site investigation confirmed that Watercourse D is an intermittent stream. The average annual high water mark was determined to be the edge of the naturally vegetated riparian corridor through the surrounding agricultural fields, as shown in Figure 4.1. The proposed development area will occur within 30 to 120 m of the average annual high water mark of Watercourse D (Figure 4.1), therefore, an EIS will be required to assess potential adverse effects and mitigation and monitoring measures.

5. Conclusions

Based on the results of the site investigation discussed above, there are several corrections to the results of the Water Body Records Review (Hatch Ltd., 2010) required. Watercourses C and D were not identified during the records review but were confirmed on and within 120 m of the Project site during the site investigation.

In addition, the Project Footprint and study area have been refined in this report compared to that shown in the Records Review, which only depicted the leased portion of the property.

Based on the results of the site investigation and the proposed Project components and boundaries shown in Figure 4.1, some components of the Project will be located between 30 and 120 m of Watercourses B, C and D. 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. 2010. Crosby Solar Project – Water Body Records Review Report. Prepared for Northland Power Solar Crosby L.P.

Appendix A

Site Investigation Field Notes

Location: Little Rideau Lakes Rd (North Crosby, ON)
Date: June 15, 2010
Time: 0800 – 1800
%C.C: 100% (Overcast) - Rain
Temp: 18°C
Wind: ~15km/h Beaufort Wind Scale: 3

American Robin
Canada Goose
- spoke to landowner low-lying, poor drainage south of little Rideau Lake Rd within cattle pasture area
song sparrow
Leopard frog
groundhog
deer scat
White-tailed deer
great-blue heron
Northern Harrier
Red-tailed Hawk
Turkey Vulture
Raven

Hedgerows (SW)

- rock pile along edge

- White Ash
- buckthorn (A)
- red ash (A)?
- Sugar maple (R)
- rock elm? (R) (D)
- hawthorn sp.
- other shrub sp.
- raspberry
- prickly gooseberry
- bur oak (R)
- common apple (R)
- eastern red cedar saplings (O)
- bitternut hickory (O)
- Manitoba maple (R)
- [illegible]
- [illegible] (R)
- alsike clover
- rough bedstraw
- [illegible]
- Wild basil

- cow vetch
- fragrant bedstraw
- riverbank grape
- grasses
- (tall) common buttercup
- virginia creeper
- common mullein
- goldenrod sp.
- raspberry sp.
- chickweed
- rough fruited cinquefoil
- red clover
- motherwort
- milkweed
- oxe-eye daisy
- common burdock
- canadian st johns wort
- bladder campion

Woodlands.

white ash (A)	aster sp.
rock elm	wood strawberry
pin cherry (R)	yarrow
butternut hickory (A)	sow thistle
common apple (O)	red clover
raster sp.	raspberry sp.
blackthorn (O)	trefoil
sugar maple	common mullein
eastern red cedar	sorrel
black ash (O)	
common juniper	
white ash (D) understory	
sugar maple (O)	
red ash (O)	
red oak	

Moist/low lying forest

% C.C = 90%

* Sugar maple (D) sub (A)
eastern redcedar (R)
largetooth aspen (O)
rock elm (O)
White ASh or green?
Bur oak (R)
Basswood (R)
white birch (R)
* Ironwood (A) understory (O)
black cherry
* trembling aspen (O)
Bur oak (R)
sedges
Canada mayflower canopy / under
* Shagbark hickory (O) (A)
Black Cherry (R)
American beech (O) (upland area)
rock piles
bedrock outcrops
vernal pool areas
white birch (R)

leaf litter (A)
some low-lying areas
groundcover sparse
honeysuckle?
firecap moss
peatmoss
squirrel nest
evidence of woodpecker

Large rock piles

Mature shagbark

more common apple on west side of woodlot

prickly ash (R)

red oak

N[illegible] used

North of Woodland - Hedgerows

X [illegible]

[illegible] maple

Elm

X Buckthorn

[illegible] (?)

[illegible]

Ash

X [illegible]wood (x)

[illegible]

[illegible] (Bitternut)

Riverbank [illegible]

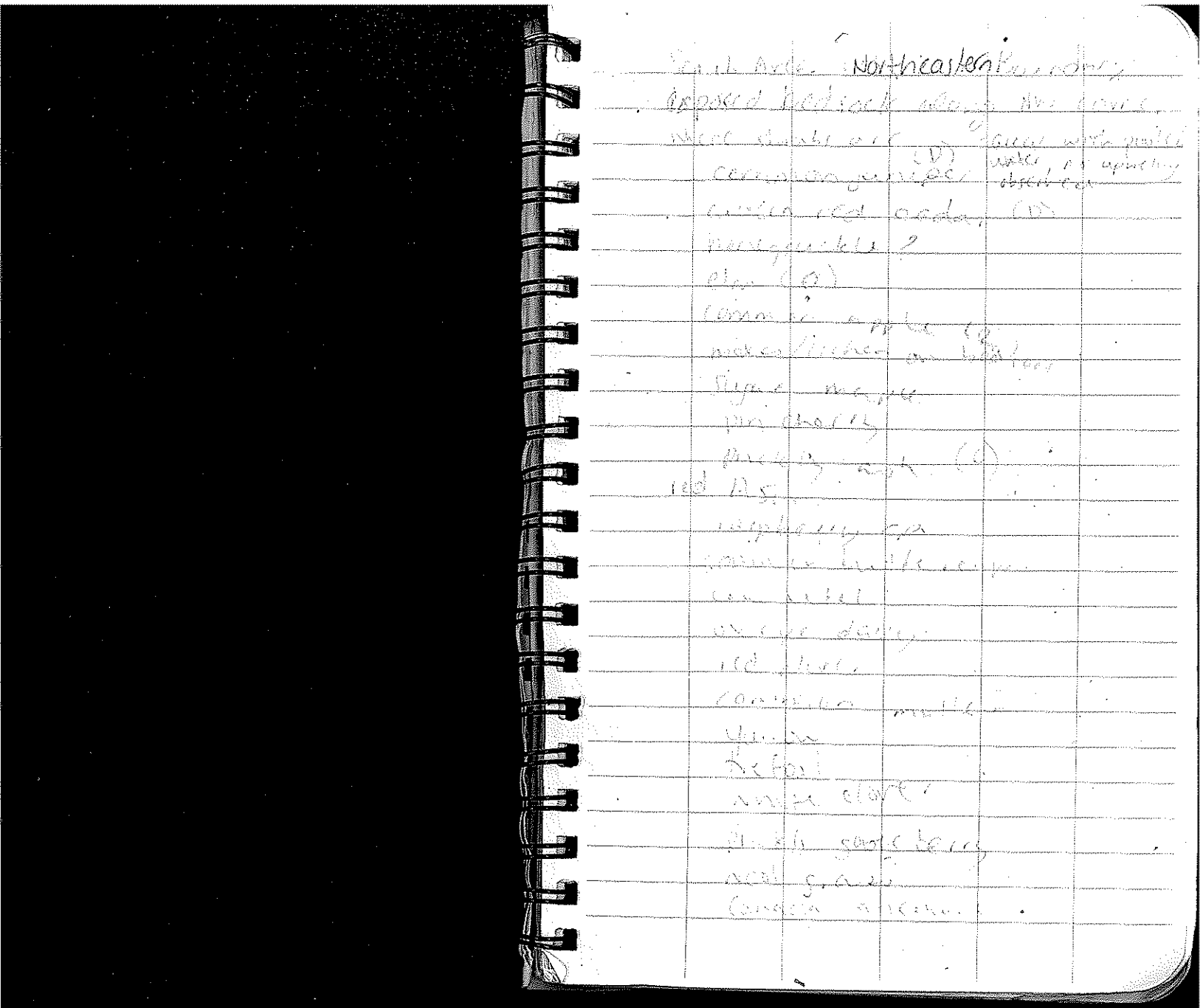
[illegible]

[illegible]

[illegible] (?)

[illegible] (x)

[illegible]



riverbank grape

[illegible] 039.356 (catchbasin)
4947437

wetland boundary [illegible]
it was difficult to determine
as soil was filled through

- water flow southeast

Black walnut along road.

* NO butternut found