



**NORTHLAND
POWER**

Belleville South Solar Project Water Body Site Investigation Report

August 15, 2011



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

Water Body
Site Investigation Report

Belleville South Solar Project

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Project Report

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Belleville South Solar Project**

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1. Introduction

1.1 Project Description

Northland Power Solar Belleville South L.P. (hereinafter referred to as “Northland”) is proposing to develop a 10-megawatt (MW) solar photovoltaic (PV) Project titled Belleville South Solar Project (hereinafter referred to as the “Project”). The Project site will be located on approximately 40 hectares (ha) of land, located in the single-tier municipality of the Corporation of the County of Prince Edward.

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 therefore, 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 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
- 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 (water body) 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 Results of Records Review

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

Table 2.1 Summary of Records Review Determinations

Determination to be Made	Yes/No	Description
Is the Project in a water body?	No	No part of the Project will be constructed within a waterbody.
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	There are no lakes located 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 in the study area.
Is the Project within 120 m of the average annual high water mark of a permanent or intermittent stream?	Yes	There are two watercourses within 120 m of the Project area.
Is the Project within 120 m of a seepage area?	Yes	There is a potential groundwater discharge area on or within 120 m of the Project.

Based on the results of the Records Review, there are waterbodies within 120 m of the Project.

3. Site Investigation Methodology

3.1 Date, Time, and Duration of Site Investigation

- Date: June 14, 2010
- Start Time: 1500 hours
- Duration: 4.0 hours

3.2 Weather Conditions During Site Investigation

- Temperature: 22°C
- Beaufort Wind: 2
- Cloud Cover: 60%

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 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, black ratsnake, Jefferson salamander, northern dusky and mountain alleghany dusky salamander, blanding's turtle, map turtle, spotted turtle, snapping turtle, queen snake, milksnake, ribbonsnake, flowering dogwood, swamp rose mallow and spoon-leaved moss.

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

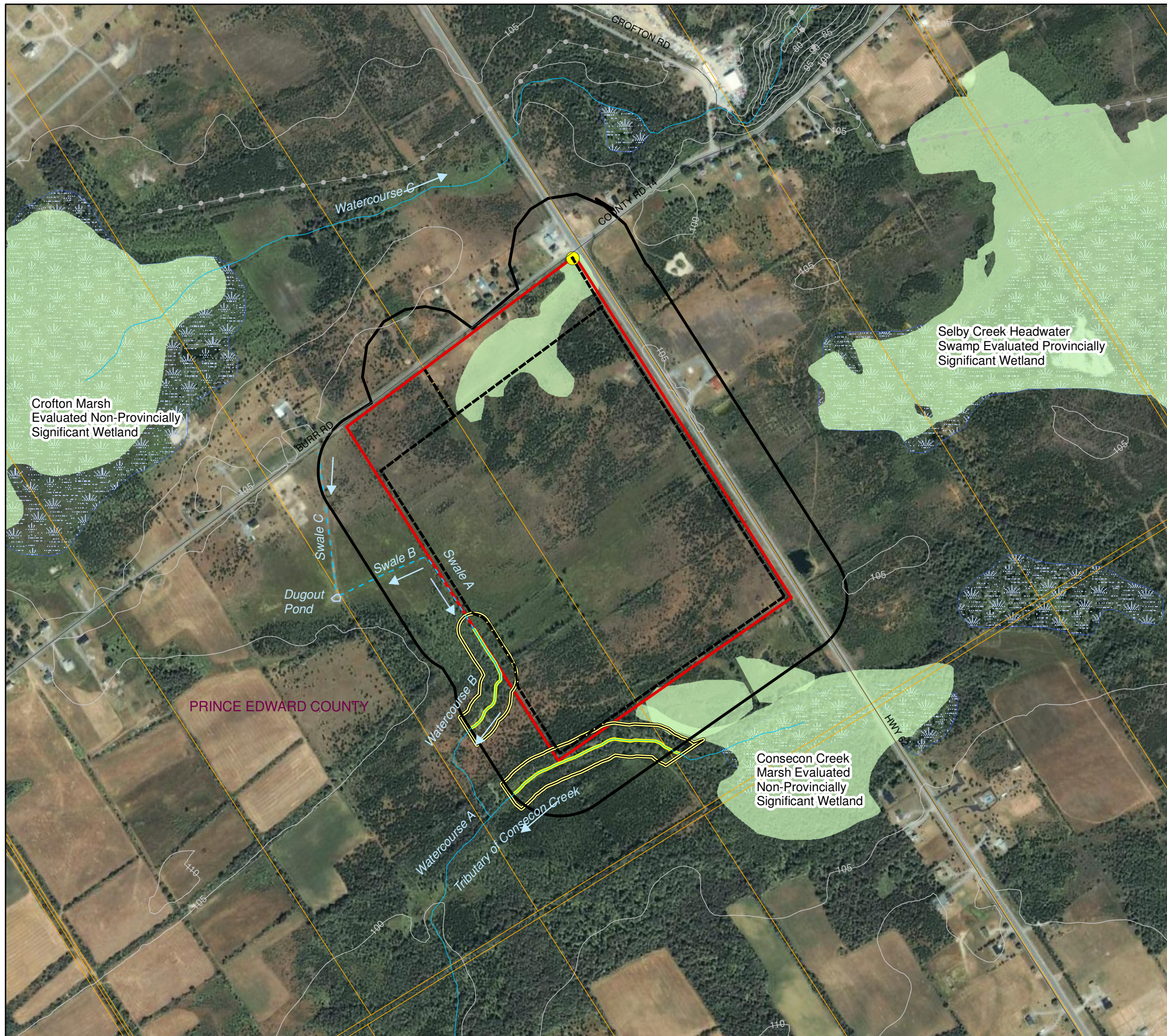
3.4 Survey Methods

The entire site and adjacent lands were 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 subject property. Features noted in the following sections, including the Project footprint boundary and the average annual high water mark and 30-m setback areas associated with watercourses are shown in Figure 4.1.



Legend

- Roads
- Transmission Line
- Topographic Contour (5m interval)
- Watercourse
- - - Grassed Waterway
- == 30m Setback From High Water Mark
- Average Annual High Water Mark
- ▭ Project Site
- ▭ 120m from Project Location
- ▭ Parcels
- ▭ Evaluated Wetland
- ▭ Unevaluated Wetland

Project Components

- Connection Point With Existing Distribution Line
- ▭ Project Location



Figure 4.1
 Northland Power Inc.
 Belleville South Solar Project
 Water Body and
 Project Boundaries **HATCH™**

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4.1 Permanent or Intermittent Streams

Two watercourses, both tributaries of Consecon Creek, are present within 120 m of the Project site. Both of these were identified during the Water Body Records Review (Hatch Ltd., 2010).

4.1.1 Watercourse A

Watercourse A originates in the Consecon Creek Marsh Evaluated Non-Provincially Significant Wetland approximately 220 m south of the Project site. It flows in a westerly direction, past the southwestern Project boundary before heading in a southerly direction. Watercourse A is a tributary of Consecon Creek which is located approximately 5.5 km downstream from the Project site. Consecon Creek flows through Consecon Lake before draining into Lake Ontario.

Watercourse A consists of a relatively linear channel that runs through the woodlot south of the Project site. The watercourse was not flowing during the June site investigation is therefore intermittent, likely serving primarily to convey stormwater flows from the surrounding lands and periodic drainage from the Consecon Creek.

The channel bed is approximately 1 to 1.5 m wide with primarily mud substrate. Sections of the bed are open with relatively little vegetation (see Figure 4.2), while others are sections have higher amounts of vegetation (primarily grasses and sedges) on the channel bed and banks (Figure 4.3). Riparian vegetation consists of grasses, sedges and ground cover species in a relatively narrow band (approximately 1 to 3 m from the channel edge), bordered by shrubs and trees. Some areas of the woodlot have high density canopy cover while others are more open.

Given the watercourse's intermittent nature and small size, it appears unlikely that any substantial amount of direct use by fish occurs at any period, although during higher flow periods, fish could possibly move upstream from more permanent reaches farther downstream outside the study area. Some invertebrate production of species with fast life cycles, could also occur in the reach within the study area.

Two photographs of Watercourse A as it runs adjacent to the Project site are shown in Figures 4.2 and 4.3.



Figure 4.2 Watercourse A South of the Project Site



Figure 4.3 Watercourse A South of the Project Site

The site investigation has confirmed that Watercourse A is an intermittent stream. There was no flow or standing water in the watercourse during the site investigation, but the channel bed was largely free of vegetation or contained vegetation that requires continuously saturated ground conditions.

To establish the average annual high water mark (as per the REA requirement), (i) riparian vegetation was assessed to establish the boundary of vegetation species tolerant of annual flooding, (ii) valley and topographic features such as the top of bank were observed. Based on these observations made during the site investigation, the high water mark along Watercourse A is based on the adjacent vegetation communities, since there is no defined top of bank feature. The average annual high water mark was determined to be the point at which vegetation transitioned into upland species that are not tolerant of annual inundation.

As shown in Figure 4.1, the Project footprint boundary will be located between 30 and 120 m from the average annual high water mark. Therefore, an EIS will be required to assess potential effects on this watercourse since it meets the setback requirements of the REA Regulation.

4.1.2 Watercourse B

Watercourse B originates immediately west of the Project site, at approximately the mid-point of the property (Figure 4.1). It flows along the Project boundary for approximately 300 m before diverging away from the Project area and draining into Watercourse A approximately 210 m west of the Project Site.

There was no flow or standing water in any reach of Watercourse B during the June site investigation. The upper reach of the channel consists of a poorly defined, grassy swale with a mix of vegetation species, including some upland and less water tolerant species, in addition to a variety of sedges and grasses. Given the presence of such vegetation community, this portion of the watercourse (as shown in Figure 4.1) does not meet the definition of a watercourse as per the REA Regulation. A photograph of this section of Watercourse B is provided in Figure 4.4.

However, the lower section of the watercourse has vegetation communities that are more indicative of those that do require continuously saturated soils (i.e., predominantly sedges) and therefore it does meet the definition of an intermittent watercourse. The channel remains poorly defined, as it flows through a mix of relatively open shrub meadows and denser wooded areas. Substrate is predominantly mud and fine mineral soils.

This section of the channel appears to serve primarily as stormwater conveyance, but may provide some intermittent aquatic habitat for tolerant fish and invertebrates. A photograph is provided in Figure 4.5.



Figure 4.4 Upstream Grassy Swale Reach of Watercourse B



Figure 4.5 Lower Reaches of Watercourse B Adjacent to the Project Site

The site investigation has confirmed that the lower portion of Watercourse B is an intermittent stream. The average annual high water mark, based on top of bank features and riparian vegetation communities is shown in Figure 4.1.

As shown in Figure 4.1, the Project footprint boundary will be located between 30 and 120 m from the average annual high water mark. Therefore, an EIS will be required to assess potential effects on this watercourse since it meets the setback requirements of the REA Regulation.

4.1.3 Other Drainage Features

Several drainage features not noted during the records review were observed west of the Project site during the site investigation. There are two grassy swales (Swales B and C in Figure 4.1) that both run toward a dugout pond with no outflow. Swale C commences at the roadside ditch along Burr Road and flows south for approximately 300 m in an excavated linear drainage swale where it enters a dugout pond. Swale B commences the western Project site boundary and runs west toward the dugout pond. It runs through a meadow marsh type wetland area with poor drainage.

Neither the dugout pond or Swales B nor C meets the definition of waterbodies in the REA Regulation. They serve primarily to convey drainage toward the dugout pond where it appears to infiltrate the ground, since there is no outflow.

4.2 Seepage Areas

The Quinte Conservation Authority Groundwater Study (2009) identified the Project area as a potential groundwater discharge zone. During the site investigation, the Project area and adjacent lands were assessed to identify the presence of any seepage. Indicators looked for during the site investigation included visible flowing seepage or spring areas, wetland vegetation requiring continuously moist soil conditions, presence of a high groundwater table, and suitable valley type topography that would be conducive to intersection with the groundwater table.

No evidence of seepage areas was present on or within 120 m of the Project site. There were no visibly flowing seepage or spring areas and the majority of the soil on the site was not saturated, with the exception of some small isolated pockets of area with poor surface drainage. There were some patches of obligate wetland vegetation species and other areas where wetland species were a part of the vegetation community [which also included upland species dominated by red cedar (*Juniperus virginiana*)]. However, this appeared to be due to presence of poor drainage, likely caused by a perched groundwater table above the shallow underlying bedrock. The poor drainage creates seasonally saturated soil conditions, since surface water drainage slowly infiltrates the underlying bedrock and remains present within the rooting zone long enough to facilitate the growth of wetland species. However, this does not appear to be associated with a groundwater discharge area, only poorly draining surface water.

Therefore, no seepage areas were identified on or within 120 m of the Project site.

5. Conclusions

Based on the results of the site investigation discussed above, there are no corrections to the results of the Water Body Records Review (Hatch Ltd., 2010). However, 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, the Project will be located between 30 and 120 m of the average annual high water mark of any waterbody. Therefore, an Environmental Impact Study (EIS) is required.

6. References

Hatch Ltd. 2010. Belleville South Solar Project – Water Body Records Review Report. Prepared for Northland Power Inc.

Quinte Conservation Authority. 2009. Groundwater Study. Accessed May 14, 2010. On-line at http://quinteconservation.ca/web/index.php?option=com_content&task=view&id=100&Itemid=85

Appendix A

Site Investigation Field Notes

Date: June 14, 2010

Time: 1500 - 1900 + 2100 - 2200

Temp: 22°C

Beaufort Wind Scale = 2

% c.c. = 100% light rain

species names recorded above

- Agricultural field used for pasture

Eastern Redcedar (D)

Junco (A)

pinkish-gray

yellow

red cluster

blackish-gray treefall

white cluster

golden rod sp.

Grasses

ox-eye daisy

sethead

arter

common milkweed

Common groundsel

clefords pink

Common milkweed

white bugloss

yellow sweet clover

blackish common

common milkweed

Small (ditch) wetland

sedges				
cow vetch	spreading dogbane			
fragrant bedstraw	service berry sp.			
milkweed				
Field chickweed				
Hungry				
Small fruited bulrush				
spikerush sp.				
nuttall's bedstraw				
awn-fruited sedge				
cardinal (S) within municipal ditch				
along Hwy 62				
small wetland patch				
- small-fruited bulrush				
- spikerush sp.				
- awn-fruited sedge				
water sedge				
soft stem bulrush				
green sedge				
purple loosestrife				
canadian thistle				
willow sp.				

plants started deer
wild turkey

Ash tree (2)				
Malva (large) Malva (small)				
Wood frog				
Field marsh				
Bur oak				
Green Ash				
poison hemlock				
- blue flag				
* milkweed				
- willow sp.				
blue joint				
deer tracks				
Small-fruited bulrush				
cardinal				
Common juniper				
solid horned oak				
adjacent to property				
Green Ash (S) (S) (S)				
willow sp.				
sedge				
cow vetch				
willow sp.				
willow sp.				
willow sp.				

