

# **Penn Energy – Hamilton\_Port Hope-4 SOLAR ENERGY FACILITY**

**In the Township of  
Township of HAMILTON  
Fit Contract No. F-000687-SPV-130-505  
FIT Application No. FIT-FQWKQZF  
COD: May 5, 2012**

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## **Water Assessment and Water Bodies Report**

***DRAFT***

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## 1.0 INTRODUCTION

Penn Energy Renewables Ltd. (Penn) has executed a Feed-in-Tariff (FIT) contract with the Ontario Power Authority (OPA) for the construction of a 10 MW (peak AC) solar energy facility near the Town of Baltimore (Figure 1). The subject lands are located in part of Lot 3 Concession 2 and Lots 3-5 Concession 1, Township of Hamilton. The proposed Renewable Energy Generation Facility (REGF) would consist of a collection of solar photovoltaic (PV) modules (each approximately 1 m x 1.67 m in dimension) that are grouped into arrays tilted and facing south. These stationary arrays are strung together forming a series of rows oriented east to west. The Environmental Protection Act (EPA) administered by the Ministry of the Environment (MOE) regulates Renewable Energy Approvals (REA) under Part V.0.1 of the act, per Ontario Regulation 359/09. As part of this act, a Water Assessment (WA) is required in order to identify water bodies in and within up to 300 m of the proposed project location. Bowfin Environmental Consulting Inc. (Bowfin) has been retained by Penn to conduct the WA.

A water assessment study includes two activities: a review of records (background information), and a site investigation. The records review includes the identification of the presence of a water feature that is within 120 m (or 300 m of a lake trout lake) from the REGF project location.

These water features include:

- a water body;
  - lake;
  - permanent or intermittent stream; or
- seepage area.

Should any water feature be found within the REGF project location or the appropriate adjacent lands, then a report that identifies and assesses any negative environmental effects of the project on the water body/ies is required (Water Body Report).

The following report provides a summary of the records review and site investigations and includes a Water Body Report if required.

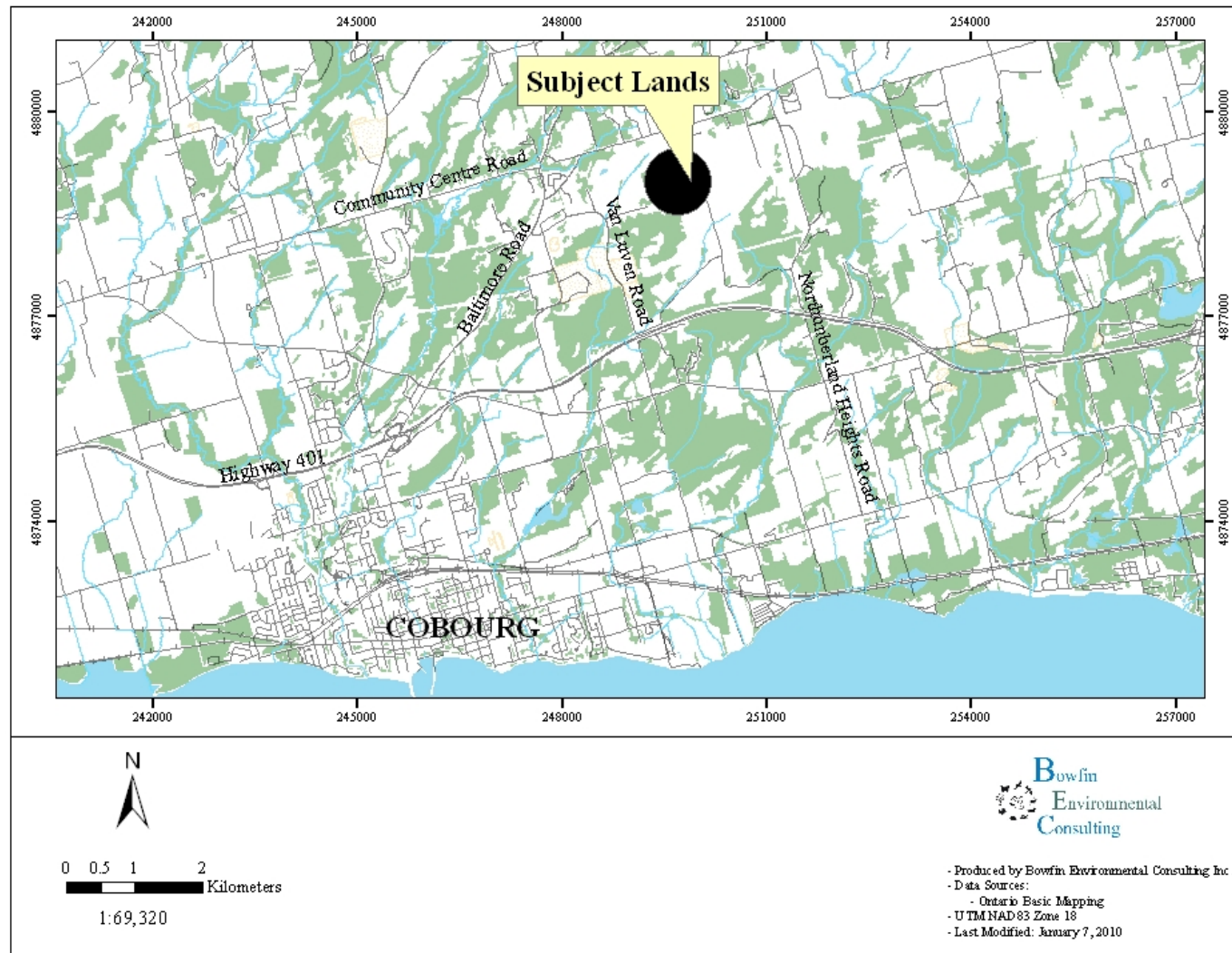
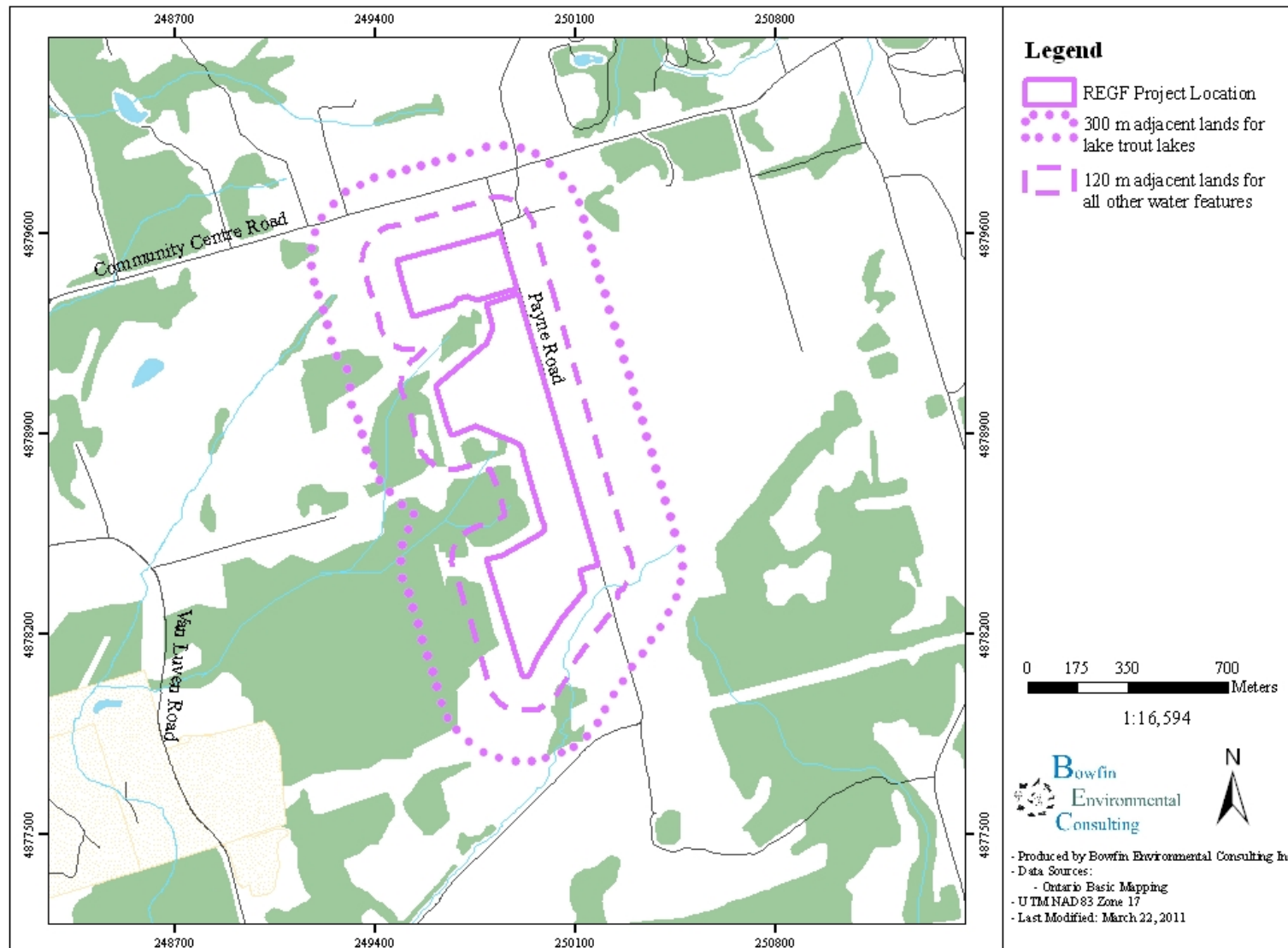
**Figure 1**      **Location of the Subject Lands**

Figure 2 Study Area Boundaries



## **2.0 METHODOLOGY**

### **2.1 Records Review**

The records review was conducted in order to identify potential environmental concerns and included identifying water features within the project area. The water features which were examined for were: water bodies, lakes (including lake trout lakes), permanent and intermittent streams, and seepage areas. Background information was requested from the Ganaraska Region Conservation Authority (GRCA) (Appendix A). Coordination meetings were also held with GRCA and OMNR on July 26<sup>th</sup>, and 27<sup>th</sup>, 2010, respectively. Numerous records related to water bodies were searched and analyzed, including those maintained by OMNR, the Crown in right of Canada and the local conservation authority such as: Natural Heritage Information Centre (NHIC), Land Information Ontario (LIO), Ontario Renewable Energy Atlas, Conservation Ontario, and Township of Hamilton Official Plan (OP). This study area is not located within the jurisdiction of any planning boards, municipal planning authority, local roads boards, local services board or the Niagara Escarpment Plan.

### **2.2 Site Investigation**

The study area for this proposed solar facility includes the portion of subject lands where any construction activities, including support facilities and staging areas, would take place (the “REGF Project Location”) as well as all adjacent lands within 120 m for all features with the exception of lake trout lakes where the study area was enlarged to include 300 m from the REGF project location (collectively, the “Study Area”) (Figure 2).

Preliminary mapping completed during the records review was corrected through ground truthing during the site investigation. The site investigations were completed by systematically cruising the study area during spring and summer to identify water features.

Resumes of the key personnel are provided in Appendix B.

Field notes are provided in Appendix C.

### 2.3 Habitat Description

The definition of water body under the REA legislation is:

*“a water body includes a lake, permanent stream, an intermittent stream and a seepage area but does not include: grassed waterways, temporary channels for surface drainage, rock chutes and spillways, roadside ditches that do not contain a permanent or intermittent stream, temporarily ponded areas that are normally farmed, dugout ponds or artificial bodies of water intended for the storage, treatment or recirculation of runoff...”*

The definition of a permanent stream is:

*“...those that continually flow during an average year.”*

and the definition for an intermittent stream is:

*“... natural or artificial channels, other than dams, that carry water intermittently and are free from vegetation dominated by plant communities that require or prefer the presence of water or continuously saturated soil to survive.”*

No definition of lakes is provided in the REA document; as such, the *Ontario Wetland Evaluation System* definition was used:

*“Areas of open water that are greater than 8 ha in size and at some location are greater than 2 m in depth from the normal low water mark”*

These definitions were utilized to identify the presence of water bodies. Habitat descriptions were based on the appropriate methodologies such as: *Ontario Wetland Evaluation System*, *Southern Manual* (OWES) for wetland habitats and *Environmental Guide for Fish and Fish Habitat* (MTO 2006) for watercourses. Data collected included information on morphology, substrate, structure and in-water cover and flora and fauna. Field notes are included in Appendix C.

### 2.4 Fish Community Sampling

Fish community sampling was performed in order to provide information on the use of the habitat by fish and to supplement data obtained during the records review. Backpack electrofisher was used within the intermittent drain and minnow traps within the wetland. Sampling was completed on July 7<sup>th</sup> and 8<sup>th</sup>, 2010. The fish were identified, counted, measured and released. Fish were measured using fork lengths (FL) (total lengths (TL) for species without a forked tail). Field notes are included in Appendix C.



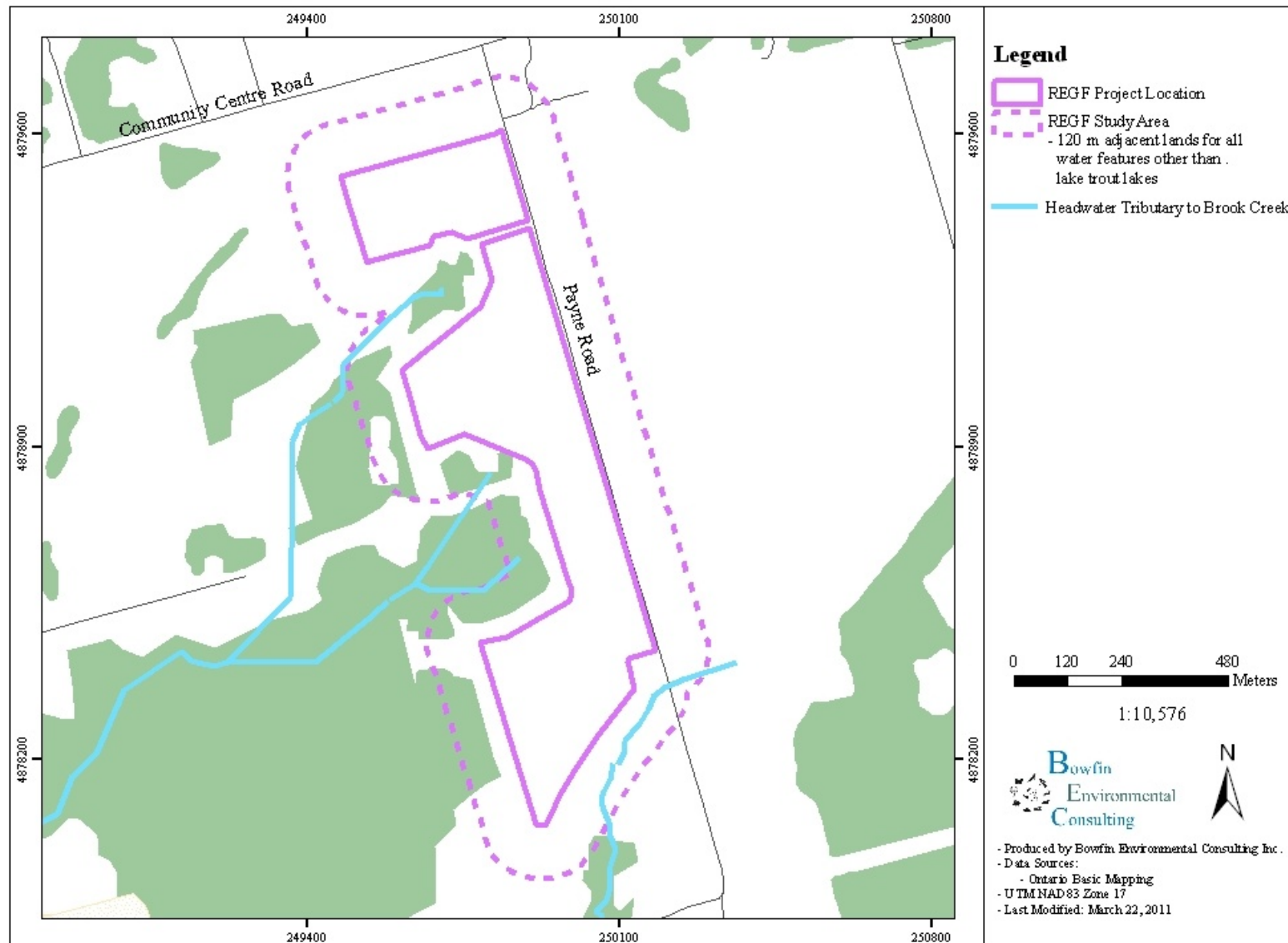
### 3.0 RECORDS REVIEW

The proposed REGF Project Location is in the Township of Baltimore. The site is bordered by Community Centre Road and cropland to the north, Payne Road to the east and south, and cropland and natural areas to the west. The habitat within the study area consisted primarily of cropland. No named watercourses were located on or within 120 m of the REGF project location. A summary of the records review results pertaining to the presence of potential water bodies in the study area is provided in Table 1 and illustrated in Figure 3 as applicable. This study area is not located within the jurisdiction of any planning boards, municipal planning authority, local roads boards, local services board or the Niagara Escarpment Plan.

**Table 1 Summary of Water Bodies Located within the REGF Project Location or the Adjacent Lands (based on the records review)**

Water Feature	On or Adjacent to REGF Project Location?	Discussion (based on records review)
Lakes	No	<ul style="list-style-type: none"> <li>♦ No lakes within 120 m of the REGF project location.</li> <li>♦ No lake trout lakes are within 300 m of the REGF project location.</li> </ul>
Permanent Streams	Yes	♦ Four branches of the headwater tributaries were identified as occurring within the study area during the records review.
Intermittent Stream		
Seepage area	Unknown	♦ Requires site investigation.

OP = official plan of the Township of Hamilton (Ainley Group 2003)

**Figure 3** Location of Candidate Water Bodies (based on records review)

## 4.0 SITE INVESTIGATION

Site investigations were completed on June 14<sup>th</sup>, and 15<sup>th</sup> and July 7<sup>th</sup> and 8<sup>th</sup>, 2010. A total of 37.5 man hours were spent on site collecting water features data (Table 2). Site investigations were completed by Michelle Lavictoire and Shaun St. Pierre. The locations of the site description sites are provided on Figure 4.

Resumes are provided in Appendix B.

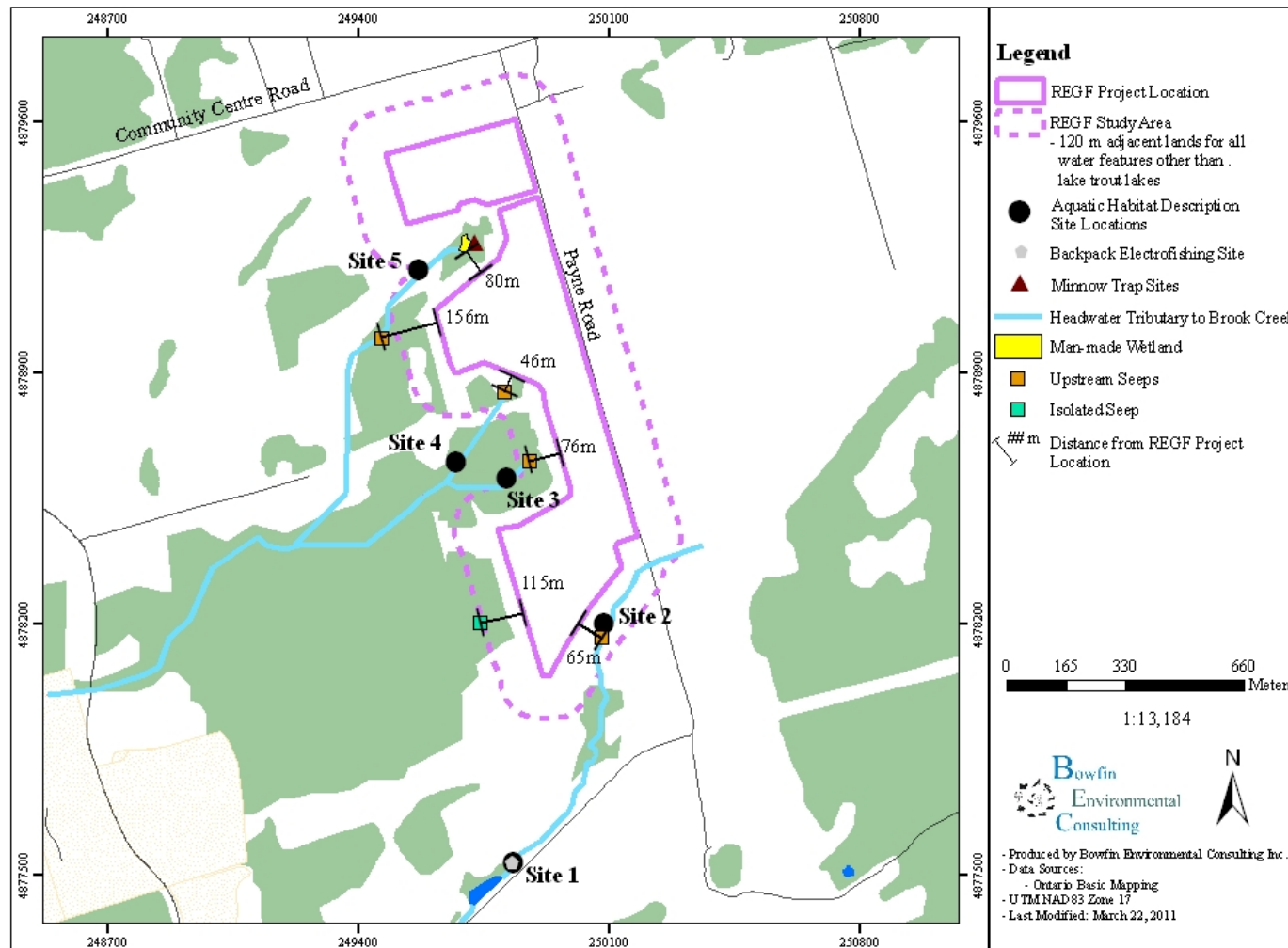
Field Notes are provided in Appendix C.

**Table 2 Summary of Dates, Times of Site Investigations**

Date	Start time	End time	Staff	Total No. of Staff Hours	Air Temperature (min-max °C)	Comments
June 14, 2010	1000	1700	Michelle Lavictoire (M. Sc.)	10	13-21	overcast, little wind
June 15, 2010	0530	1100	Shaun St. Pierre (B. Sc., and Fisheries and Wildlife Technologist)	11	11-21	sunny with scattered clouds in the morning, no wind
July 7, 2010	1100	1500		2	18-28	sunny
	2000	2145		3.5		no wind
July 8, 2010	0500	1030		11	16-25	sunny

Min-max. temp taken from: Environment Canada 2010. National Climate Data and Information Archive [on-line] available: <http://www.climate.weatheroffice.gc.ca> [November 23, 2010]

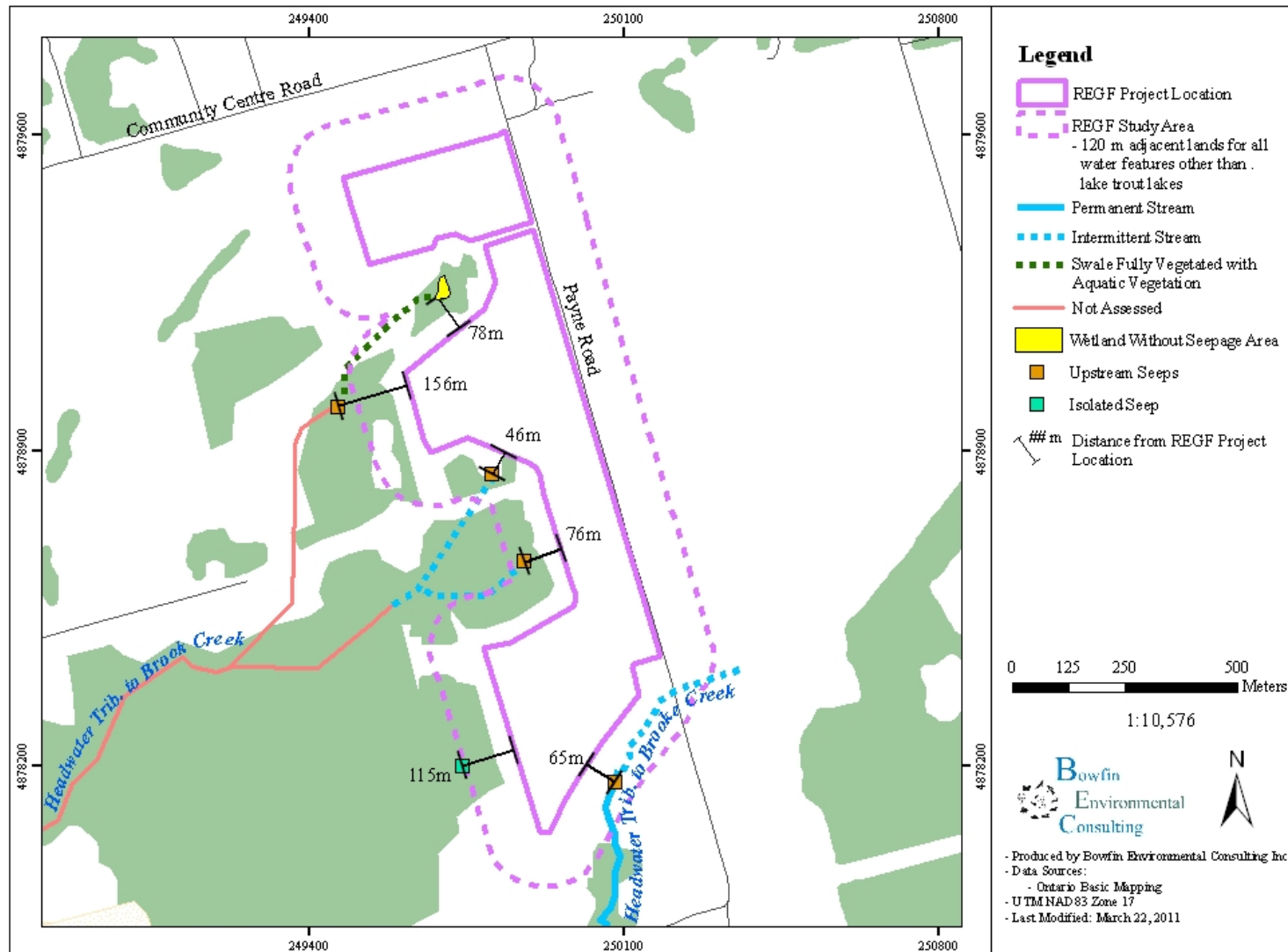
**Figure 4 Location of Candidate Water Bodies (based on site investigations) and Location of Aquatic Habitat Description and Fish Community Sampling Sites**



#### **4.1 Confirmation of and Corrections/Additions to Records Review Findings: Presence/Absence of Candidate Water Bodies**

The site investigations confirmed that there were no lakes located in or within 120 m of the REGF project location and no lake trout lakes in or within 300 m of the REGF project location. The site investigations found that the three southern headwater tributaries met the permanent or intermittent definitions of streams. The northern headwater tributary did not contain any streams but a small man-made wetland had been created at the upstream end. Seepage areas were also present within the study area. These five features are discussed below and summarized in Table 2. Their locations are shown on the Figure 5.

Figure 5 Location of Confirmed Water Bodies



**Table 3**      **Summary of Water Features Located within the REGF Project Location or the Adjacent Lands (based on the Site Investigations)**

Water Feature	Findings		Changes (corrections to records review and/or addition of new water body features)	On or Adjacent to Project Location?
	Records Review	Site Investigations		
<b>Lakes</b>	<ul style="list-style-type: none"> <li>No lakes within 120 m of the REGF project location.</li> <li>No lake trout lakes are within 300 m of the REGF project location.</li> </ul>	<ul style="list-style-type: none"> <li>None were observed.</li> </ul>	None	None
<b>Permanent Streams</b>	<ul style="list-style-type: none"> <li>Four branches of the headwater tributaries were identified as occurring within the study area during the records review. Site investigations required to determine if streams are present.</li> </ul>	<ul style="list-style-type: none"> <li>The downstream portion of the southernmost tributary was identified as a permanent stream.</li> </ul>	Small section of permanent stream added	Yes
<b>Intermittent Stream</b>		<ul style="list-style-type: none"> <li>The middle two tributaries were identified as intermittent streams.</li> </ul>	Intermittent stream added	Yes
<b>Seepage Area</b>	<ul style="list-style-type: none"> <li>Required site investigations.</li> </ul>	<ul style="list-style-type: none"> <li>Seepages were located within each tributary.</li> <li>There was also an isolated seepage area.</li> </ul>	Seepage areas added	Yes



## 4.2 Permanent Streams

The downstream portion of the southernmost headwater tributary met the definition of a permanent stream. Site 1 was located within the permanent stream and was assessed on July 7<sup>th</sup> and 8<sup>th</sup> 2010. Water was present from the upstream seep downstream even during the summer visits (Figure 5). Site 1 was located outside of the study area as this was the only portion of the stream that could be sampled for aquatic fauna, due to depth limitations further upstream.

Site 1 was 40 m long (Figure 6). The water temperature was 16.0°C at 2120h, pH was 8.18, conductivity was 471 µs, TDS was 239 ppm, and the air temperature was 24.0°C. The cool water temperature compared to the air temperature indicated that groundwater upwellings were present. The average channel and wetted widths were 149 cm and 82 cm. The average bankfull depth was approximately 20 cm and the average water depth was 5 cm (range 1 – 16 cm). The habitat type consisted of glide (60%), riffle (20%), and run (20%) morphological units. Some pool and riffle habitat was observed but did not fall within a point of interest. Small steps (<20 cm tall) were also located within this site. The substrate was composed of fines (48%), pebble (32%), and cobble (20%). In-stream cover was provided at 92% of the points. The in-stream cover consisted of overhanging vegetation, and undercut banks. The riparian area was fully vegetated with herbaceous vegetation dominated by dog-strangling vine and spotted joe-pye-weed. There was no shrub or tree cover.

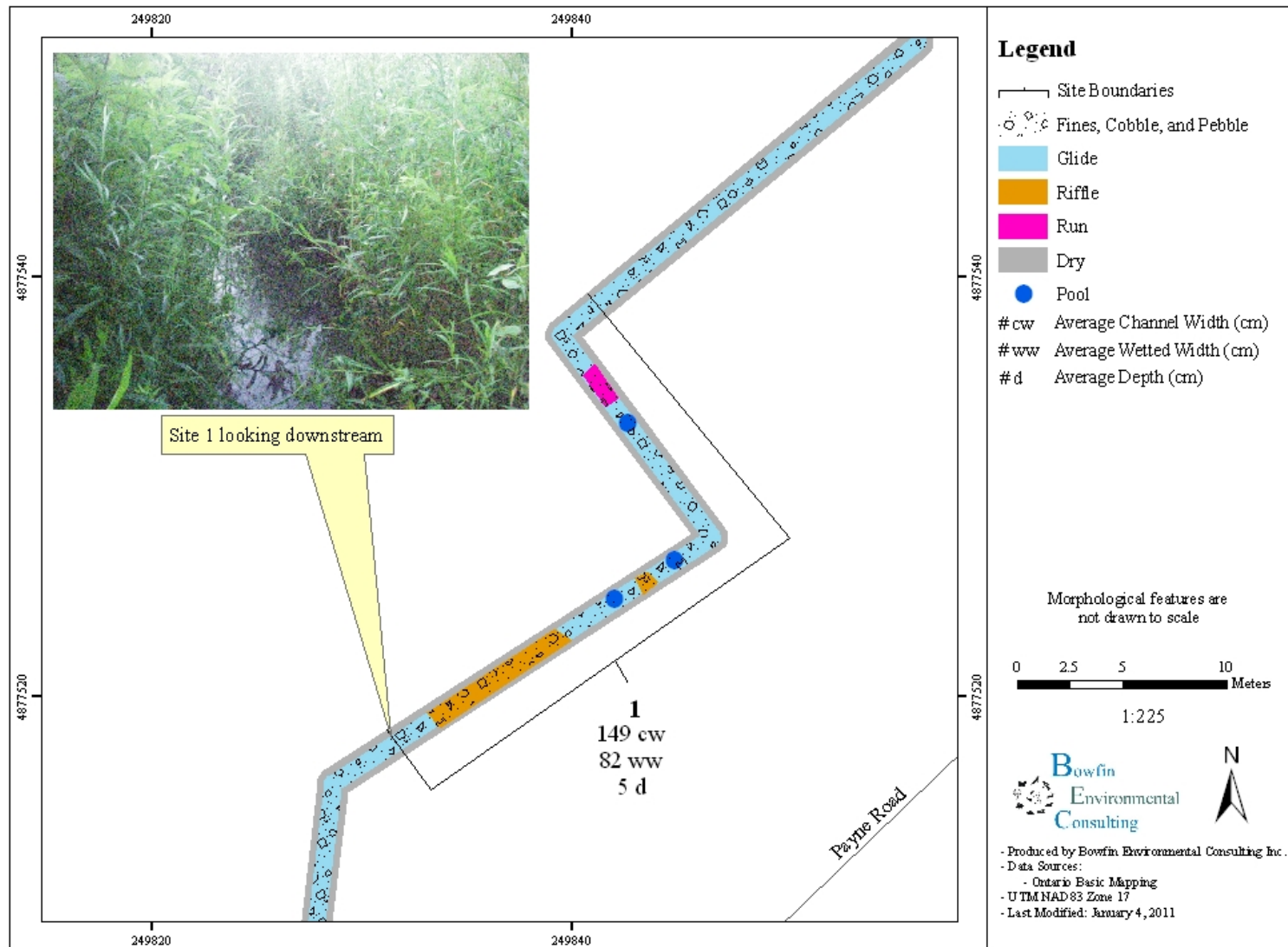


**Photo 1** Site 1 looking downstream from upstream.

The area fished was 33 m<sup>2</sup> and the shock time was 148 seconds. A total of 31 blacknose dace (FL range 20-81mm) were captured. It was noted that sampling was limited in some areas due to the very shallow nature of the system. No amphibians were observed.



Figure 6 Habitat Mapping of Site 1



### 4.3 Intermittent Streams

The upper portion of the lower headwater stream and all of the middle headwater streams met the definition of an intermittent stream. Seeps located the furthest upstream on the streams are identified on Figure 5. No seeps were located within the intermittent stream portion of the lower headwater tributary. While additional seeps may have been present, no signs of additional seeps were observed (i.e. no iron staining, no changes in water volume). Three aquatic habitat description sites were established on the intermittent streams, Sites 2-4. The descriptions were completed on July 8<sup>th</sup> and are presented below. No sampling was completed due to insufficient water.

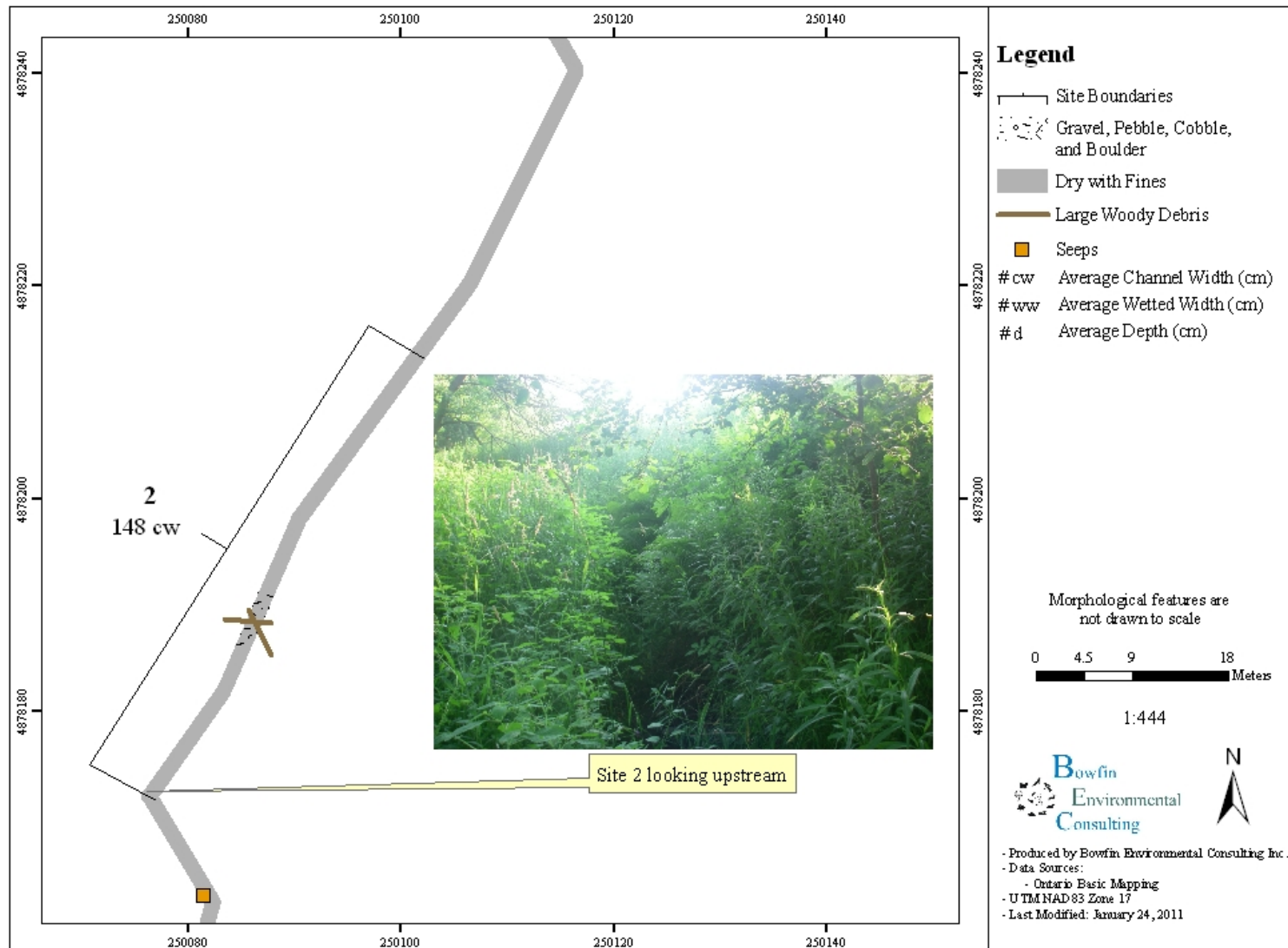
#### *Site 2*

Site 2 was located 690 m upstream from Site 1 immediately upstream of the permanent stream. During the site investigation, the area was dry (Figure 7). The site length was 40 m. The average channel width was 148 cm. The substrate was dominated by fines and followed by cobble, pebble, and gravel. Some large boulders were observed but did not fall within an observation point. In-stream cover was provided at 60% of the points. There was too little water to provide in-stream cover. Some large woody debris was observed but did not fall within an observation point. Banks were undercut. The riparian area was fully vegetated primarily by herbaceous vegetation dominated by spotted jewel-weed, reed canary grass, and goldenrod. Common buckthorn and Manitoba maple were scattered along the banks and provided little stream cover.



**Photo 2**      **Site 2 looking upstream from downstream.**

Figure 7 Habitat Mapping of Site 2



**Site 3**

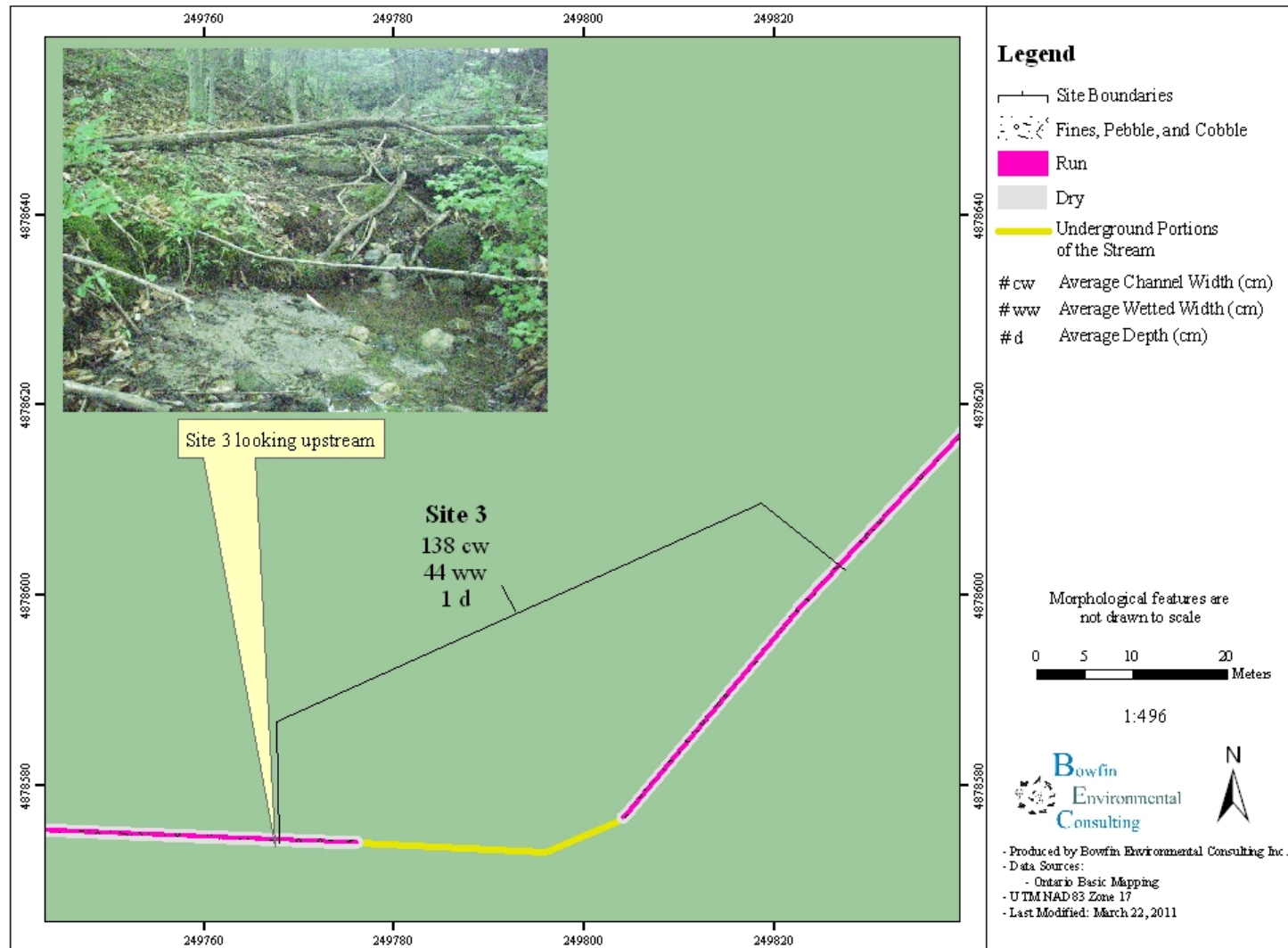
Site 3 was located on the south branch of the middle headwater tributary and was 40 m long. This site had an intermittently defined channel (portions of the stream travelled underground and was indistinguishable from the surrounding areas) (Figure 8). Water was present throughout the above ground portions but in very small amounts. The water temperature was 14.0°C at 0820h, pH was 7.92, conductivity was 460 µs, TDS was 232 ppm, and the air temperature was 19.0°C. The average channel and wetted widths were 138 cm and 44 cm. The average bankfull depth was approximately 14 cm and the average water depth was 1 cm (range 0 – 3 cm). The habitat type consisted of run morphological units. The substrate was composed of fines (68%), pebble (20%), and cobble (12%). There was too little water to provide in-water cover. Banks were undercut. The riparian area was fully vegetated by herbaceous and woody vegetation. The herbaceous vegetation was dominated by ostrich fern, wood nettle, and jack-in-the-pulpit. The woody vegetation consisted of trees that provided good canopy cover. The tree species were: sugar maple, shagbark hickory, and white cedar.



**Photo 3**      **Site 3 looking downstream from downstream.**



Figure 8 Habitat Mapping of Site 3



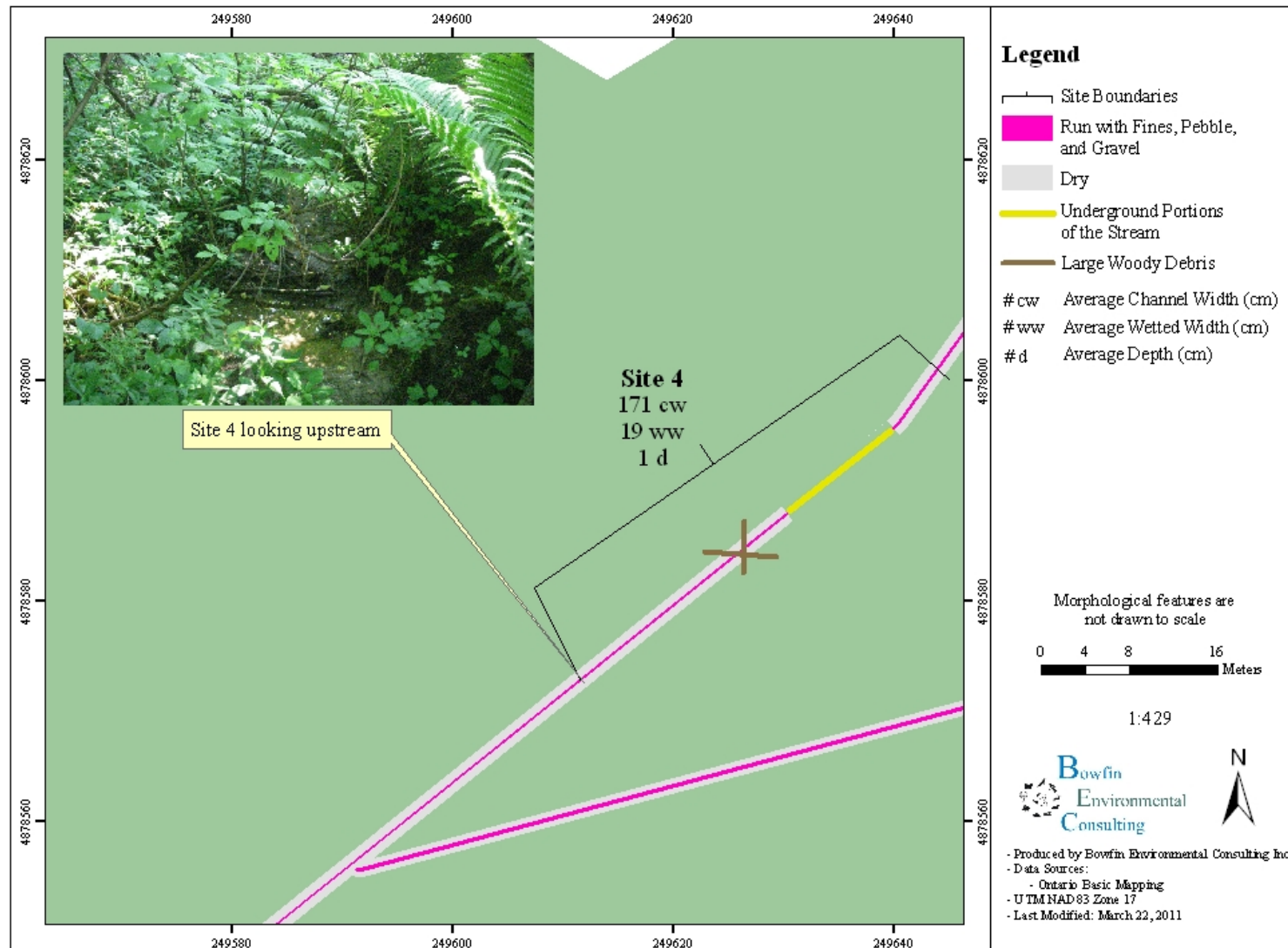
**Site 4**

Site 4 was located on the north branch of the middle headwater tributary and was 40 m long. This site had an intermittently defined channel (portions of the stream travelled underground and was indistinguishable from the surrounding areas) (Figure 9). Water was present throughout the above ground portions but in very small amounts. The water temperature was 15.0°C at 0848h, pH was 7.94, conductivity was 442 µs, TDS was 222 ppm, and the air temperature was 20.0°C. The average channel and wetted widths were 171 cm and 19 cm. The average bankfull depth was approximately 11 cm and the average water depth was 1 cm (range 1 – 3 cm). The habitat type consisted of run morphological units. The substrate was composed of fines (90%), pebble (5%), and cobble (5%). There was too little water to provide in-stream cover. Some large woody debris was observed but did not fall within an observation point. Banks were eroding. The riparian area was fully vegetated by herbaceous and woody vegetation. Herbaceous vegetation was dominated by ostrich fern followed by wood nettle, and jack-in-the-pulpit. The woody vegetation consisted of trees and provided good canopy cover. Tree species included: sugar maple, shagbark hickory, and white cedar.



**Photo 4**      **Site 4 looking upstream from downstream.**

Figure 9 Habitat Mapping of Site 4



#### 4.4 Man-made Pond

The man-made pond consisted of an earthen berm at the upstream end of the fully vegetated swale near the house (Figure 10). The swale within the study area was vegetated primarily with spotted joe-pye-weed. The banks were dominated by reed canary grass followed by goldenrod sp., and spotted joe-pye-weed. There was no shrub or tree cover. There was no water present and no signs of seepages (no iron staining, no water-cress).



**Photo 5 Site 5 looking upstream from downstream.**

The pond's length was 40 m, and the width was 15 m. The substrate was composed of fines. The maximum depth was 75 cm. In-stream cover was provided by dense aquatic vegetation, and large woody debris. The aquatic vegetation was dominated by lesser duckweed, and great duckweed followed by reed canary grass, and spotted joe-pye-weed. The riparian area was fully vegetated. Herbaceous vegetation was dominated by spotted jewel-weed followed by riverbank grape, and reed canary grass. The little canopy cover provided by crack willow, and Manitoba maple. The man-made pond doesn't meet the definition of a water body and would be more appropriately labelled as a dugout pond. There were no seepage areas associated with the man-made pond (no iron staining, no indicator plants such as water-cress and water temperature did not indicate the presence of groundwater).





**Photo 6** Taken from the north side looking south

Three minnow traps were set on July 7, 2010 at 1415h, and were retrieved on July 8, 2010 at 0934h. Each trap was set for 19 hours and 14 minutes. No fish were captured

This man-made pond did not provide any fish habitat due to the lack of connectivity with fish habitat and the earthen berm located on the downstream end. Green frogs were observed using this area.

**Conclusion:** Neither the swale nor the pond are water bodies.

#### **4.5 Seepage**

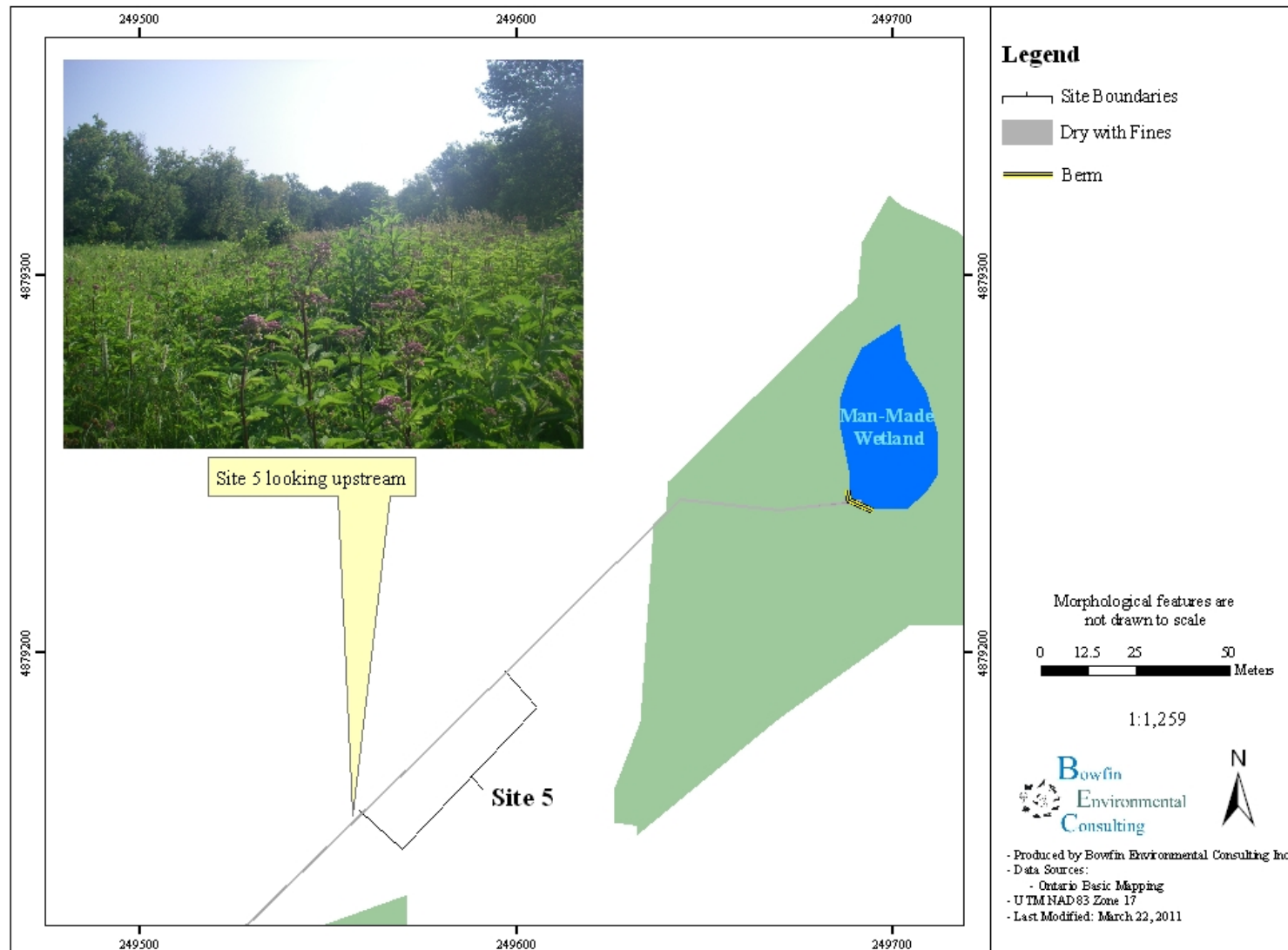
In addition to the groundwater upwellings which were present within the streams described above, an isolated seepage area was located on the edge of the pine plantation on the western side of the study area. The seep contained the following vegetation: field horsetail, spotted joe-pye-weed, sensitive fern, crack willow, ostrich fern, Virginia creeper, sparse-flowered thimbleberry, awl-fruited sedge, bittersweet nightshade, and cut-leaved water-horehound.



**Photo 7 Looking at the seepage area, June 15, 2010**



**Photo 8 Looking at the seepage area, June 15, 2010.**

**Figure 10**     **Habitat Mapping of Man-Made Wetland and Site 5**

## 5.0 WATER ASSESSMENT CONCLUSION

The records review found that there were four headwater tributaries of Brook Creek located within the study area. This was confirmed during the site investigations. The site investigations also located the presence of other candidate water bodies. The habitat descriptions and community sampling completed during the site investigations permitted the classification of these areas as per the REA definitions. The outcome was that there was one permanent stream (with an associated seepage), three intermittent streams (of which two had a seepage area) and one isolated seepage area confirmed to be present in the study area (outside of, but within 120 m of the REGF) (Figure 10). Of the areas that were confirmed to be water bodies, only the permanent stream contained fish. No amphibians or reptiles were observed within the water bodies.

Pursuant to Part V “Prohibitions – Renewable Energy Projects” of O. Reg. 359/09, section 39, no person shall construct, install or expand a REGF in or within **30 m** of:

- a) the average annual high water mark of a lake;
- b) the average annual high water mark of a permanent or intermittent stream; or
- c) a seepage area.

As documented in this Water Assessment (records review and site investigation), the proposed REGF complies with this requirement.

Additionally, subsection (1) of section 40 prohibits a REGF within **300 m** of the average high water mark of a lake trout lake, or within **120 m** of:

- a) the average annual high water mark of a lake (other than a lake trout lake);
- b) the average annual high water mark of a permanent or intermittent stream; or
- c) a seepage area.

The proposed REGF does not comply with this requirement, but O. Reg. 359/09 permits the proponent to encroach if they submit a report [in accordance with subsection (2)] that identifies and assess any negative environmental effects of the project on a water body referred to in subsection (1) and on land within 30 m of that water body.

As documented in this Water Assessment, there are no trout lakes within 300 m of the REGF and no other lakes within 120 m of the REGF. There was however a permanent stream (with seepage), intermittent streams (with seepage) and an isolated seepage area within 120 m of the REGF. As such a Water Body Report is required for this proposed solar facility and is presented in the next section of this report.

## 6.0 WATER BODIES REPORT

As documented in the above Water Assessment, there are no trout lakes within 300 m of the proposed Renewable Energy Generation Facility (REGF) and no other lakes within 120 m of the REGF. There was however a permanent stream (with seepage), intermittent streams (with seepage) and an isolated seepage area within 120 m of the REGF. The following water body report (WBR) looks at the potential effects to water quality and quantity as well as potential effects to other uses. The report begins with a description of the proposed solar facility and its construction methods, operation and decommissioning phases and documents the project's setbacks from water bodies. This is followed by an evaluation the proposed REGF's potential impacts, any re-design which was completed as part of the site plan development process, recommended mitigation measures and residual impacts (following re-design and mitigation measures). If any negative environmental effects of the project on the water features are identified, this WBR report will describe how the Environmental Effects Monitoring Plan and the Construction Plan Report addresses them.

### 6.1 Solar Facility Project Description and Anticipated Potential Impacts

The REGF's potential to impact water bodies was evaluated for the construction, operation and decommissioning phases. The proposed REGF would consist of a collection of solar photovoltaic (PV) modules (each approximately 1.00 m x 1.67m in dimension) that are grouped into arrays, tilted and facing south. These stationary arrays are strung together forming a series of rows oriented east to west. Electricity collection and distribution lines would link the PV modules to a collection house with inverter and transformer equipment. For this size of operation 10-15 collection houses are anticipated. Laneways would provide access to each collection house. The entire operation (solar modules, collection houses and access lanes) would be fenced in order to provide for safety and security, in accordance with applicable requirements. A perimeter lane would be constructed immediately inside of the fence. The access lanes (perimeter lane and laneways to collection houses) would consist of a typical farm lane. These activities would require clearing of vegetation and minor grading. The solar modules are placed above the ground and as such allow for low growing herbaceous vegetation to be planted underneath. The foundation system for the arrays would be completed by pile driving or core drilling pipes into the ground. The exact methods will be decided following geotechnical investigations. The construction period would take approximately 6 months to complete. The expected lifespan of the solar modules is 20-30 years.

It should be noted that as the project's design has evolved the REGF layout has been modified substantially. When natural features were identified, setbacks/buffers were established and the project footprint was pulled-back from those features in an effort to minimize or avoid any negative effects on streams, seepages as well as natural heritage features. The REGF utilizes no

land that hasn't already been modified for long-term agricultural purposes. In almost every case the new setbacks/buffers are simply portions of the former croplands that will be left fallow during the lifespan of the REGF, allowing soil nutrients to replenish. The REGF footprint will not be located within 30 m of any water body and no water taking will occur.

During the operation of the solar facility, routine maintenance would include regular mowing within the facility and the landscaped areas outside the perimeter fence along the northern and eastern boundaries. An area that is approximately 5 m wide on the outside of the perimeter fence on the western and southern boundaries will also be mowed regularly to ensure that no woody vegetation would become established where it could cause damage to the fence or shade the solar modules. The former cropland areas between the perimeter fence and woodland/valleyland edges on the western and southern project boundaries would be left fallow to naturalize as a meadow.

The decommissioning of the site would include the removal of the modules, collection house and the pipes used to secure the modules in place. The site could then be reverted back into agricultural use or natural features, dependent upon the wishes of the landowner.

The potential impacts are discussed in the sections below (sections 6.2 and 6.3). The significance of the potential impacts is measured using three different criteria: area affected, duration of impacts and magnitude. The area affected may be local in extent signifying that they will only be impacted within the study area or regional signifying that they may impact an area outside the immediate study area. The duration of the impact may be rated as short term (1-2 years), medium term (2-4 years) or long term (>4 years). The magnitude of the impact may be negligible signifying that the impact is not noticeable, minor signifying that the project's impacts are perceivable and suggests minor mitigations, moderate signifying that the project's impacts are perceivable and require mitigations as well as monitoring and/or compensations and major signifying that the project's impacts would destroy the environmental component within the study area.

## **6.2 Construction/Decommissioning Phases**

Similar work activities and impacts would occur during both the construction and decommissioning phases and as such these are dealt with together. Activities which could potentially impact water bodies are: clearing, grubbing, grading, lane construction and installation of the solar panels and perimeter fence. All activities associated with the construction and decommissioning of the REGF will occur within the land that is currently used as croplands. A 30 m buffer from the top of the steep slopes of the valleylands (associated with the water bodies) to the perimeter fence will be established. As such, no work will occur within 30 m of any water body. This project includes the creation of a larger buffer around the water



bodies which will result in a local, long term positive impact and will enhance the protection of the water quality and temperature. It is noted that there will be no creation of any impermeable surface, no water taking and no removal of natural vegetation.

The potential impacts associated with these activities are:

1. Decrease in surface water quality and quantity;
  - Sedimentation of the tributaries of Brook Creek;
  - Change in seepage contribution to base flow of the tributaries as a result of soil compaction.
2. Impacts to aquatic species and/or their habitat; and/or
3. Accidents or malfunctions
  - Spills from project machines.

Several of these potential impacts may be reduced or eliminated through the use of mitigation measures. These mitigation measures are described below.

#### **6.2.1 Decrease in Surface Water**

Surface water features can be impacted in terms of the quality and quantity. None of the construction/decommissioning activities would occur within 30 m of any water feature. As such provided that typical best management practises such as those listed below are properly implemented, no impacts to surface water quality are anticipated.

The construction of laneways and the perimeter lane as well as the use of machinery during construction and decommissioning could result in soil compaction. There is the potential that this compaction could indirectly affect the seepage areas. Since the existing land use consists of active row cropping that encroaches much closer than the REGF project activities, it is anticipated that no changes to flow will occur. However, the existing seepage areas will be monitored once during the summer of the year following the construction. No water taking is proposed for this project.

#### ***During Construction/Decommissioning***

- Water will be used as a dust suppressant during periods when visible dust is generated;
- Watering for dust control on land will not result in the excessive formation of puddles, rutting by equipment or vehicles or siltation of watercourses; and
- Water body features will clearly be indicated on the construction plans and no activities will occur within 30 m of any feature.

### **6.2.2 Impacts to Aquatic Species or their Habitats**

As the proposed REGF project and associated activities will not occur within 30 m of any water body, the potential impacts to aquatic habitat has been eliminated. However migratory species such as turtles could be impacted should they travel overland to the wetland pond. It is noted that no turtles were observed within the multiple site visits. Impacts to turtles could be prevented by training contractors to make visual observations for these species and allowing them safe passage should they be observed. Note that no species of conservation value were observed within these water features. Also note that no fish habitat will be impacted by this project.

### **6.2.3 Accidents and malfunctions**

Although the likelihood of accidents and malfunctions occurring would be minimized by following the mitigation measures outlined below, should accidents and/or malfunctions occur they have the possibility of being serious and need to be considered before they happen. Again it is noted that no construction/decommissioning activities will be located within 30 m of the water bodies.

All equipment working near the water should be well maintained, clean and free of leaks. Maintenance on construction equipment such as refuelling, oil changes or lubrication would only be permitted in designated areas located at a minimum 30 m from the watercourses, including the location of the quarry pumping stations, where sediment erosion control measures and all precautions would be made to prevent oil, grease, antifreeze or other materials from inadvertently entering the ground or the surface water flow.

Spill kits would be located on site. The crew would be fully trained on the use of clean-up materials in order to minimize impacts of any accidental spills. The area would be monitored for leakage and in the unlikely event of a minor spillage the project manager would halt the activity and corrective measures would be implemented. Any spills would be immediately reported to the MOEE Spills Action Centre (1-800-268-6060). It is recommended that a spill contingency plan would be developed and provided to employees.

## **6.3 Operational Phase**

It is noted that the only activities associated with the operational phase include maintenance of the laneways and perimeter fence and regular mowing. These activities will be completed with small machinery such as lawn tractors and small backhoes and will occur over 30 m from any water feature. No impacts are anticipated to occur to the water bodies during the operational phase. Again it is noted that the maintenance crew should be trained to make visual observations for wildlife species and allowing them safe passage should they be observed. Note that no species of conservation value were observed within these water features. Also note that no fish habitat will be impacted by this project.



## **6.4 Water Body Report Conclusion and Monitoring Plan**

As discussed above, during the initial phases of this project's design, the REGF layout was modified substantially to avoid natural features, including water bodies. The potential impacts to the water bodies as a result of this project have been minimized and in most cases eliminated through the establishment of a minimum 30 m setback. Furthermore, the existing land-use is such, that no natural vegetation in the vicinity of any water feature will be removed during any phases of this project. Rather the minimum 30 m buffer will create a larger protection zone and result in overall improvement, allowing soil nutrients to replenish. This project will also not create any impermeable surfaces.

Similar to the information provided in this WBR, a Construction Plan Report will also be available to address the potential negative environmental effects that may result from construction or installation activities on the woodland and animal movement corridor. The Construction Plan Report also addresses the mitigation measures described in this WBR.

When negative environmental effects of a project on the significant natural features are identified, then the EIS report needs to describe how the Environmental Effects Monitoring Plan addresses them. A description of the potential impacts, re-design, mitigation measures and residual impacts are provided in the sections below. For this project, the potential to impact natural features has been minimized or eliminated through re-design (i.e. moving the project away from significant features). An Environmental Effects Monitoring Plan will be created by Penn and will include the mitigation measures outlined in this WBR.

### **6.4.1 Monitoring Plan**

Since the construction of the project could result in soil compaction which in turn could impact the presence of seepage areas within the study area monitoring is required. This monitoring would consist of a survey of the seepage areas once, during the summer following construction. A summary report of the findings would be created and circulated to MOE. Should any issues be documented, they would be discussed with MOE.

## 7.0 REFERENCES

Ainley Group (2003) *Official Plan of the Township of Hamilton*. Adopted on October 21, 2003.

MMAH. (2005) *Ontario Provincial Policy Statement*. Ministry of Municipal Affairs and Housing

OMNR. (1993) *Ontario Wetland Evaluation System. Southern Manual* NEST Technical Manual TM-002 March 1993. (updated December 2002).

OMNR (2001). *Ecological land Classification for Southern Ontario: Training Manual* SCSS TM 01, March 2001.

## Appendix A – Correspondence from GRCA

**Ganaraska Region  
Conservation Authority**

2216 County Road 28  
P.O. Box 328  
Port Hope, ON L1A 3W4

Phone: 905-885-8173  
Fax: 905-885-9824  
[www.grca.on.ca](http://www.grca.on.ca)

MEMBER OF  
CONSERVATION ONTARIO

March 23, 2010

**GRCA File: HAM1 11 2010**

Robert Gray  
Penn Energy Trust  
620 Righters Ferry Road  
Bala Cynwyd, PA  
19004

Dear Mr. Gray:

**Re: Information Request  
Part Lot 3, Concession 2 (Community Centre Rd. & Payne Rd.) and  
Part Lots 3,4,& 5, Concession 1 (Payne Road & Cherry Hill Farm Rd.)  
Township of Hamilton**

We have completed our review of your information request regarding the above noted lands and your plan to develop a solar power generating facility. With respect to the subject lands we would like to note the following:

1. The northern parcel adjacent to Payne Road is traversed by three headwater tributaries of Brook Creek. A permit from this Authority is required prior to the alteration of or interference in any way with the channel of an identified watercourse.
2. Portions of the subject property adjacent to the watercourses on site are located within the regulatory jurisdiction of the Ganaraska Region Conservation Authority. A permit is required under this Authority's Development, Interference with Wetlands, Alteration to Shorelines and Watercourses Regulation (Ontario Reg. 168/06) prior to any construction or site alteration within the regulated portions of the property.
3. Portions of the subject property contain areas of steep and potentially unstable slopes, associated with the valley containing the watercourse noted above. Generally development is directed away from erosion hazards, such as steep slopes.

Although no detailed plan has been prepared at this time, we have attached a map indicating the approximate limits of the regulated portions of the lands in question. The regulation limit associated with confined (apparent) valley systems is made up of the sum of a stable slope allowance (3:1), a toe erosion allowance, and an allowance not exceeding 15 metres. Depending on the proximity of works proposed to the limits shown on the attached plan, detailed site investigation and/or survey information may be required.

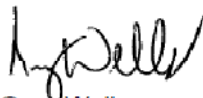
March 23, 2010  
Penn Energy Trust  
Page 2 of 2

Should all development and site alteration be proposed outside of the GRCA's regulation limits, no permits would be required, and no objection would be raised should a rezoning or re-designation of the lands be required.

Following a query of the Ministry of Natural Resources NHIC database for this area, it does not appear any known occurrences of rare species exist on or adjacent to the subject lands.

Once a concept plan for the development of the solar farm is available, we would be pleased to provide further input. I trust this meets your information requirements at this time. Should you have any further questions, please do not hesitate to contact the undersigned.

Yours truly,



Greg Wells  
Manager, Planning & Regulations

Encl.(1)

## Appendix B – Resumes

### MICHELLE L. (NUNAS) LAVICTOIRE, M. Sc.

#### EDUCATION

M.Sc. Natural Resources, Environmental Assessment of Best Management Practices for Cattle Pasturing near Small Streams, Macdonald Campus, McGill University – Supervisor Dr. Curtis

B.Sc. Wildlife Biology, Macdonald Campus, McGill University, 1997

#### LANGUAGES

Fluent in English, French, Spanish and novice Indonesian.

#### PROFESSIONAL AFFILIATIONS

American Fisheries Society (AFS), Ontario Association of Certified Engineering Technicians and Technologists (O.A.C.E.T.T.), Association Québécoise pour l'évaluation d'impacts (AQEI), International Association for Impact Assessment (IAIA), World Sturgeon Conservation Society.

#### POSITIONS HELD

2002-:	Bowfin Environmental Consulting Inc., Principal/Biologist
2000-2002:	Self-employed, Biologist
1999-2000	Tera Environmental Consultants, Calgary, AB, Environmental Planner
1998-1999:	Enviroconsult Inc. Calgary, AB, Biologist
1998:	Golder Associates Ltd., Calgary, AB, Contract Technician
1997-1998:	Envirowest Consultants Ltd., Prince George, BC, Biologist
1996:	Heritage Laurentien, Montreal, PQ, Naturalist
1996:	Martineau-Walker, Montreal, PQ, Naturalist
1995:	Ottawa-Carleton Wildlife Centre, Ottawa, ON, Wildlife Intern

#### CERTIFICATIONS/COURSES

OACETT rcjii Graduate Technologist, Class 1 WSC Electroshocking Certification, first aid, CPR, PADI Instructor, marine radio operator, Pleasure Craft Operator Card. Ontario Fishes course offered by the Centre for Biodiversity and Conservation Biology at the Royal Ontario Museum. Ontario Freshwater Mussel Identification Workshop, Ontario Wetland Evaluation Training, Ecological Land Classification, Bitternut Health Assessor. MTO R.A.Q.S. Fisheries Assessment, Environmental Inspection during Construction and Fisheries Compliance during Contracts

#### EXPERIENCE

Experience in environmental assessments, peer reviews, terrestrial habitat assessment, freshwater and marine habitat assessment, route selection, watershed studies and terrestrial and fisheries inventories including habitat mapping, stream classification, underwater surveys, electroshocking, and development of mitigation and compensation measures, including obtaining extensions to OMNR in-water timing constraints and DFO Authorizations and DFO Permits for Killing Fish by Means other than Fishing.

**Aquatic and Terrestrial Environmental Impact Assessments**

- Completed EIS for proposed WPCP expansion in the Town of Greater Napanee, ON
- Currently working on a terrestrial and aquatic component for the evaluation of proposed small hydroelectric options for a Cree community in northern Quebec.
- Currently responsible for the aquatic component for the Cataraqui Bridge Crossing, Kingston, ON.
- Currently completing the aquatic and terrestrial assessments for the proposed Clear Point small hydroelectric facility in Renfrew, ON.
- Currently completing the aquatic and terrestrial assessments for three proposed solar farms located in Port Hope, Prescott and Martintown.
- Currently working on an aquatic assessment for a proposed quarry near Rockland, ON.
- Completed aquatic environmental impact assessment for proposed sand pit operations in Greely and Bourget.
- Completed an environmental assessment for a proposed development along Heb Gordon Drain, Manotick, ON.
- Evaluated wetland boundaries for Doran Creek Wetland following OWES, Iroquois Ontario.
- Evaluated wetland boundary and significant woodland features for several single lot developments in the United Counties of SD&G and City of Ottawa.
- Completed the Environmental Impact Statement for the route selection and the Environmental Impact Assessment for the preferred option for the Caron Street Expansion in Rockland, ON.
- Completed the aquatic impact assessment and terrestrial species at risk evaluation for a proposed expansion to a small hydroelectric facility in Douglas, ON.
- Completed terrestrial EIS for proposed WTPP expansion in Iroquois, ON.
- Completed a terrestrial and aquatic route selection assessment for the Simcoe WPCP.
- Completed a Level 1 and Level 2 aquatic and terrestrial assessments for a proposed quarry expansion near Cornwall, ON
- Completed Level 2 fisheries report for Gagne Pit expansion near Rockland, Ontario.
- Completed wetland assessment following OWES for the proposed Morrisburg Industrial Park
- Completed aquatic impact assessment for PTTW, Apple Hill Quarry.
- Currently working on Aquatic and Terrestrial Environmental Impact Assessments for First Chute small hydroelectric facility projects on the Bonnechere River, ON.
- Completed the aquatic habitat and community assessment for a permit to take water for the Amberwood Golf Course, Ottawa ON
- Complete fish community and habitat impact assessment for the Morrisburg Waste water tunnel
- Prepared aquatic impact assessment for the construction of the Clarkson WWTP outfall, Lake Ontario.
- Created artificial reef design for the Town of Saugeen Shores WPP.
- Conducted assessment of fish habitat use and determined potential impacts for the Town of Saugeen Shores WPP.
- Developed and conducted a study to assess fish kills within the Town of Saugeen Shores WPP.
- Fish habitat assessment along Stagecoach Road, Ottawa ON.
- Complete aquatic habitat and community impact assessment for a permit to take water for the Summersheights Golf Course.
- Prepared impact assessment and monitoring plan for the Burloak Water Purification Tunnel project (Burlington, ON).
- Completed aquatic habitat and community assessments for the permit to take water for the Riverbend Golf Course, Ottawa ON
- Conducted aquatic field assessments and reports for EA for vermiculite Canada project near

Bobcaygeon.

- Terrestrial screening level habitat assessment of Ferguson Lake development.
- Designed fish habitat compensation and monitoring plans for Cataraqui River Drilling Project.
- Assessed fish habitat within the Ottawa River near L'Orignal for the Wastewater treatment plant environmental screening report.
- Assessed fish habitat within Lake St. Lawrence (St. Lawrence River) near Morrisburgh for the wastewater treatment plant environmental screening report.
- Conducted level 1 terrestrial impact assessment for Vermiculite Canada project near Bobcaygeon.
- Conducted Environmental Screening Report for South Dundas between Morrisburg and Iroquois.
- Fish habitat assessment Foster Drain, Jock River, Ottawa ON
- Fish habitat assessment on drains on HWY 417 in Casselman, ON
- Conducted fisheries habitat assessment and designed artificial embayments and fish habitat enhancements for the Chat Falls Boat By-pass.
- Conducted environmental assessment for the proposed South River Hydroelectric Facility including an assessment of impacts on aquatic and terrestrial habitats and communities.
- Wrote Environmental Screening Report and conducted environmental inspections for Cataraqui River Drilling Project.
- Conducted Alexandria Wastewater treatment Plant Expansion Environmental Impact Study.
- Conducted Westley's Point terrestrial and Aquatic Environmental Screening Report for a sewer and watermain.
- Fish habitat assessment on Poole Creek near Stittsville, ON.
- Conducted field work for the environmental screening for the Harbour Front Trunk Sewer Overflow Control – Environmental Assessment.
- Fish habitat assessment Sawmill Creek, Cahill Tributary and Brown's Inlet, Ottawa ON
- Conducted fish habitat assessment and prepared environmental impact statement investigating the potential impacts of a lowering and realignment on the aquatic habitat on Spratt Municipal Drain.
- Conducted terrestrial and aquatic field assessment and wrote Environmental Screening Report for a development project on Loughborough Lake.
- Identified and mitigated potential fish habitat impacts as a result of a proposed increase in water level of the Garry River System, Alexandria, Ontario.
- Fish habitat assessment of Hosaic Creek within the Dupont Nature Reserve, Morrisburg ON.
- Assisted with terrestrial environmental impact assessments, in identification of environmental features to identify constraints and opportunities in support of a proposed Official Plan amendment in Tatlock, Ontario.
- Conducted the marine aquatic impact assessment for the Strait of Georgia Pipeline Crossing, BC.
- Assisted with environmental impact assessments, environmental field reports and fieldwork for various pipeline projects in Alberta.
- Wrote Environmental Overview for Tanglewood Residential Development in Calgary.
- Wrote Environmental Overview for Creekside Mills Residential Development in Calgary.
- Wrote Environmental Overview and Environmental Protection Plan for Beddington Trail, Calgary.
- Wrote Environmental Overview for Elbow Valley Environmental Protection Plan in Calgary.

### **Aquatic Inventories**

- Completed fish community sampling for the Third Crossing on the Cataraqui River (boat electrofishing and seine netting).

- Completed fish community sampling on Lafontaine drain in Rockland for a proposed subdivision.
- Completed backpack electrofishing and minnow trapping on watercourses at proposed sand pit expansions in Greely, and Bourget Ontario.
- Completed backpack electrofishing and minnow trapping on tributaries to Brook Creek in Port Hope, on a tributary to the St. Lawrence River near Prescott and Wood Drain in South Glengarry for proposed solar farms.
- Completed walleye spawning monitoring (night surveys and egg traps) in and around the chute between Lakes Opemisca and Barlow in northern Quebec.
- Completed a fish kill monitoring of the recently upgraded water treatment facility in Southampton, ON.
- Completed fish community sampling on a tributary to Gray's Creek in Cornwall, Ontario for a proposed subdivision.
- Conducted young-of-the-year walleye monitoring on the Raisin River and Lake St. Francis using boat electrofishing, Cornwall ON.
- Conducted boat electrofishing sampling on the Cataraqui River for a proposed dredging program, Kingston ON.
- Completed boat electrofishing and habitat mapping for Port of Prescott proposed expansion.
- Conducted fish community sampling within an unnamed drain in Russell, ON.
- Conducted fish community sampling within Feedmill Creek for a proposed development Ottawa, ON.
- Conducted fish community sampling within a tributary to the St. Lawrence River, Brockville, ON.
- Conducted fish community sampling and pike monitoring on the Eastman Drain, Cornwall ON.
- Conducted fish community monitoring and pike surveys on the Heb Gordon Drain, Manotick, ON.
- Conducted fish community sampling on tributaries to Shirley's Creek Kanata, ON.
- Conducted fish community sampling on Foster Drain, Ottawa ON.
- Designed and conducted walleye larvae survey of Hoople Creek and Raisin River (neuston net).
- Collected and analyzed fish and benthic macroinvertebrates from Pattingale and Hoople Creeks for a comparison study of impacted and non-impacted sites for the Raisin Region Conservation Authority.
- Developed and conducted first year of sampling for a benthic macroinvertebrate monitoring program for PTTW, Riverbend Golf Course, near Ottawa, ON.
- Completed R.I.N. (OMNR) gill netting protocol on Reach 1 of the Bonnechere River, Renfrew ON.
- Collected fish community and benthic macroinvertebrate information within tributaries to Clarence Creek for a proposed subdivision, Rockland, ON.
- Collected fish community and benthic macroinvertebrate information within tributaries to Lafontaine Creek for a proposed subdivision, Rockland, ON.
- Collected fish community information from two tributaries to the Ottawa River, Wendover, ON.
- Sampled fish communities within Adams Pond (Ottawa, ON).
- Completed first year of fish community monitoring for the Poole Creek re-alignment at Huntmar Road, Ottawa (backpack electrofishing multi-season)
- Completed the first year of a three year monitoring project for the Cataraqui Utilities Crossing project within the Cataraqui River (boat shocking, seine netting, habitat assessment)
- Completed a three year monitoring project of the new wetland channel created in the Little Cataraqui River, Kingston ON (seine netting).



- Assessment of benthic macroinvertebrates and fish communities within tributaries of the Bonnechere River (Renfrew ON) (seine netting, gill netting, backpack electrofishing, minnow trapping, multi-season).
- Conducted fish removal on a tributary to Trout Lake for Cruickshank on HWY 60
- Conducted young-of-the-year muskie seining within the Ganonoque area for Muskies Canada and OMNR (seine netting)
- Fish community sampling Mosquito Creek, Carp River and its tributaries. Ottawa, ON (backpack shocking)
- Provided fish removal services for Poole Creek at Huntmar, Kanata Ontario.
- Conducted young-of-the-year muskie and walleye seining within Lake St. Francis (Cornwall, ON).
- Assisted the City of Ottawa in locating and identifying potential walleye spawning grounds in the Rideau River.
- Conducted boat electrofishing on the Cataraqui River (Kingston, ON).
- Collected and analyzed walleye eggs from the spawning grounds at on the Raisin River and Hoople Creek.
- Conducted shoreline boat and beach seining along Lake St. Francis for the Lake St. Francis Fish Habitat Plan.
- Conducted and analyzed data from a stream assessment project of Hoople, Hoasic and Sutherland Creeks (OSAP protocol).
- Conducted boat electrofishing along the shoreline of Lake St. Francis and Raisin River, Cornwall ON with the RRCA.
- Designed, collected and analyzed the results for benthic macroinvertebrate community surveys on several watercourses within Ontario including: South River (Village of South River), tributary to the Beaudette River (Alexandria), Hoasic and Hoople Creeks (Morrisburgh), Sutherland Creek and Raisin River (Cornwall), Jock River (Ottawa) and a tributary to Feedmill Creek (Ottawa).
- Collected information on aquatic habitat, including inventory of fish communities and spawning survey to support proposed water taking from the Tay River (backpack shocking).
- Conducted boat electrofishing along the shoreline of Raisin River, Cornwall ON.
- Lake St. Francis (Cornwall, ON) and on the Cataraqui River (Kingston, ON).
- Developed and conducted fish habitat and community study on the Lower Raisin River (backpack shocking, seine netting, boat eletrofishing multi-season).
- Developed, organized and conducted marine field work, gathered environmental information, located contacts and assisted in writing the draft report for the Strait of Georgia Pipeline Crossing.
- Developed and conducted a fish survey on West Nose Creek, Alberta.
- Assisted in a fry monitoring project at the NOVA pump house on Red Deer River, Alberta. Responsibilities included setting and monitoring fry traps, and data collection.
- Conducted FRBC stream inventorying for Lakeland Mills, British-Columbia.
- Project Director: Realized, developed and presented a population study on the host sea anemones and anemonefishes in Sulawesi, Indonesia in cooperation with McGill University, Ecosurveys Ltd (UK) and Newman Biomarine Pte Ltd (Singapore). The study involved coral habitat mapping and fish surveys.

### **Environmental and Fisheries Inspections**

- Completed inspections during construction and fish salvage on Meade Creek at HWY 7, near Peterborough, ON.
- Designed fish salvage operations for a small hydro facility in Ontario.
- Clarkson's wastewater tunnel inspection design and quality control

- Burloak water purification tunnel blasting fish kill monitoring design and implementation
- Burloak water purification tunnel suspended sediments inspection design and implementation
- Provided environmental and fisheries inspections for the construction of the Poole Creek Re-alignment/Huntmar Drive Crossing.
- Conducted fish removal for MTO project on HWY 125.
- Provided fish removal services on the Trans-Northern Pipeline near Cornwall
- Provided fish removal services for a culvert replacement on Green's Creek near Maynooth, ON.
- Provide environmental and fisheries inspections for MTO projects in Napanee and Vankleek Hill, Lancaster and Ottawa Ontario.
- Conducted Environmental inspection of the dewatering process for the Elbow Valley Residential sanitary sewer system, Calgary Alberta.

### **Species at Risk Inventories**

- Completed SAR assessment for the Colborne Effluent forcemain.
- Completed Protection of SAR assessment for MTO Contract 2010-4028 near Perth, ON.
- Completed butternut assessments in Port Hope, Prescott, and Martintown for proposed solar farms.
- Completed butternut assessments for a proposed sand pit expansion near Bourget, ON.
- Completed butternut assessment for proposed quarry near Moose Creek, ON.
- Completed SAR habitat assessment and search for butternut and American ginseng inventories along Thorps-Ellis Drain, S, D & G
- Completed SAR habitat assessment for proposed WPCP expansion in Greater Napanee, ON.
- Completed butternut assessment on butternuts located on a proposed property to be subdivided in Stittsville.
- Completed butternut inventory for the proposed Clear Point Hydroelectric facility, Renfrew, ON.
- Completed visual surveys for turtle species at risk along the Bonnechere River, Renfrew, ON.
- Completed visual survey for Eastern musk turtle near Kemptville, ON

### **Other**

- Currently co-authoring the Walleye Management Plan for Lake St. Francis with the Raisin Region Conservation Authority and OMNR.
- Assisted in the peer review of the Talston Hydroelectric project, NWT Canada.
- Presented a talk on monitoring walleye larvae and BMPs at the IAGLR Conference, May 2006.
- Presented *How to Develop a Monitoring Program for BMPs* at the Great Lakes Sustainability Non Point Source Symposium, March 2006
- Co-authored Lake St. Francis Fish Habitat Plan for Raisin Region Conservation Authority.
- Coordinated the 2003 Strategic Habitat Restoration Working Group workshop for the Raisin Region Conservation Authority.
- Co-authored a paper on the Effects of Marine Pipelines on the Benthic Environment, presented at the 7<sup>th</sup> International Symposium on Environmental Concerns in Right-of-Way Management.
- Created and conducted environmental education programs in French for children and the general public.

**SHAUN M. ST.PIERRE, B.Sc.****EDUCATION**

B.Sc. Biology, Trent University 2007

Fisheries and Wildlife Technology, Frost Campus, Sir Sandford Fleming College, 2005

Fisheries and Wildlife Technician, Frost Campus, Sir Sandford Fleming College, 2004

**LANGUAGES**

Fluent in French and English

**POSITIONS HELD**

2006-: Bowfin Environmental Consulting Inc., Field Assistant/Environmental Site Inspector

2005: St. Lawrence River Institute of Environmental Sciences, Field Research Assistant

2004: MNR Kawartha Lakes, Field Research Assistant

2003: DFO- Experimental Lake Area, Field Research Assistant

2001: Resource Stewardship S, D &G, Stewardship Ranger

**CERTIFICATIONS**

Ontario Benthos Biomonitoring Network, Ontario Stream Assessment Protocol, Butternut Health Assessor, Class 2 Electroshocking, first aid, CPR, Pleasure Craft Operator Card, Marine Radio Operator, WHMIS, All Terrain Vehicle Riders Course (issued by the Manitoba Safety Council), Water Safety Training (Bronze Cross), Ontario Trapping Course and Snowmobile Licenses.

**EXPERIENCE**

Experience assisting in environmental monitoring, environmental assessments, terrestrial habitat assessment, freshwater habitat assessment, fish behavioral studies, winter bat hibernaculum inventories and fisheries inventories including habitat mapping, electroshocking, FWIN and RIN. Other experience include GIS.

**Aquatic Inventories**

- Assisted with boat electrofishing along the shoreline of the Cataraqui River (Kingston, ON), South Nation River (Casselman, ON), Raisin River (Lancaster, ON), and Lake St. Francis (South Lancaster, ON).
- Assisted in collecting and data entry for benthic macroinvertebrate community surveys on several watercourses within Ontario including: Bonnechere River (Renfrew, ON), tributaries of the Bonnechere River (Renfrew, ON), the Jock River (Ottawa, ON) and tributary to the Beaudette River (Alexandria, ON).
- Assisted in collecting and data entry for several fish community surveys using backpack electrofisher including: Bonnechere River (Renfrew and Douglas, ON), tributaries of the Bonnechere River (Renfrew, ON), tributary to the Beaudette River (Alexandria, ON),

tributaries to the South Nation River (Jessup Falls, ON), Butler's Creek (Brockville, ON), Black Creek (Westminster, ON) and Lac Opemisca (Ouje-Bougoumou, QC).

- Mapped fish habitat in many watercourses including: tributaries to the South Nation River (Jessup Falls, ON), Butler's Creek (Brockville, ON), Black Creek (Westminster, ON).
- Assisted in YOY sampling on the Raisin River (Lancaster, ON).
- Assisted in conducting riverine index netting on the Bonnechere River (Renfrew, ON).
- Assisted in conducting larvae surveys on Hoople Creek, Raisin River and the Bonnechere River.
- Assisted in collecting walleye eggs from the spawning grounds on the Raisin River and Hoople Creek.
- Assisted in the monitoring of a new wetland channel created in the Little Cataraqui River.
- Marsh monitoring program breeding amphibian survey at Hoople Creek and the Bonnechere River.
- Assisted in conducting fall walleye index netting for the MNR in Kawartha Lakes

### **Species at Risk Inventories**

- Butternut survey and assessment for proposed development (Brockville, ON).
- Butternut survey and assessment for proposed development (South Lancaster, ON).
- Butternut survey and assessment for quarry expansion (Moosecreek, ON).
- Butternut survey and assessment for quarry expansion (Westminster, ON).
- Butternut survey along the Bonnechere River near Renfrew Ontario.
- American Eel survey on the South Nation River (Casselman, ON)
- American Ginseng survey for proposed development (South Lancaster, ON).
- American Ginseng survey along the Bonnechere River near Renfrew Ontario.

### **Terrestrial Inventories**

- Plant community inventories for proposed development (Ouje-Bougoumou, QC)
- Plant community inventories for proposed development (Brockville, ON)
- Plant community inventories for proposed development (Hamilton, ON)
- Plant community inventories for proposed development (Simcoe, ON)
- Plant community inventories for proposed development (South Lancaster, ON).
- Plant community inventories for quarry expansion (Moosecreek, ON).
- Plant community inventories for quarry expansion (Westminster, ON).
- Plant community inventories along the Bonnechere River (Renfrew)
- Plant community inventories for the Caron street extension (Rockland)

### **Environmental and Fisheries Inspections**

- Conducted environmental inspections for the construction of the Clarkson WWTP outfall, Lake Ontario.
- Assisted in providing environmental and fisheries inspections for the blasting and drilling operation for the Burloak Water Purification Tunnel project (Burlington, ON).
- Assisted in providing environmental and fisheries inspections for the construction of the Poole Creek Re-alignment/Huntmar Drive Crossing.

### **Aquatic Habitat Mapping for Municipal, City Roads and Provincial Highways**

- Conducted MTO habitat assessments at Prince of Wales, Fernbank road, Fallowfield road, HWY 115, Arbuckle drain, the Carp river, tributaries to the Carp river and tributaries to Mud creek.

**Other**

- Assisted in conducting a winter bat hibernaculum inventory (Plantagenet)
- Field research assistant for the Metalicuous study and EDC study (Experimental Lakes Area)
- Captured, pit tagged and tracked Northern Pike (Experimental Lakes Area)
- Construction and maintenance of nature trail (the Cornwall Outdoor Recreational Area)
- Conducted frog deformities surveys (Glengarry)

## Appendix C – Field Notes

PENN-HAMILTON JUNE 14/10 (8)

Further N cultural meadow

p 58 NW p 59 NE

p 60 + p 61 mk 016  
step d/s

iron staining

27 cm  
from water depth

75 cm WW  
S 3, S 3, S 3  
1, 1, 1

Mk 017 side channel p 57 d/s  
cw ww d

110 50 2.6 6

NOBITIONLY (11)

Penn Hamilton June 14/2010

mk 016

p 80 81 88 d/s end of  
culvert

p 83 d/s p 84 u/s  
dry m27 fine s  
to pockets of cobble  
d/gravel

common yellowthroat

p 86 field east side of  
Byrne Rd south of farm

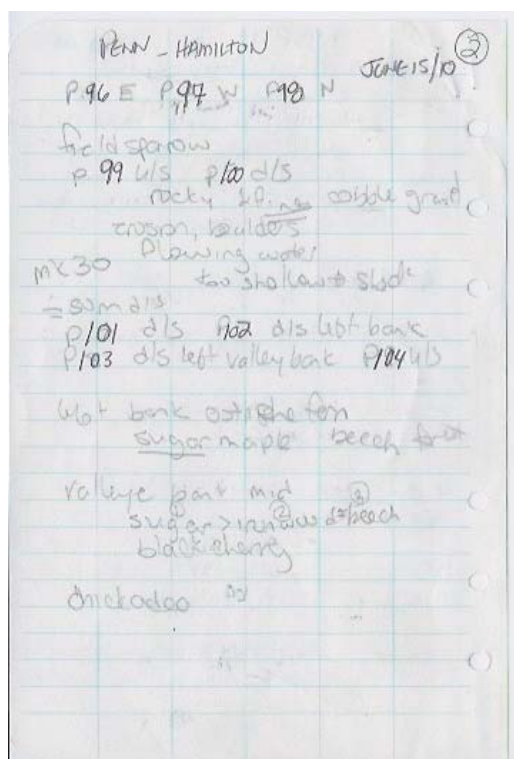
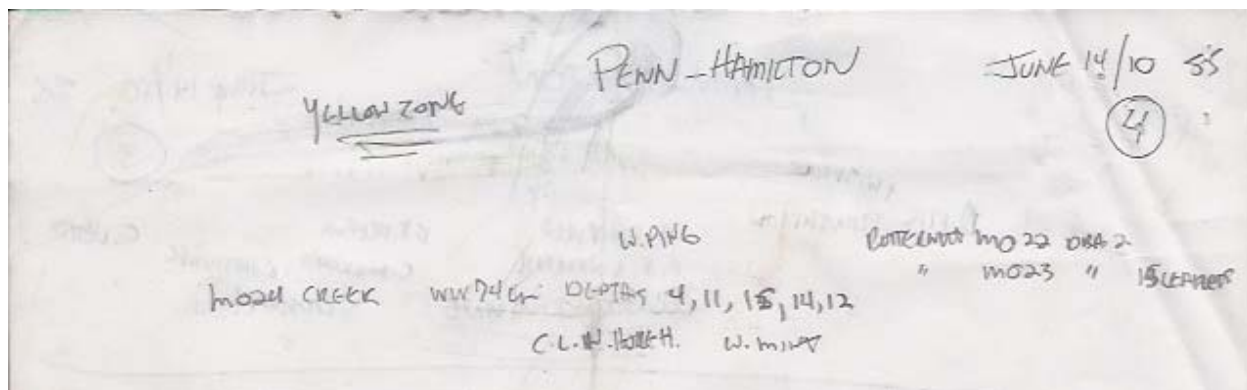
p 87 u/s

p 88 culvert

standing water; trees

p 89 better picture of foot  
side

M. maple d ash ash lac



Penn Hamilton June 15/10 ⑥  
 mk037 p 129-131  
 BUTTERFLY healthy 17 leaflets  
 mk038 p 132; 133; 134  
 WHEAT 19 leaflets  
 healthy  
 mk039 p 135-137  
 WHEAT 15 leaflets  
 healthy 19 missing terminal  
 mk040 p 138 u/s p 139 d/s  
 p 140-141 subsh  
 dry ditch, lanes roadside  
 sections, some seepage  
 p 142-143  
 Area 123  
 15-18m cedars p 144  
 90% no ground

seed mk041 June 15/10 ⑦  
 P 145 (146-147)  
 water  
 seed A. horsetail, yarrow  
 constitution  
 no channel  
 creek willow  
 surrounded by cedar  
 ostrich  
 black throated blue warbler?  
 cedar waxwing black throated  
 Green Warbler  
 mk042 p 148, 149 - 46 scar  
 Walnut 18-21 leaflets  
 p 150 path  
 18? 2?  
 +151 +152  
 mk043 - 153  
 gray catbird  
 p 154-155 BUTTERFLY  
 p 156, 157, 158, 159 - HELENIUM SP.

Penn Hamilton June 15, 2010 ⑦  
 Area 17  
 12-15m m. maple > ~~white oak~~  
 60-70% ~~white oak~~  
 1m white oak all leafed out  
 <1  
 jewelweed, ostrich fern  
 100% - LATE ~~leafed out~~  
 p 160, 161, 162  
 mk044 BUTTERFLY p 163 & 164  
 open. crowning sp.  
 snail  
 mk046 dry ditch u/s d/s  
 p 165 p 166  
 mk047 p 167 reed grass  
 broad leaf cattails



Penn Hamilton June 5/2010 (9)

20-25m sugar maple >> white ash >  
 20% basswood

4-8 Sugar maple > white ash >  
 20% basswood > beech

0.5-1m ~~30%~~ sugar maple >> gooseberry  
 8% - 18% = red elderberry

ground sugar maple  
 10% jack in pulpit, penstemon

Deadfall P. 189

mk 051 boulders, gravel,  
 fine sand  
 running water

air 17°C  
 water 8°C

stream bank / grave (10)

15-18m white ash >> blackberry  
 55%

6-10m sugar maple >> white ash  
 40%

2-4m white ash >> m. maple  
 80% - 10%

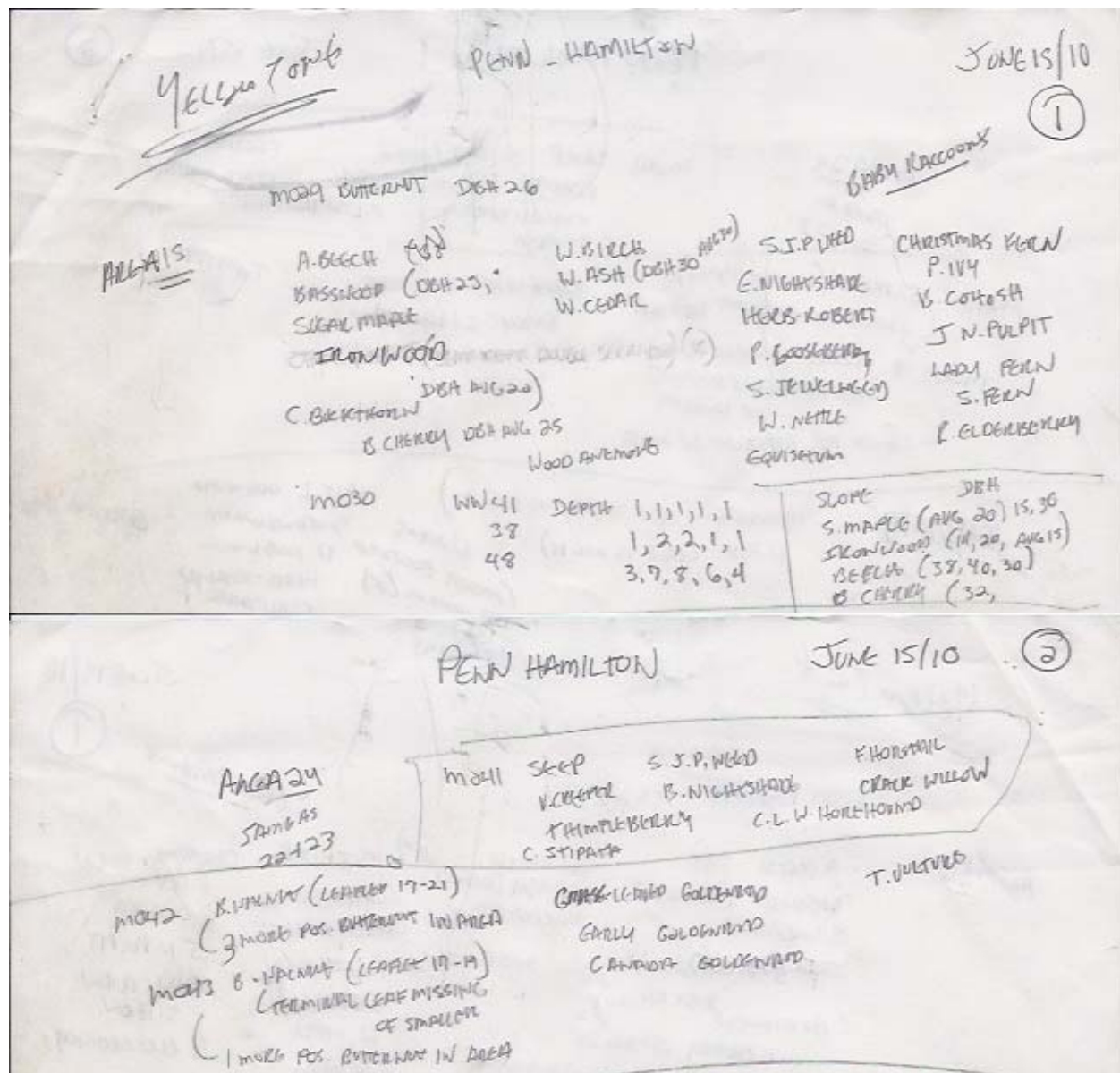
0.5-1m red raspberry, sugar maple  
 25%

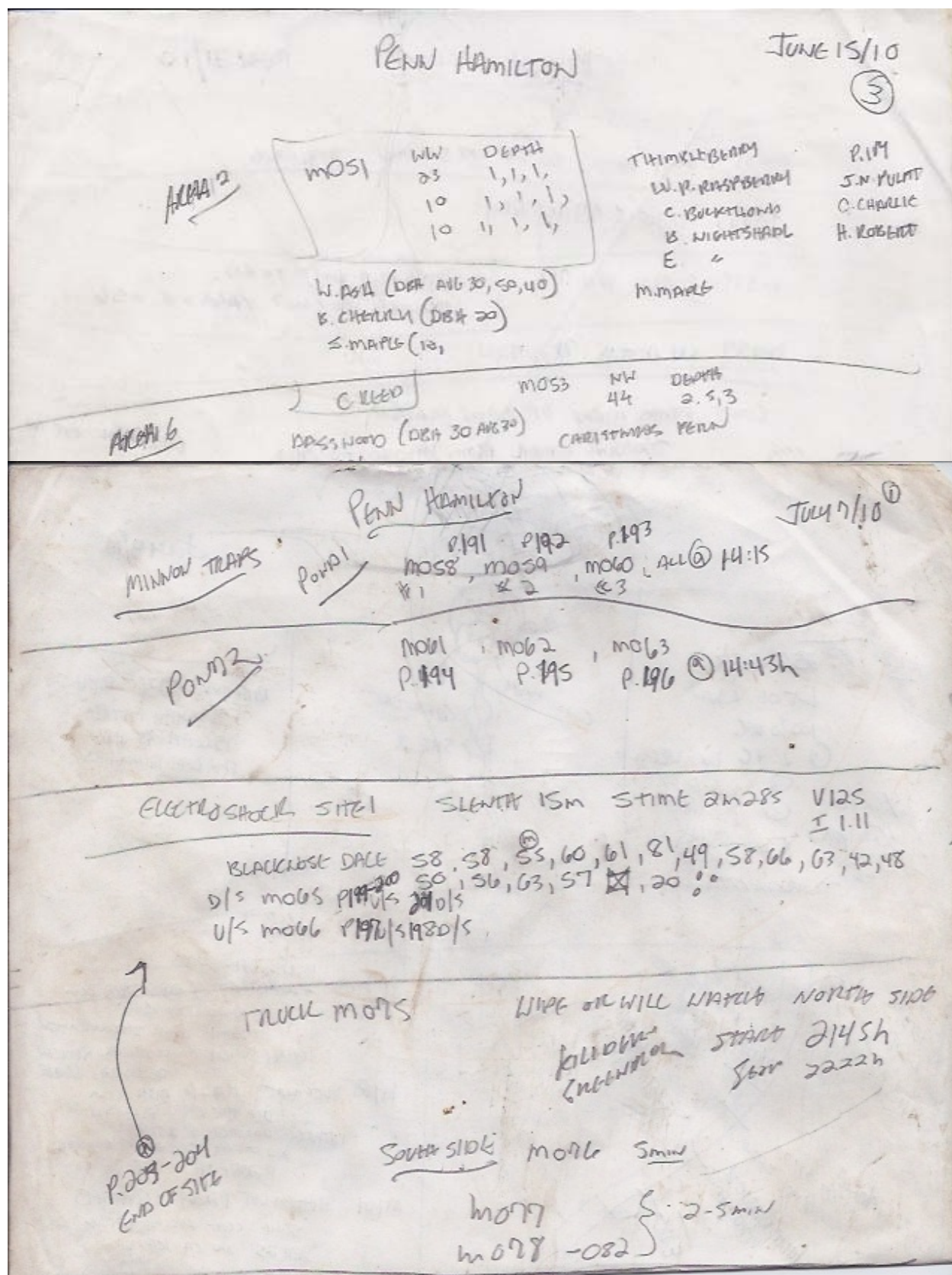
ground jack in pulpit on clatters  
 20% nightshade

P. 180  
 P. 182

mk 052 p. 181 d/s p. 183 u/s  
 p. 184 m/s substrate  
 dry → inter ditches

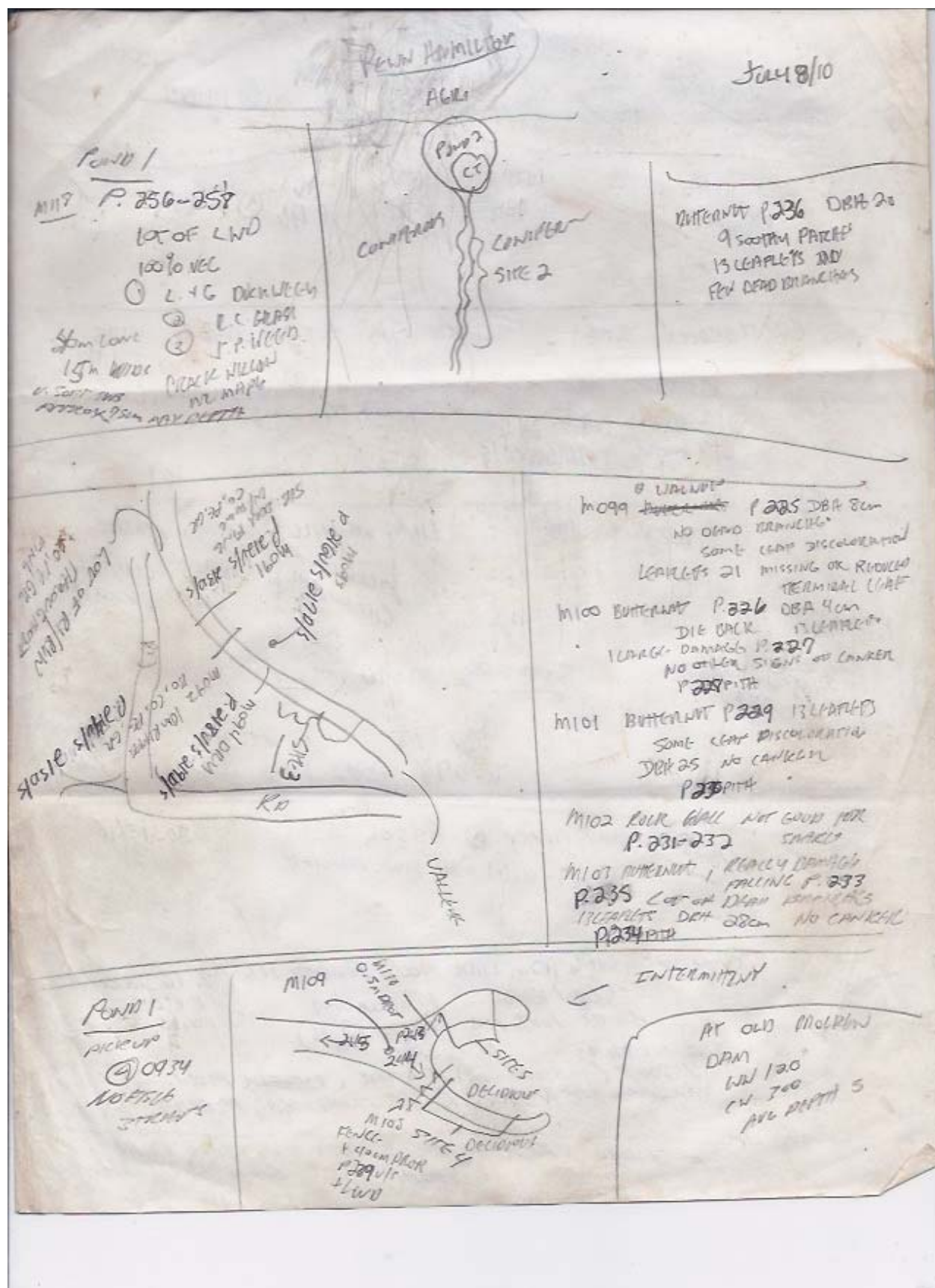
mk 053 p. 186 u/s p. 187 d/s  
 wet again







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## **Appendix D– Site Concept Plans**