



**NORTHLAND
POWER**

Burk's Falls West Solar Project

Draft Water Body Site Investigation Report

September 7, 2011



Northland Power Inc.
on behalf of
Northland Power Solar
Burk's Falls West
Toronto, Ontario

Draft Water Body
Site Investigation Report

Burk's Falls West Solar Project

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Project Report

September 7, 2011

**Northland Power Inc.
Burk's Falls West Solar Project**

DRAFT Water Body Site Investigation Report

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1. Introduction

1.1 Project Description

Northland Power Solar Burk's Falls West L.P. (hereinafter referred to as "Northland") is proposing to develop a 10-megawatt (MW) solar photovoltaic project titled Burk's Falls West Solar Project (hereinafter referred to as the "Project"). The Project will be located on approximately 40 hectares (ha) of land, located south of Highway 520 at the border of Armour and Ryerson Townships, in the single tier municipality of Armour Township (Figure 1.1).

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 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 location. These requirements were not deemed applicable to the Project as no such lakes were found during the Water Body Records Review (Hatch Ltd., 2011a).

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).

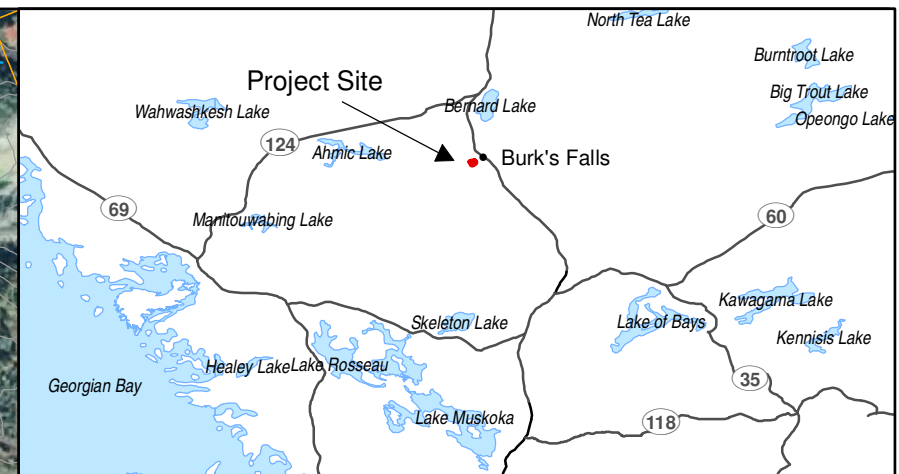
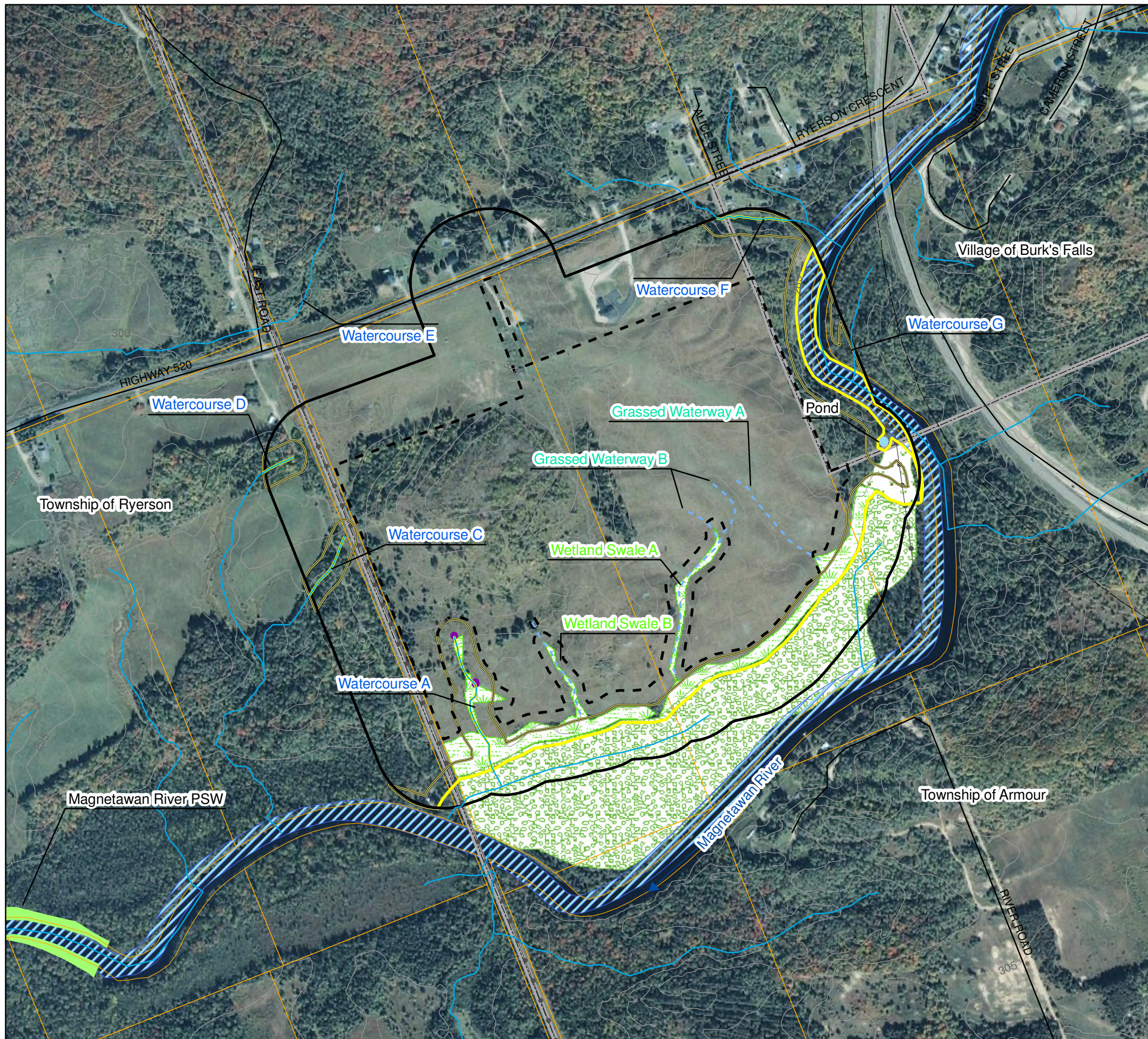
Section 31(3) of the REA Regulation requires the proponent to prepare a report setting out the following:

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

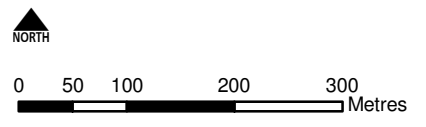
Table 2.1 summarizes the results of the Water Body Records Review (Hatch Ltd., 2011a).



Legend

- Seepage Area
- Road
- Railway
- Trail
- Topographic Contour (5 m Interval)
- Transmission Line
- Watercourse
- Grassed Waterway
- Average Annual High Water Mark
- Project Location
- 120 m from Project Location
- Parcel
- Lower Municipality
- Evaluated Wetland
- Mineral Mixed Swamp
- Mineral Alder Thicket Swamp
- Mineral Meadow Marsh
- Walleye Migration Route

Notes:
 1. Base and Environmental data downloaded from LIO, Feb 18, 2011.
 2. Produced by Hatch under licence from Ontario Ministry of Natural Resources, Copyright (c) Queens Printer 2011.
 3. Spatial referencing UTM NAD 83.



1:7,000 Figure 1.1
Northland Power Inc.

Back of figure

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 located within 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 location.
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 location.
Is the Project within 120 m of the average annual high water mark of a permanent or intermittent stream?	Yes	There are seven permanent or intermittent streams on and within 120 m of the Project location.
Is the Project within 120 m of a seepage area?	No	No seepage areas are known to be present on or within 120 m the Project location.

3. Site Investigation Methodology

3.1 Site Investigation 1

3.1.1 *Date, Time and Duration of Site Investigation*

- Date: June 1, 2011
- Start Time: 0530 hours
- Duration: approximately 3.5 hours

3.1.2 *Weather Conditions During Site Investigation*

- Temperature: 23°C
- Beaufort Wind: 2-3
- Cloud Cover: 0%

3.1.3 *Name and Qualifications of Person Conducting Site Investigation*

The site investigation was completed by Caleb Coughlin. Caleb is an environmental technologist with more than 5 years experience, specializing in fisheries and fish habitat assessments for renewable energy projects including hydroelectric, solar and wind energy facilities. Caleb has conducted numerous water body site investigations for proposed solar and wind power projects under the REA process. Caleb has also been involved with baseline and post-construction monitoring studies for 29 proposed/existing hydroelectric facilities on 14 different river systems in Ontario. Caleb has coordinated and completed dozens of index netting surveys on rivers and lakes including Riverine Index Netting, Ontario Broad-scale Monitoring, Fall Walleye Index Netting, Nearshore Index Netting and Summer Profundal Index Netting. Caleb has extensive knowledge in aquatic and terrestrial habitat assessments and is a Certified Ontario Wetland Assessor. Caleb is also experienced in water, sediment and benthic invertebrate sampling.

3.2 Survey Methods

The entire property on which the Project is located was searched by the site investigator 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 location, where access was permissible 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 and location of seepage areas on and within 120 m of the Project location, are shown in Figure 1.1.

4.1 Permanent or Intermittent Streams

The Water Body Records Review (Hatch Ltd., 2011a) identified three permanent or intermittent streams on the Project location (noted as Watercourses A, B and C in the Records Review Report). During the site investigation, it was determined that these features did not meet the definition of a water body in the REA Regulation, as discussed in Section 4.1.1. As will be discussed in the following sections, Watercourses A and B (identified in the Records Review) have been relabelled as Grassed Waterways A and B and Wetland Swale A in Figure 1.1 of this Report, since they do not meet the definition of a water body in the REA Regulation.

The Records Review noted an additional four watercourses within 120 m of the Project location (noted as the Magnetawan River and Watercourses D, F and G in the Records Review Report and in Figure 1.1 of this Report). An additional watercourse (Watercourse E in Figure 1.1) is located outside the 120 m distance from the Project location, but was included on the mapping in the Records Review in the event that the average annual high water mark extended closer to the Project location. Permission was not obtained from the adjacent property owners to access these watercourses. Observations were made from the property line, where possible. For the purposes of the REA process, these features have been assumed to meet the REA definition of a water body and will be treated accordingly. Each of these is discussed in Section 4.1.2.

During the site investigation, several additional drainage features not noted during the Records Review were observed. These are labelled as Watercourse A and Wetland Swale B in Figure 1.1 of this Report, and discussed in Section 4.1.3.

4.1.1 *Permanent or Intermittent Streams on the Project Location Noted During the Records Review*

4.1.1.1 *Grassed Waterway A (Noted as Watercourse A in the Records Review)*

This feature was noted during the Records Review as being a watercourse originating in the northeastern portion of the Project location and flowing in a generally southeasterly direction for

approximately 750 m (450 m of which was on the Project location, as shown in Figure 1.1 of the Records Review) before draining into the Magnetawan River south of the Project location.

During the site investigation, it was determined that this feature is a temporary drainage route consisting of a low lying area between adjacent rolling topographical features. There is no defined channel and there was no flow observed during the site investigation noted in Section 3, nor during any of the other site investigations conducted to assess natural heritage features of the property (as discussed in Hatch Ltd., 2011b). The low lying area predominantly consists of meadow vegetation, with a mix of upland vegetation and some sedges and rushes. The predominant function of this drainage route would be to convey overland flow during precipitation and runoff events toward the Magnetawan River. Given the vegetation community within the area, it is evident that the duration of the presence of water is limited, since the vegetation community is not dominated by hydrophilic species. The labeling on this drainage feature has therefore been changed from that in the Records Review. For the purposes of this report, it is labeled as Grassed Waterway A in Figure 1.1.

Given that there is no defined channel and that the vegetation community within the drainage feature is not dominated by *"plant communities that require or prefer the continuous presence of water or continuously saturated soils for survival"* (definition from O.Reg.359/09), this feature does not meet the definition of a waterbody in the REA Regulation. Therefore, no setback is required around this feature and no Environmental Impact Study (EIS) is necessary.

4.1.1.2 Grassed Waterway B/Wetland Swale A (Noted as Watercourse B in the Records Review)

This feature was noted during the Records Review as being a watercourse originating in the southeastern portion of the Project location and flowing in a generally southerly direction for approximately 800 m (50 m of which is on the Project location and approximately 400 m of which is surrounded by the Project location) before draining into the Magnetawan River south of the Project location.

During the site investigation, it was determined that this feature is a temporary drainage route consisting of a low lying area between adjacent rolling topographical features. There is no defined channel and there was no flow observed during the site investigation noted in Section 3, nor during any of the other site investigations conducted to assess natural heritage features of the property (as discussed in Hatch Ltd., 2011b). The upper reach of this swale contains a mix of primarily upland meadow vegetation. This reach is denoted as Grassed Waterway B in Figure 1.1. The low lying area down gradient predominantly consists of mineral meadow marsh vegetation, with sedges (primarily green, beaked, awl fruited and small fruited sedges) dominating the vegetation community. Horsetails, golden rods, and Canada blue-joint was also present although primarily on the peripheries or any slightly higher topography areas within the marsh. This reach is denoted as Wetland Swale A in Figure 1.1. A photograph of this drainage feature is shown in Figure 4.1.



Figure 4.1 Photograph of Wetland Swale A Looking Up-gradient to Grassed Waterway B

The predominant function of this drainage route would be to convey overland flow during precipitation and runoff events toward the Magnetawan River. Given the meadow marsh type vegetation community within the area, it is evident that water or saturated soils are present at times throughout the year in sufficient duration to support this type of community. However, given that there is no defined channel to convey surface flows, this feature does not meet the definition of a waterbody in the REA Regulation. Therefore, no setback is required around this feature and no Environmental Impact Study (EIS) is necessary.

However, as noted in the Natural Heritage Site Investigation Report (Hatch Ltd., 2011b) the Wetland Swale A portion of this surface drainage feature does meet the definition of a wetland, since the community is dominated by wetland vegetation. Accordingly, as shown in Figure 1.1, the Project location does not encompass the portion of the feature identified as wetland.

4.1.1.3 *Watercourse C*

This feature was noted in the Records Review (Hatch Ltd., 2011a) as being a watercourse originating in the wooded area in the northwestern corner of the Project location, running in a generally southwestern direction towards the Magnetawan River. The mapping obtained for the Records

Review notes this feature as running for approximately 220 m on the Project location, and an additional 700 m off the Project location.

However, during the Site Investigation, no evidence of any watercourse (i.e., presence of a channel or wetland vegetation that may indicate saturated soils, or evidence of overland flow through presence of debris or flattened vegetation) was found on the Project location.

The site investigators did not have permission to access the portion of Watercourse C located on the adjacent private property. Therefore, to be conservative, it has been assumed that Watercourse C does meet the definition of a waterbody in the REA Regulation just beyond the property boundary (the Site Investigators saw no evidence of a waterbody within approximately 10 m of the property, based on a visual reconnaissance from the edge of the property). The average annual high water mark has been assumed to be 4 m wide at the top of bank and a 30-m setback line from this has been noted in Figure 1.1. This setback does not encroach onto the Project location, however it is located within 120 m of the Project location. Therefore, an Environmental Impact Study will be required to assess the potential adverse effects on land on and within 30 m of Watercourse C.

4.1.2 Permanent or Intermittent Streams within 120 m of the Project Location

4.1.2.1 Magnetawan River

The Magnetawan River arises on the western slopes of Algonquin Park and runs for approximately 196 km before draining into Lake Huron. The watershed has an overall area of approximately 2850 km² (Acres International, 2004).

The river comes within 120 m of the eastern boundary of the Project location. It then flows south of the Project location, approximately 150 to 50 m away from the Project boundary. The river is relatively large, being approximately 50 m wide throughout the reach adjacent to the Project.

The average annual high water mark for the Magnetawan River, based on observations made during the site investigation (e.g., bank height, bank vegetation communities, water level during the site investigation and evidence of floodplain inundation), was determined to be the top of bank immediately adjacent to the main channel of the river. As determined during the Records Review (Hatch Ltd., 2011a), the large wetland south of the Project location is likely within the 1:100-yr floodplain of the Magnetawan River, and it has been assumed, for the purposes of this Report, that the average annual flood encroaches into this low-lying wetland as well.

As shown in Figure 1.1, the average annual high water mark is located between 30 and 120 m from the Project location. Therefore, the potential adverse effects of the Project on the Magnetawan River and surrounding land will be assessed in the EIS.

4.1.2.2 Watercourse D

This watercourse, noted during the Records Review (Hatch Ltd., 2011a) arises approximately 50 m west of the Project location. It flows in a westerly direction away from the Project location and drains into the Magnetawan River approximately 300 m west of the southern end of the Project location.

Permission was not obtained to access this watercourse from the owner of the private property on which this watercourse is located, therefore, it was not directly observed. Based on aerial photography review, there is evidence of the watercourse channel present through the open meadow

area of the adjacent property. For the purposes of this report, it has been assumed that the watercourse does meet the definition of a permanent or intermittent stream in the REA Regulation.

Given its apparently small size, as indicated on mapping obtained during the Records Review, the average annual high water mark has been assumed to be at the top of bank, as shown in Figure 1.1. Since the Project location is approximately 50 m away from the average annual high water mark, the potential effects of the proposed development on this watercourse and land within 30 m will be assessed in the EIS.

4.1.2.3 *Watercourse E*

This watercourse, noted during the Records Review (Hatch Ltd., 2011a) originates approximately 250 m northwest of the Project location, and flows in a general southwesterly direction, approaching to within approximately 200 m of the northwestern corner of the Project location. It flows in a westerly direction away from the Project location and drains into the Magnetawan River several kilometers away.

Permission was not obtained to access this watercourse from the owner of the private property on which this watercourse is located, therefore, it was not directly observed. Based on aerial photography review, there is evidence of the watercourse channel present through the open meadow area of the adjacent properties. For the purposes of this report, it has been assumed that the watercourse does meet the definition of a permanent or intermittent stream in the REA Regulation.

However, given that it is separated from the Project location by Highway 520, the average annual water mark does not come within 120 m of the Project location. Therefore, this watercourse will not be carried through into the EIS.

4.1.2.4 *Watercourse F*

This watercourse, noted during the Records Review (Hatch Ltd., 2011a) originates approximately 250 m north of the Project location, and flows in a general southwesterly direction, approaching to within approximately 170 m north and northeast of the Project location. It flows in a southeasterly direction and comes within approximately 100 m of the Project location, before draining into the Magnetawan River approximately 150 m east of the northeastern corner of the Project location.

Permission was not obtained to access this watercourse from the owner of the private property on which this watercourse is located, therefore, it was not directly observed. For the purposes of this report, it has been assumed that the watercourse does meet the definition of a permanent or intermittent stream in the REA Regulation.

Given its apparently small size, as indicated on mapping obtained during the Records Review, the average annual high water mark has been assumed to be at the top of bank, as shown in Figure 1.1. Since the Project location is approximately 100 m away from the average annual high water mark, the potential effects of the proposed development on this watercourse and land within 30 m will be assessed in the EIS.

4.1.2.5 *Watercourse G*

This watercourse, noted during the Records Review (Hatch Ltd., 2011a) is located approximately 115 m east of the Project location, on the opposite side of the Magnetawan River. Permission was not obtained to access this watercourse from the owner of the private property on which this

watercourse is located, therefore, it was not directly observed. For the purposes of this report, it has been assumed that the watercourse does meet the definition of a permanent or intermittent stream in the REA Regulation.

Given its apparently small size, as indicated on mapping obtained during the Records Review and the fact that it is not observable on aerial photography, the average annual high water mark has been assumed to be at the top of bank, as shown in Figure 1.1. Since the Project location is within 120 m of the average annual high water mark, the potential effects of the proposed development on this watercourse and land within 30 m will be assessed in the EIS.

4.1.3 *Drainage Features Observed During the Site Investigation But Not Noted During Records Review*

Two drainage features that had not been noted during the records review, including one meadow marsh drainage feature (Wetland Swale B in Figure 1.1) and one seepage supplied watercourse channel with two observed seepage locations (Watercourse A in Figure 1.1), were observed on and within 120 m of the Project location, as described in the following sections.

4.1.3.1 *Wetland Swale B*

This feature was observed as originating in the southern portion of the property (noted as Wetland Swale B in Figure 1.1). It was determined that this feature is a temporary surface drainage route consisting of a low lying area between adjacent rolling topographical features. There is no defined channel and there was no flow observed during the site investigation noted in Section 3, nor during any of the other site investigations conducted to assess natural heritage features of the property (as discussed in Hatch Ltd., 2011b). The low-lying area predominantly consists of mineral meadow marsh vegetation, with sedges (primarily green, beaked, awl fruited and small fruited sedges) dominating the vegetation community. Horsetails, golden rods, and Canada blue-joint was also present although primarily on the peripheries or any slightly higher topography areas within the marsh. A photograph of this drainage feature is shown in Figure 4.2.



Figure 4.2 Photograph of Upstream End of Wetland Swale B

The predominant function of this drainage route would be to convey overland flow during precipitation and runoff events toward the wetland and the Magnetawan River. Given the meadow marsh type vegetation community within the area, it is evident that water or saturated soils are present at times throughout the year in sufficient duration to support this type of community. However, given that there is no defined channel to convey surface flows, this feature does not meet the definition of a water body in the REA Regulation. Therefore, no setback is required around this feature and no Environmental Impact Study (EIS) is necessary. However, as noted in the Natural Heritage Site Investigation Report (Hatch Ltd., 2011b) this surface drainage feature does meet the definition of a wetland, since the community is dominated by meadow marsh wetland vegetation. Accordingly, as shown in Figure 1.1, the Project location does not encompass the portion of the feature identified as wetland.

4.1.3.2 *Watercourse A*

This watercourse was observed in the southwestern portion of the property. It consists of a defined watercourse channel originating from several seepage zones and flowing south toward the Magnetawan River. Flow from the seepage areas was present during the Site investigation and there was a defined channel with a variety of substrates including muck and rock (gravel and cobble). Wetland vegetation within and adjacent to the channel was predominantly meadow marsh

vegetation. This watercourse, the two seepage areas and the average annual high water mark are shown in Figure 1.1. A photograph of this watercourse is shown in Figure 4.3.



Figure 4.3 Photograph of Watercourse A

This watercourse meets the definition of a permanent or intermittent stream, since there is a defined channel present and there is no established vegetation community present within the channel. The average annual high water mark has been determined to be the top of bank of the channel. A 30-m setback has been applied, per the requirement of the REA Regulation. However, the project location is within 120 m of the average annual high water mark, therefore an EIS is required to consider to the potential adverse effects and mitigation requirements to protect this feature.

4.2 Lakes

No lakes were observed on or within 120 m of the Project location. No lake trout lakes are present within 300 m of the Project location.

4.3 Groundwater Seepage Areas

As noted in Section 4.1.3.2, several groundwater seepage areas were observed in the southwestern portion of the property (Figure 1.1). These seepage areas supply water to a short watercourse channel, leading to the Magnetawan River.

A 30-m setback has been provided around these seepage areas, per the requirements of the REA Regulation. However, the Project location is within 120 m of the seepage areas, so the potential effects of the Project on these seepage areas and the required mitigation measures will be considered in an EIS.

4.4 Other Water Body Features

A pond was observed approximately 100 m east of the Project location, within a wooded area with a small camping location adjacent to the Magnetawan River. One edge of the pond consisted of mowed grass to the water's edge, while the remainder of the pond was bordered by natural vegetation communities. There did not appear to be any inflow or outflow channel to or from the pond.

The pond may have been man-made at one point, although if it was, it has been naturalized over time and does not have a man-made appearance at the present time. It may also be a low-lying depression adjacent to the Magnetawan River that is supplied by surface drainage (precipitation or snow melt) and is not hydraulically connected to the river itself. The pond may also intersect the local groundwater table.

Given that it was not possible to determine if this is a dug pond, which would not be a water body under the REA Regulation, it has been assumed that this pond does meet the REA Regulation definition of a waterbody. Figure 1.1 shows the average annual high water mark, as evidenced by the presence of wetland vegetation around the periphery of the pond. A 30-m setback has been applied from this high water mark.

5. Conclusions

Based on the results of the site investigation identified above, there are some minor corrections to the Water Body Records Review Report (Hatch Ltd., 2011a) required. These are identified in Table 5.1.

Table 5.1 Corrections to Water Body Records Review Report (Hatch Ltd., 2011a)

Water Body Feature	Results of Records Review	Correction Required Following Site Investigation
Permanent or Intermittent Streams	Watercourse A was mapped on the Project location	Watercourse A (now noted as Grassed Waterway A) does not meet the REA Regulation definition of a permanent or intermittent stream and therefore, is not identified as a water body requiring a setback.
	Watercourse B was mapped on the Project location	Watercourse B (now noted as Grassed Waterway B and Wetland Swale A) does not meet the REA Regulation definition of a permanent or intermittent stream and therefore, is not identified as a water body requiring a setback.
	Watercourse C was mapped on the Project location	Watercourse C does not meet the REA Regulation definition of a permanent or intermittent stream on the Project location and therefore, is not identified as a water body requiring a setback, on the Project location. It has been assumed to be a watercourse on the adjacent property.
	No other watercourses noted on the Project location during the Records Review.	Watercourse A in this Site Investigation Report was not noted during the Records Review but is present and will require a 30-m setback and consideration in the EIS.
Groundwater Seepage Areas	No groundwater seepage areas were noted during the Records Review	Two groundwater seepage areas, providing flow to the Seepage Watercourse were observed during the site investigation.

Based on the results of the site investigation and the proposed Project location shown in Figure 1.1, some components of the Project will be located between 30 and 120 m of the average annual high water mark of the Magnetawan River, Watercourses A, C, D, F and G and two seepage areas. 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

Acres International. 2004. Magnetawan River Water Control Operating Plan – Final Report. Prepared for Ontario Ministry of Natural Resources. March 2004.

Hatch Ltd. 2011a. Burk's Falls West Solar Project – Water Body Records Review Report. Prepared for Northland Power Inc.

Hatch Ltd. 2011b. Burk's Falls West Solar Project – Natural Heritage Site Investigations Report. Prepared for Northland Power Inc.

Appendix A
Site Investigation
Field Notes

3 May 2011 - Burk's Falls West

- Temp 7°C @ 20:01

Overcast - light rain on and off

- Stick nest located @ the

east side of property in ~~nest~~ Bark

area GPS point - Burk's nest

photo's taken on Lewis canopy

@ 20:30 - Nest in Poplar tree

- No sign of any species around.

- photo's of wet area by river

looks like someone camped here

Could be visual pool - South side

pool area GPS point - Vern Pool 1

- lots of Peepers going

- Amphibian Survey done from

same GPS point

- Amphibian Survey # 2 @ 21:03

- Peepers

GPS point - Bfw Frog 2

- Amphibian Survey @ 21:15

- GPS point - Bfw Frog 3

GPS point - BFW Owl 1

@ 21:40

- Sky clearing very calm and

- Owl call back. Some species
seen as BFO site (Red region @).

- No Res points

- GPS point Bfw Frog 4

location off of road where peepers
were singing - Amphibian Survey

- Finish @ site @ 22:17

Temp 05 - Clear sky

Wind @

4 May 2011 - Burk's Falls West

Temp 7°C - Wind 2.

Sunny Cloud cover 5%

- GPS point Bfw Woodcock 1

is a cavity tree - flushed female wood

duck out of it when worked by

feathers on at base of tree in 1990

- Photos 1 & 2 taken

GPS point 179 - is the start of
wetland boundary
photo # 3 also taken

GPS point 180 - on wetland boundary line
photo # 4 taken

GPS point 181 - point on wetland
photo # 5 taken

GPS point 182 - point on wetland boundary
photo # 6 taken

GPS point 183 - point on wetland boundary
photo # 7 taken

- line of wetland seen to top
of hills distinct hills to North. Slipping
down and the boundary off.
- Vegetation still different. more forest
green grass of present in front land areas.

- GPS point 184 - extension of wetland
between 2 hill areas, connected to wetland
on South end. photo # 8 taken

GPS point 185 - little valley way holding
water connected to wetland
photo # 9 taken

GPS point 186 - in valley area that has
water

GPS point 187 - point in valley area
in valley section
- some flow to the water
- photo # 10 taken

GPS point 188 - wet area
photo # 11

GPS point 189 - Start of wet
area that runs down to wetland
photo # 12, 13 taken

GPS point 190 along water course area
on west side

GPS point 191 - along wetland/water area
between hill sides

GPS point 192 - along west side "Not in the line"

GPS point 193 - where corrected
back to large wetland area.

GPS point 194 - on wetland boundary
- photo # 14 taken

- GPS point 195 - another point where
water course is coming between hilled areas
to wetland
photo # 15 taken

- GPS point 196 - photo of old cattails
wetland area

GPS point 197 - along east side of
water course between hill sides

GPS point 198 - End of water area
at top of hill

GPS point 199 - Along west side of
wet area between hill sides

GPS point 200 - West side of
where wet/water course meets wet land again

GPS point 201 - Wetland edge
photo # 16 taken

- GPS point 202 - Small culvert
for water to flow down hill into wetland/
photo # 17, 18 taken
- Some flow on north side of culvert.

GPS point 203 - Wet area between
two hilly areas west border of property

GPS point 204 - Main top of hills
water flowing fairly well

GPS point 205 - Top of water course
going through hills and heading to wetland
Spring/water seepage area
- 3 photos on my BlackBerry

GPS point 206 - along west side
of water course

GPS point 207 - west side of water course

GPS point 208 - west side of water course

"Return the favor"

GPS point 209 - where water course
meets back with large wetland.

GPS point 210 - wetland boundary

GPS point 211 End of wetland pointage
and where property fence meets it.

- Seems to follow the mapping fairly
close except for the 3 water
courses/run off areas that flow through
hilled areas to wetland.

- track same as Bfw Wetland pd.

@ 12:33

- Start Snake Survey @ 12:47

Very Sunny - Temp 116

Wind 12 5% Cloud cover

Start at SE Corner of Property.

GPS point 212

GPS point - Blowsnake Ph 1 - photo of
open soil area - some sand with top soil
& rocks along fence row

3 photos taken on Black Berry (#1, 5, 6)

NO GPS point - End point of Transect 1
photo of pond interior - east property
photo # 7 on Black Berry. Corner of property NE

- Did a little search of wooded area
in North East Corner

GPS point - 213 Start of Transect #2

GPS points Blowsnake Ph 2

- photos of Barren soils Low top

3 photos taken on Black Berry - #3(8, 9, 10)

GPS point 214 End of transect #2

GPS point 215 - Start of Transect #3

GPS point 216 - End of Transect #3

GPS point 217 - Start of Transect #4

GPS point 218 - End of Transect #4

Raptor Survey @ 13:48

GPS point Bfw - Raptor - 1

- No Responses

"All in the Rain"

Raptor Survey @ 14:31
GPS point Blue - Raptor 2
- No Responses

- GPS point didn't save. The location is near the stake and there is a road down to the south of the nest. Where the property meets back in the location.

- Raptor Survey @ 14:34
GPS point Blue - Raptor 3
- No Responses

- Raptor Survey @ 14:53
GPS point Blue Raptor 4
- No Responses

Finish on Site @ 15:21
Temp 11°C - Sunny
- Cloud cover 40-50%
- Wind I

GPS-41-FOC

- closest ELC is F044

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>West of Hydroline</u>		POLYGON:	
	SURVEYOR(S):		DATE: <u>June 1</u>	TIME: start
				finish
	UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input checked="" type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input checked="" type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input checked="" type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input checked="" type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) >> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	1	4	Balsam Fir, Tamarack, Aspen, White Spruce
2 SUB-CANOPY	3	3	Balsam Fir
3 UNDERSTOREY	2	0	Moss
4 GRD. LAYER	7	1	Trillium, Sphagnum moss

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m

CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION: BA:

SIZE CLASS ANALYSIS:	A	< 10	A	10 - 24	O	25 - 50	N	> 50
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STANDING SNAGS:	N	< 10	R	10 - 24	R	25 - 50	N	> 50
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DEADFALL / LOGS:	O	< 10	O	10 - 24	O	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE: PIONEER YOUNG MID-AGE MATURE OLD GROWTH

SOIL ANALYSIS:

TEXTURE: DEPTH TO MOTTLES / GLEY g = G =
 MOISTURE: Fir 2 DEPTH OF ORGANICS: 3 cm (cm)
 HOMOGENEOUS / VARIABLE DEPTH TO BEDROCK: unknown (cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	
COMMUNITY SERIES:	
ECOSITE:	
VEGETATION TYPE:	
INCLUSION	
COMPLEX	

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

TREE TALLY BY SPECIES:

PRISM FACTOR

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5	TOTAL	REL. AVG
Balsam Fir	18						
Tamarack As	3						
White Spr	1						
TOTAL							100
BASAL AREA (BA)							
DEAD							

STAND COMPOSITION:

COMMUNITY PROFILE DIAGRAM

Notes:

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>Hardwood</u>	POLYGON:	
	SURVEYOR(S): <u>Calvin Coughlin</u>	DATE: <u>June 1990</u>	TIME: start finish
	UTMZ:	UTME:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input checked="" type="checkbox"/> ORGANIC <input type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL, UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORE <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREE		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	4	Hard maple - Elmwood, Am Elm, Basswood
2 SUB-CANOPY	3	4	" " " "
3 UNDERSTOREY			
4 GRD. LAYER	2	1	T. Tim, H. wood, 2 prunus

HT CODES: 1 = >25 m 2 = 10<HT<25 m 3 = 2<HT<10 m 4 = 1<HT<2 m 5 = 0.5<HT<1 m 6 = 0.2<HT<0.5 m 7 = HT<0.2 m
CVR CODES 0 = NONE 1 = 0% < CVR < 10% 2 = 10 < CVR < 25% 3 = 25 < CVR < 60% 4 = CVR > 60%

STAND COMPOSITION: BA:

SIZE CLASS ANALYSIS:	A	< 10	O	10 - 24	R	25 - 50	N	> 50
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STANDING SNAGS:	O	< 10	N	10 - 24	N	25 - 50	N	> 50
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DEADFALL / LOGS:	O	< 10	N	10 - 24	N	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE: PIONEER YOUNG MID-AGE MATURE OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G =
MOISTURE: <u>Dry</u>	DEPTH OF ORGANICS:	<u>1 cm</u>	(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	<u>5 cm</u>	(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	
COMMUNITY SERIES:	
ECOSITE:	
VEGETATION TYPE:	
INCLUSION	
COMPLEX	

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

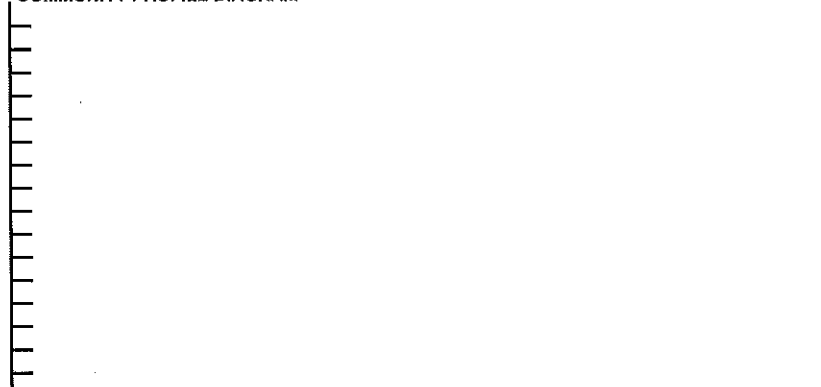
TREE TALLY BY SPECIES:

PRISM FACTOR 10 x 10 grid

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5	TOTAL	REL-AVG
Hard maple	19						
Elmwood	8						
Elm	2						
TOTAL							100
BASAL AREA (BA)							
DEAD							

STAND COMPOSITION:

COMMUNITY PROFILE DIAGRAM



Notes:

FOD 3-1

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>Podac-Pond GPS 39</u>	POLYGON:	
	SURVEYOR(S): <u>Colb Coughlin</u>	DATE: <u>June 18</u>	TIME: start
	UTMZ:	UTME:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input checked="" type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input checked="" type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input checked="" type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	1	4	Trembling Aspen, Lase-tooth.
2 SUB-CANOPY	2	3	Trembling Aspen, white spruce, Hawthorn.
3 UNDERSTOREY	6	50	
4 GRD. LAYER	6	4	Grass, Golden Rod, Oxeye Daisy

HT CODES: 1=>25m 2=10<HT<25m 3=2<HT<10m 4=1<HT<2m 5=0.5<HT<1m 6=0.2<HT<0.5m 7=HT<0.2m
CVR CODES 0=NONE 1=0%<CVR<10% 2=10<CVR<25% 3=25<CVR<60% 4=CVR>60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	0	< 10	A	10 - 24	0	25 - 50	N	> 50
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STANDING SNAGS:	N	< 10	N	10 - 24	N	25 - 50	N	> 50
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DEADFALL / LOGS:	R	< 10	R	10 - 24	N	25 - 50	N	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:	PIONEER	<input checked="" type="checkbox"/> YOUNG	MID-AGE	MATURE	OLD GROWTH
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SOIL ANALYSIS:

TEXTURE: <u>Sand</u>	DEPTH TO MOTTLES / GLEY	g =	G =
MOISTURE: <u>Dry</u>	DEPTH OF ORGANICS: <u>0.5cm</u>		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: <u>unkn</u>		(cm)

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	
COMMUNITY SERIES:	
ECOSITE:	
VEGETATION TYPE:	
INCLUSION	
COMPLEX	

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

TREE TALLY BY SPECIES:

PRISM FACTOR

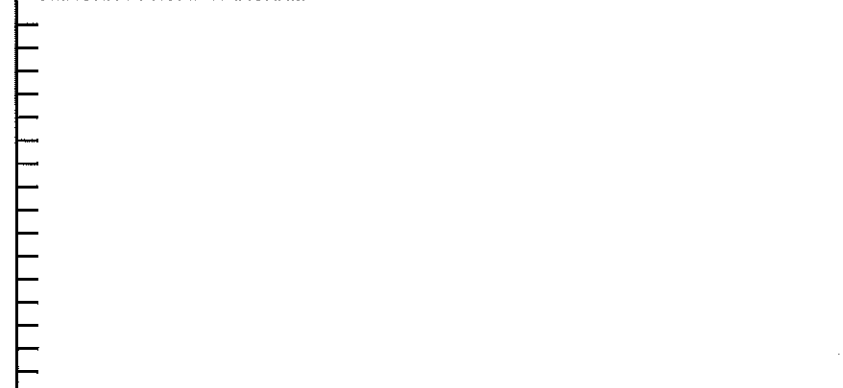
10 x 10

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5	TOTAL	REL. AVG
Trembling As	11						
Lase-tooth	3						
Hawthorn	3						
White Spruce	4						
TOTAL						100	
BASAL AREA (BA)							
DEAD							

STAND COMPOSITION:

--

COMMUNITY PROFILE DIAGRAM



Notes:

June 10th

Burt's Falls ALT

MAM-1 = GPS-032

Watercourse GPS-033

culvert

Alder wet low land

Edge of GPS-034

Riv.

Kingfisher

Edge of GPS-035

Narrow 10-30m wide community
starting at *Hydrilites*
Species -

Balsam Fir A

Black Cherry A

American Elm O

White Birch O

White Spruce - 0

ODS - 036 - Wetland
ge - Possible Fir
- MAM than Alder
ket.

ODS - 037 - MAM

plowed
Fire Fern
er Red.

ODS - Sm Spruce

Black Ash in
position Area between
Thicket and MAM
er sedge in wetlands

S.
da Blue Joint.

in

ODS - 038

edge of off site
end - 10m riparian
a of Wetland.
ess patches west side

Transition into Tumbling Aspen
Quickly = 2-3m wetland

ODS - 39

RLLC Point

Aspen stand - Runs From
Wetland Edge - See Tracks
Along Field Edge and River,
Trainer Lot Not part of it.
municipal lawn

ODS - 40 Intermittent

to y - the grassed waterway
Dissects with aspen + sedge.

ODS - 41 - RLLC

west of Hydrologic.

Balsam Fir Dominated.

Tumbling Aspen = Oc.

White Spruce - R

Trillium - Ground

Sphagnum - Ground

S-42 Spring - photo.
grass. 3m apart

course to Alder wetland.

- 43 - 11 Large White
- vs 40 2.5m tall

ss.

- 44 - Basswood cavity
- photo.

S-45 BLC - Hardwood
st -

Survey - Hard Maple - 9-10m
- Ironwood - 10-15m
- American Elm - 15-20m
- Basswood - 5m
- Average dia of all 9cm

cock - 5cm
Organics

cover - Tillam 5 in this
as - No grass
sm on pecks.

ed - Diy

Wildlife Observation
Woodcock - 2
Mallards - 5
Kingfisher - 2
Moose - 1 - Heard walking along
River. Investigated. Fresh Tracks.
- Hawk -
- Deer Beds - Near GPS 39
- Canada Geese.

- Cabin 5
-

50
12 hours
40
~~40~~
8
67 hours

L @ island 23