Penn Energy – Hamilton_Port Hope-4
SOLAR ENERGY FACILITY

In the

Township of HAMILTON

Fit Contract No. F-000687-SPV-130-505
FIT Application No. FIT-FQWKQZF
COD: May 5, 2012

Natural Heritage Assessment
Part III: Evaluation of Significance

DRAFT

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1.0 INTRODUCTION

Penn Energy Trust (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, northeast of Cobourg, Ontario (Figure 1). The subject lands are located in Lot 3 Concession 2 of the Township of Hamilton. The proposed Renewable Energy Generation Facility (REGF) would consist of a collection of solar photovoltaic (PV) modules (each approximately 1.00 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, pursuant to Ontario Regulation 359/09. As part of this act, a Natural Heritage Assessment (NHA) is required in order to identify potential impacts to the natural area. Bowfin Environmental Consulting Inc. (Bowfin) has been retained by Penn to conduct the NHA.

A NHA study includes three activities: a review of records (background information), a site investigation and an evaluation of the significance of each natural feature identified. A separate report has been created for each of these activities. The evaluation of significance of the natural feature is based on methods accepted by the Ontario Ministry of Natural Resources (OMNR). These features would include:

- Areas of natural and scientific interest (ANSI) (earth or life science);
- wetlands (coastal, northern, southern);
- valleylands;
- wildlife habitat;
- woodlands;
- Certain additional Natural features in the Oak Ridges Moraine Conservation Plan Area;
- Certain additional Natural features in the Greenbelt Plan's Protected Countryside;
- Provincial parks; and
- Conservation Reserves.

Should any significant natural features be found within the REGF project location or the appropriate adjacent lands to the feature, then an Environmental Impact Study (EIS) is required to identify and assess the potential environmental effects of the project on the natural feature, Provincial Park or conservation reserve.

The following report provides a summary of the Evaluation of Significance, the third of three parts of this project's Natural Heritage Assessment.

Figure 1 Location of the Subject Lands

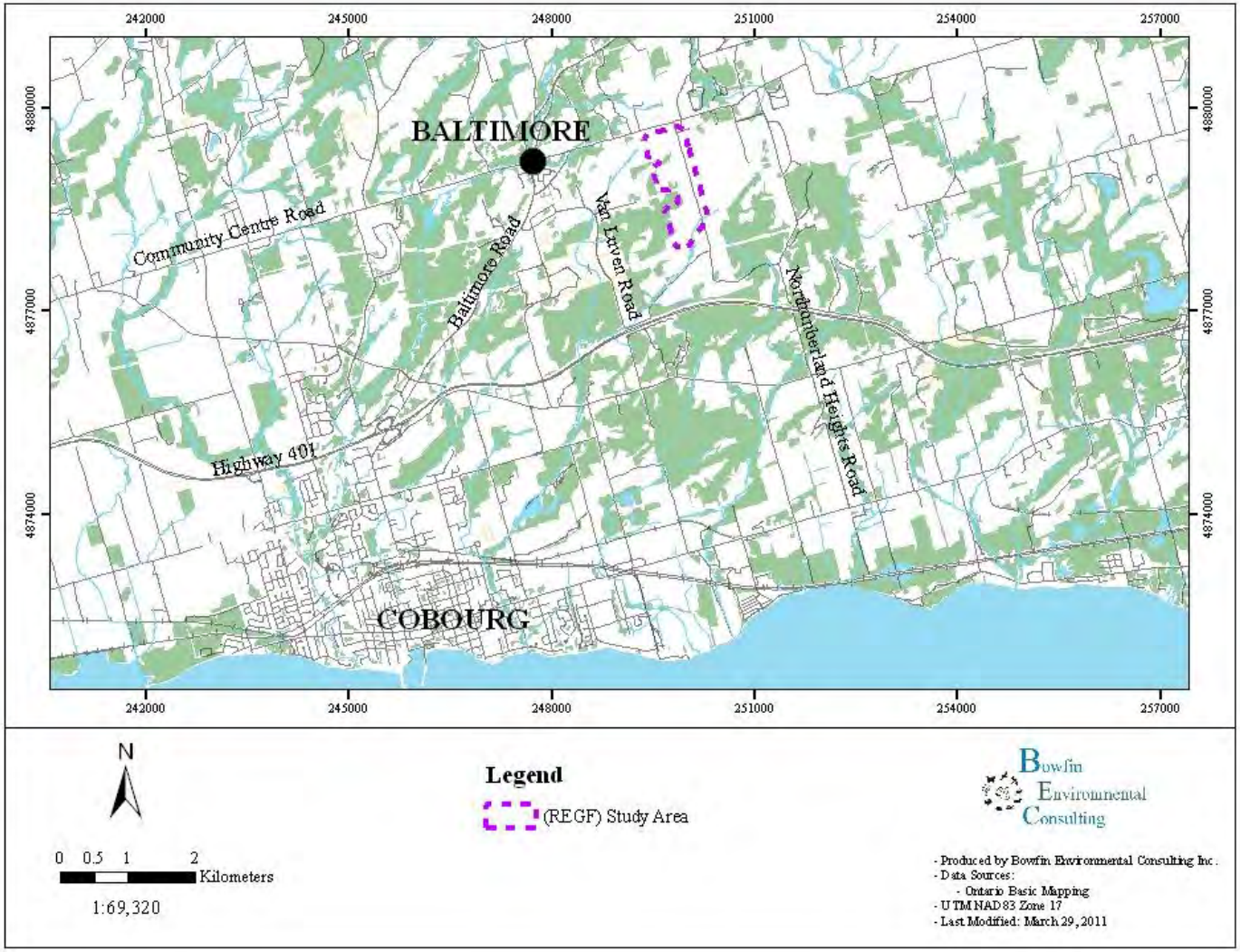
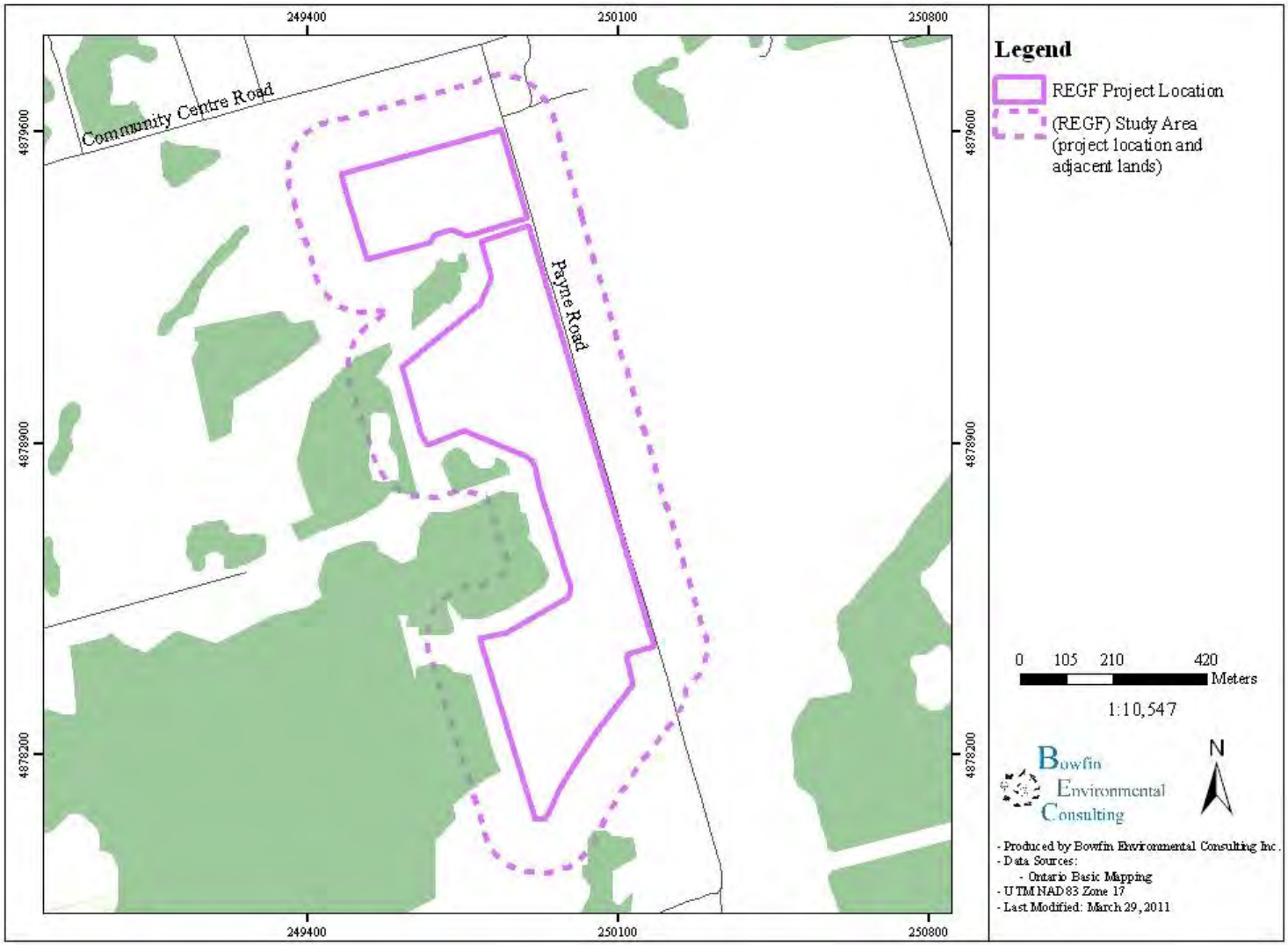


Figure 2 REGF Study Area (including the Project Location and adjacent lands within 120 m)



2.0 METHODOLOGY

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 ("REGF Project Location") as well as all adjacent lands within 120 m (the "Study Area") (Figure 2).

2.1 Evaluation of Significance

The evaluation of the significance of the natural heritage features was completed as described in O. Reg359/09. The significance of woodland, valleylands and wildlife habitat were based on the following:

- areas identified as significant by OMNR
- evaluation criteria or procedures established or accepted by OMNR
    - Natural Heritage Assessment Guide for Renewable Energy Projects (2010)
    - Significant Wildlife Habitat Ecoregion Criteria Schedules – Working Draft (2009)
    - Significant Wildlife Habitat Technical Guide (2000)

The determination of significance for southern wetlands, coastal wetlands and ANSIs based on the following:

- areas identified as Provincially significant by OMNR
- Ontario Wetland Evaluation System
- Appendix C – of the Natural Heritage Assessment Guide for Renewable Energy Projects (Wetland Characteristics and Ecological Functions Assessment for Renewable Energy Projects)

The habitat descriptions gathered during the site investigations (following the ELC) were used to cross-reference with the habitat requirements of the species listed in Appendices G and Q of the SWTHG as well as those species of conservation concern listed as potentially occurring within the study area. The following items were looked for:

- Seasonal concentrations of animals;
- Rare vegetation communities or specialized habitats for wildlife;
- Habitats of species of conservation concern; and
- Wildlife movement corridors.

It is also noted that species and/or their habitats that are protected under the Provincial *Endangered Species Act* are dealt with in a separate report.

3.0 SUMMARY OF RECORDS REVIEW AND SITE INVESTIGATIONS CONCLUSIONS

Based on the records review candidate significant woodlands, valleylands and wildlife habitat occur in or within 120 m of the REGF project location. There were no records of wetlands or provincial park or conservation reserves in or within 120 m of the REGF project location and no ANSIs (earth science or life science) within 50 m of the REGF project location. The potential for additional natural features, wildlife habitat and sand barrens, savannahs, tallgrass prairie and alvars was verified during the site investigations. The site investigations confirmed that the candidate woodlands and some of the valleylands identified in the Records Review Report do indeed occur within 120 m of the REGF project location. Much of the valleyland located to the south of the study area was located within meadow habitat and active crop lands. These portions of the "valleyland" consisted of an incised channel but did not contain any unique landform features associated with valleylands. However, within the beech forest, a 200 m long segment of valleyland was still present (Figure 3). The location of the northern valleyland was also corrected. The uppermost (eastern) end of this valleyland was also surrounded by agriculture and had been manipulated. As such, the length was reduced by 210 m (Figure 3). Note that during the records review a fifth valleyland located to the northwest of the study area was included on the map. Since this valleyland is located 235 m from the study area it is not discussed in the site investigation report.

The majority of the habitat was not suitable for deer overwintering yard (i.e. project location consisted of row crops and much of the surrounding forest habitat was deciduous). A portion of the adjacent woodlands to the southwest of the REGF project location did provide potential deer overwintering habitat and this area is described in Section 4.0.

Additional natural features documented during the site investigations included: windrows, seeps, and a small wetland feature. All habitats observed during the site investigations are described in Section 4.0 of this report. A summary of the site investigation findings and corrections to the records review is presented in Table 1 and on Figure 3.

Table 1 Summary of Known and Candidate Natural Features Located within the REGF Project Location or the Adjacent Lands

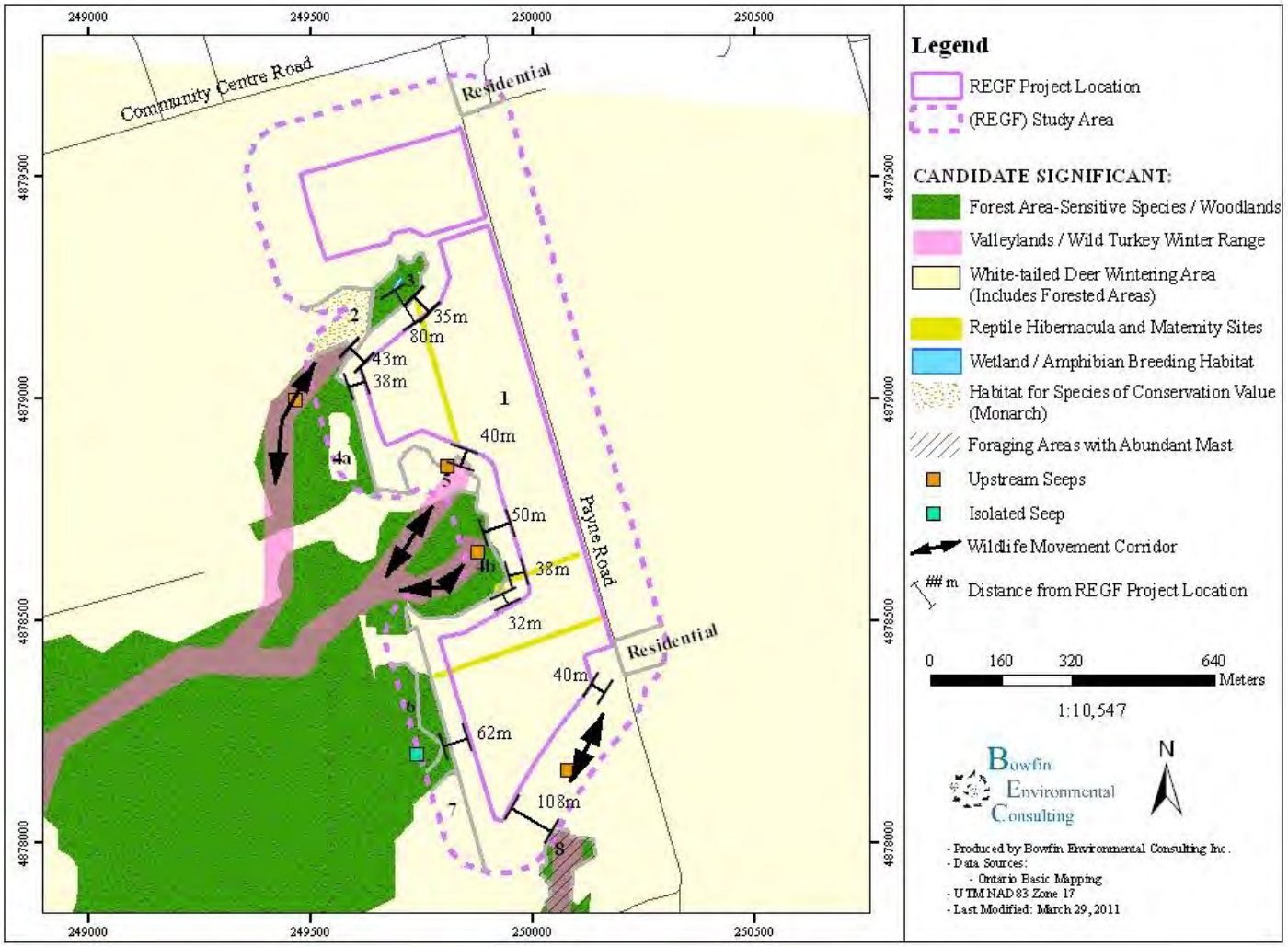
Natural Heritage Feature	Findings		Corrections to Records Review and Additional Natural Features
	Records Review	Site Investigations	
Wetlands	• No PSW are identified within the study area on the OP or during the records analyzed.	• A small wetland is located immediately to the southwest of the house. It consists of a man-	• New wetland feature identified (Figure 3)

Natural Heritage Feature	Findings		Corrections to Records Review and Additional Natural Features
	Records Review	Site Investigations	
		made pond (created by a berm). • Significance of feature to be evaluated in Evaluation of Significance Report.	
Woodlands	• OP and the records analyzed did not list any significant woodlands within the study area. • Satellite imaging identified a large woodland within 120 m of the REGF project location.	• A large woodland was confirmed to the west of the REGF area. • Significance of feature to be evaluated in Evaluation of Significance Report.	• Woodland presence and boundaries confirmed (Figure 3)
Valleylands	• The four headwater tributaries to Brook Creek are located within valleys that are designated as Environmentally Sensitive Areas on the OP.	• The presence of four headwater tributaries to Brook Creek was confirmed during the site investigations. • Significance of feature to be evaluated in Evaluation of Significance Report.	• The southern valleyland was reduced to an isolated 200 m long segment. • The northern valleyland length was reduced by 210 m (Figure 3)
Wildlife Habitat	• Located within an OMNR listed deer overwintering area. • Valleylands and woodlands likely provide wildlife habitat.	• The habitat within the REGF project location consists of primarily row cropping with the exception of rock piles and windrows. • The remainder of the candidate	• Potential for winter deer yard within coniferous stand confirmed. Remainder of area not suitable as it consisted of

Natural Heritage Feature	Findings: Records Review	Findings: Site Investigations	Corrections to Records Review and Additional Natural Features
		significant wildlife habitat is located outside of the REGF project location. • Significance of feature to be evaluated in Evaluation of Significance Report.	deciduous habitats or active row cropping. • New potential wildlife habitat confirmed (Figure 3)
ANSIs – Earth Science	• No significant ANSIs are listed as occurring within the study area on the OP or the records analyzed. • REGF project location is not located within 50 m of an ANSI	confirmed	no change
ANSIs – Life Science	• No significant ANSIs are listed as occurring within the study area on the OP or the records analyzed. • REGF project location is not located within 50 m of an ANSI		
Sand Barrens, Savannah, Tallgrass Prairie and/or Alvars	• None were identified as occurring within the records review.		
Provincial Park or Conservation Reserve	• REGF project location is not within a provincial park or conservation reserve.		

OP = official plan of the Township of Hamilton

Figure 3 Location of Candidate Significant Natural Features (based on Records Review and Site Investigations)



4.0 EVALUATION OF SIGNIFICANCE

The following section provides an evaluation of all of the natural features documented as occurring within the study area during the site investigations. The locations of the candidate natural features (i.e. woodland, wetlands, valleylands and wildlife habitat) in respect to the study area are shown on Figure 3 of this report and the significant natural features on Figure 7. Evaluation of significance was completed by Michelle Lavictoire who is certified by OMNR to conduct wetland evaluations and ecological land classifications. The evaluation of significance was completed between August 2010 and March 2011.

4.1 Wetlands

Ontario Regulation 359/09 defines a wetland as:

> *"Land such as a swamp, marsh, bog or fen, other than land that is being used for agricultural purposes and no longer exhibits wetland characteristics, that,*
> *a) is seasonally or permanently covered by shallow water or has the water table close to or at the surface, and*
> *b) has hydric soils and vegetation dominated by hydrophytic or water-tolerant plants.*

The evaluation of the significance of the wetland was completed by Michelle Lavictoire who is certified by the OMNR to conduct wetland evaluations using the Ontario Wetland Evaluation System (OWES) (OMNR 2002) on the June 14th, 15th and August 19th visits. In general, wetland habitat includes swamps, marshes and open water habitats. Based on OWES a wetland habitat is characterized as:

> "Lands that are seasonally or permanently flooded by shallow water as well as lands where the water table is close to the surface; in either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic or water tolerant plants".

There is one small, isolated, man-made wetland located within 56 m of the REGF project location. This wetland is located within polygon 3 (FODM7-7) and measures 96 m². Based on OWES, wetlands that are less than 2 ha are usually not evaluated. This wetland was created by berming the downstream end of a swale. There are no special features associated with the wetland which would warrant its evaluation (i.e. bog, fen). There are no other wetlands within 120 m of the REGF area. No significant wetlands are located within the study area.

Conclusion: Candidate wetland feature is not brought forward.

4.2 Woodlands

The confirmation/documentation of woodlands was completed by Michelle Lavictoire (certified by OMNR to conduct Ecological Land Classifications) during the June, July and August 2010 visits. The O. Reg 359/09 (amended January 1, 2011) defines woodlands as:

> *"treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or plantation established for the purpose of producing Christmas trees…"*

The woodland habitats encountered included those that are identified as beech deciduous forest (polygon 8, FOD4-1), sugar maple hardwood forest (polygon 4a & b, FODM6-5), Manitoba maple lowland (polygon 3, FODM7-7), and the coniferous plantation (polygon 6, TAGM1) on Figure 4. These polygons are located outside of the REGF project location (Figures 4). Polygon 8 is located approximately 108 m from the REGF project location. The potential for significant woodlands to occur in or within 120 m of the subject lands is evaluated below.

Woodlands were evaluated based on the *Natural Heritage Assessment Guide for Renewable Energy Projects* (NHAG). The delineation of the woodland was completed based on the guidelines in the NHRM. A desktop exercise was used in which air photos, satellite imaging, the Ontario Base Mapping (OBM) ground thruthing were combined to locate the extent of the forest patch. Using this method, the polygons listed above should be grouped into woodland patches as the woodland should be evaluated as a whole. There are five woodland patches located within the study area; these have been labeled as A-E (Figure 5).

The NHAG evaluates significant woodlands in context of their size, ecological functions, and uncommon characteristics. A woodland that meets the minimum standards for one or more criteria is considered significant in the NHAG. Each of the criteria and how they relate to the forest patch located within the study area is discussed below.

Woodland Size

As mentioned above, the woodland polygons all form part of five forest patches (Patches A-E, Figure 5). The largest patch, patch "A" is approximately 108.5 ha and has three isolated interior habitat parcels (0.6 ha, 0.2 ha and 33.2 ha each). The total size of Patch B is 6.6 ha, C is 0.9 ha, D is 1.2 ha and E is 1.9 ha. There is no interior habitat associated with Patches B-E. Note that the above measurements include the entire patch (within and outside of the study area). The East Lake Ontario Watershed has a forest cover of approximately 29.5% (based on the Ganaraska Region Conservation Authority Watershed Report Card) and as such any forest stand that is ≥20 ha should be considered significant. Only the Patch A meets this criterion.

Figure 4 Habitat Mapping of Study Area

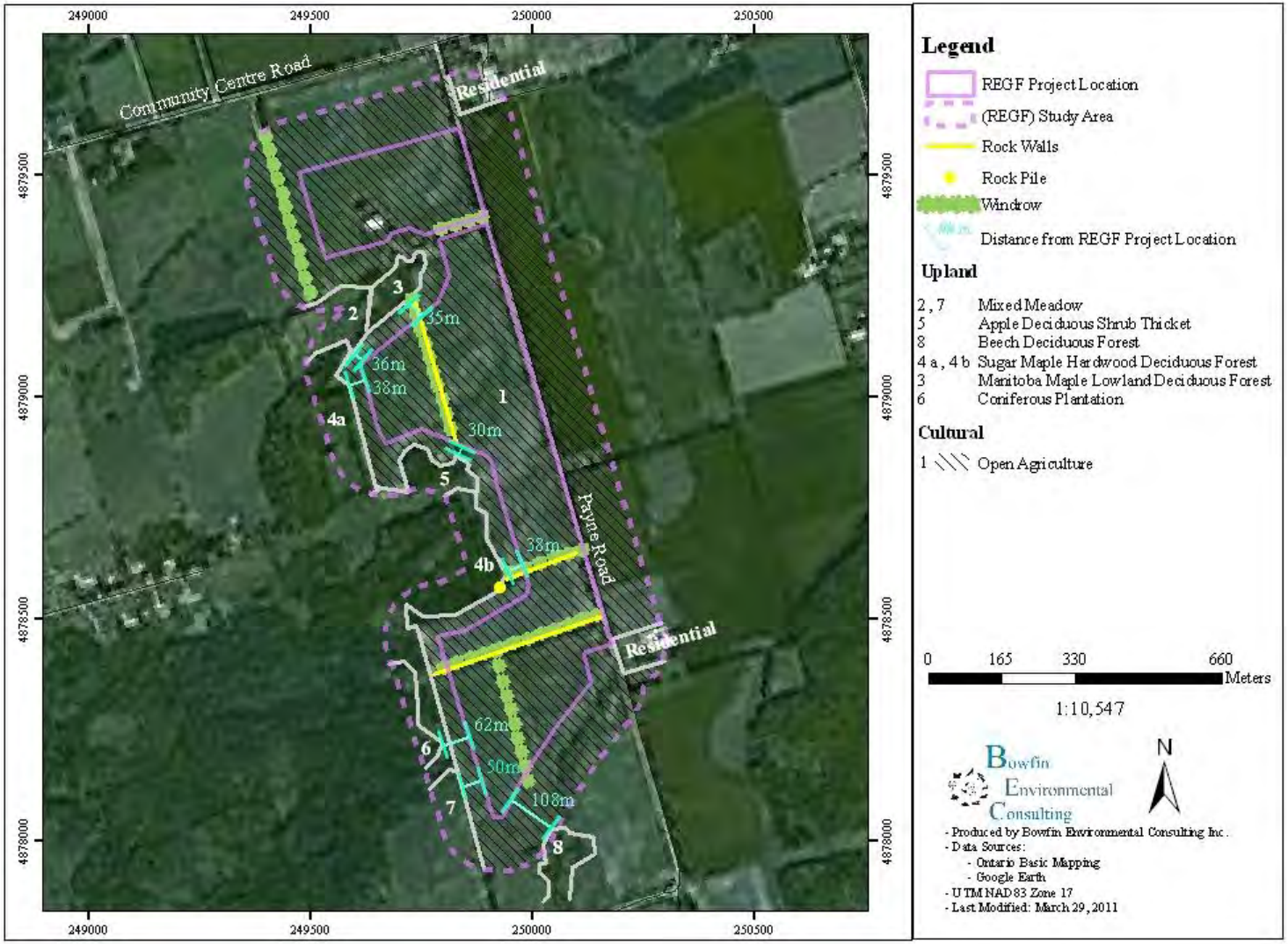
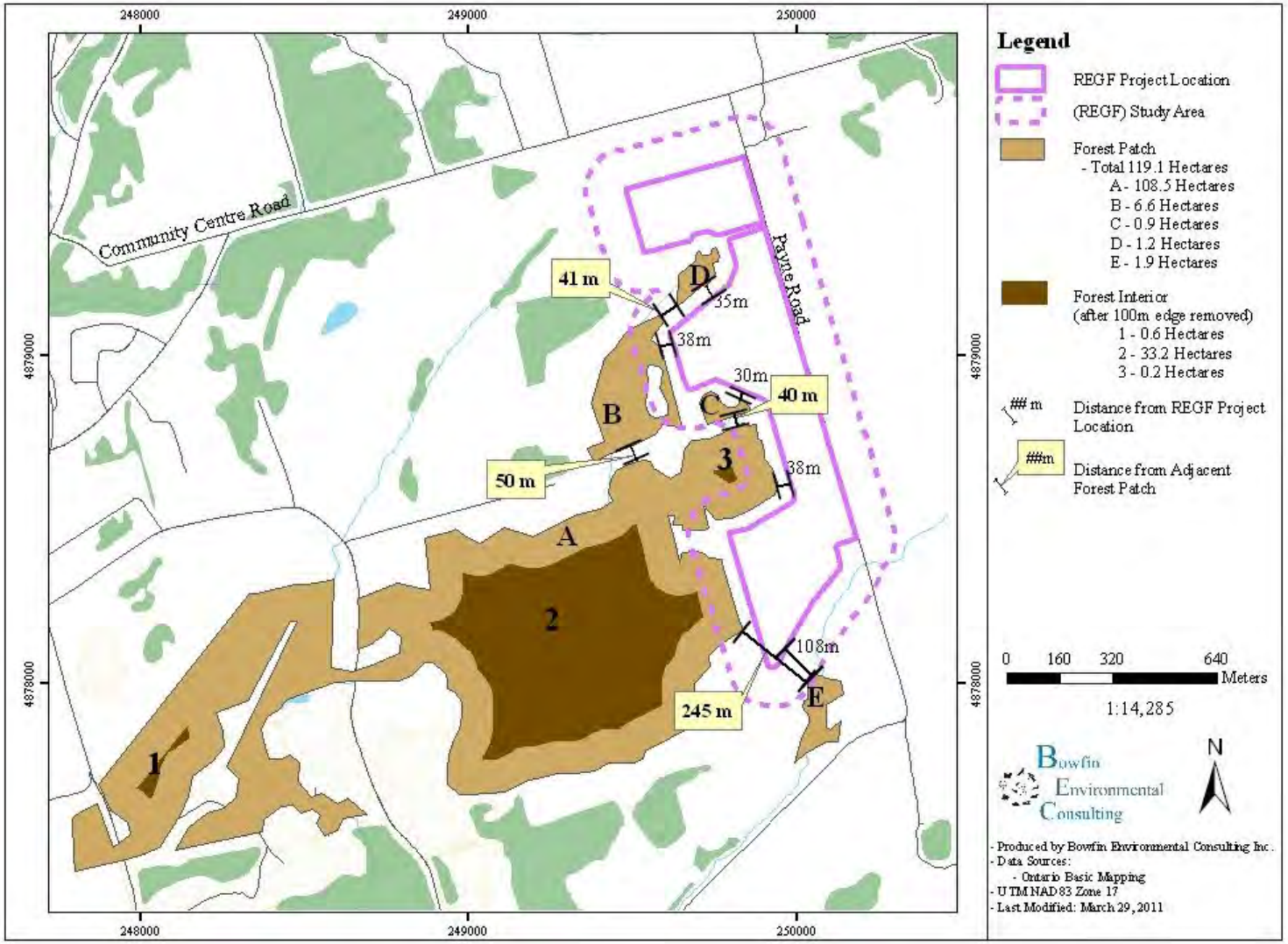


Figure 5 Location of Woodland Forest Patches



Ecological Functions Criteria

This criterion is based on five factors: woodland interior, proximity to other woodlands or other significant natural heritage features, linkages, water protection and woodland diversity. Patch A meets the woodland interior, water protection and woodland diversity factors. Patch B meets the water protection and woodland diversity factors. The three remaining patches do not meet any of the five ecological functions factors (Table 2).

Uncommon Characteristics

This criterion refers to stands that are considered uncommon based on the composition, cover type, age or structure. No unique species compositions, vegetation communities, habitat or mature trees were observed in any of the five woodland patches.

Table 2 Presence/Absence of Woodland Ecological Functions

Factor	Comments	Meets Minimum Requirements				
		A (108.5 ha)	B" (6.6 ha)	C (0.9ha)	D (1.2 ha)	E (1.9 ha)
Woodland interior	Patch A contains three isolated interior parcels (approx. 0.6 ha, 0.2 ha and 33.2 ha) of which only the later is of sufficient size to provide interior habitat.	Yes	No	No	No	No
Proximity to other woodlands or other significant natural heritage features	Must be located within 30 m of other significant features or fish habitat and must be a min. of 4 ha	No	No	No	No	No
Linkages	Must be located between 2 other significant features, each of which must be within 120 m of the other and the woodland must be a min. of 4 ha.	No	No	No	No	No
Water protection	Must be within 50 m of water features and the woodland must be a min. of 4 ha. (Several groundwater discharge zones and seeps were observed within the valleys; but most woodland patches are <4 ha)	Yes	Yes	No	No	No
Woodland diversity	Must be dominated by native naturally occurring sugar maple, black maple, silver maple, red maple, yellow birch, hickory, beech, black ash, walnut, tamarack, spruce, pine, oak, basswood or hemlock and be a min. of 4 ha. (portions of patch A meet this criteria)	Yes	Yes	No	No	No

Summary

There are five forest patches located within the study area and all are located at a minimum distance of 30 m from the edge of the REGF project location with the exception of Patch E which is located 108 m from the REGF project location. As a woodland is only required to meet one of the criterion to be deemed significant, both Patches A and B should be considered significant. The smaller polygons (C-E) are NOT significant primarily because they are less than 4 ha.

Conclusion: Polygons A & B are considered significant woodlands present within the study area and will be discussed in an Environmental Impact Study Report (EIS).

Table 3 Summary of Woodland Evaluation

Patch	Woodland Size (min. size requirement 20 ha)	Ecological Functions	Uncommon Characteristics
A (108.5)	Yes	Meets 3 (woodland interior, water protection, woodland diversity)	No
B (6.6)	No	Meets 2 (water protection, woodland diversity)	No
C (0.9)	No	No	No
D (1.2)	No	No	No
E (1.9)	No	No	No

4.3 Valleylands

The confirmation/documentation of valleylands was completed by Michelle Lavictoire during the June, July and August visits. The O. Reg 359/09 defines valleylands as:

> *"a natural area:*
> *a) that is south and east of the Canadian Shield as shown in Figure 1 in the Provincial Policy Statement issued under section 3 of the Planning Act and approved by the Lieutenant Governor in Council by Order in Council No. 140/2005, and*
> *b) that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year"*

The evaluation of the significance of the valleylands found within the study area was completed using the criteria outlined in the NHAG and is summarized in Table 4. The NHAG contains three criteria for the evaluation of valleylands:

1. Landform-related functions and attributes
2. Ecological features
3. Restored ecological functions

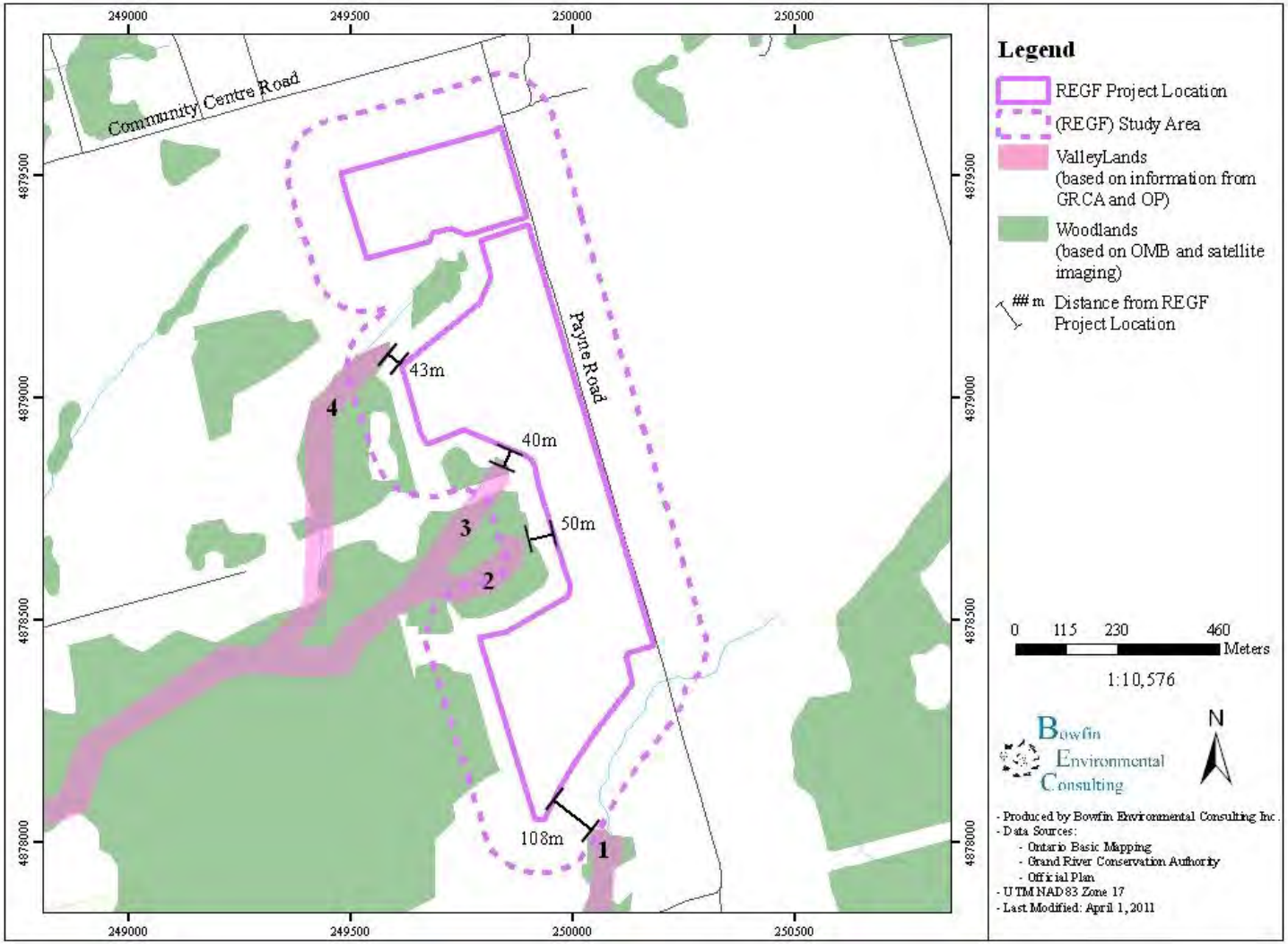
During the site investigations, four areas were confirmed as valleylands, numbered 1-4 (Figure 6). Valleylands 2, 3 and 4 demonstrated active or historical erosion, contained primarily native vegetation from top of bank to top of bank, and contained one or more seeps. They also likely form part of a wildlife movement corridor. Valleyland 1 consisted of an isolated 200 m long section of valley, located on the southern edge of the project area. Row cropping to the edge of the banks occurred upstream and downstream from this isolated segment.

Conclusion: Valleyland 1 is not being brought forward due to its isolation and heavy agricultural impacts. Valleylands 2-4 will be brought forward to the EIS report.

Table 4 Summary of Evaluation of Valleylands (using NHAG)

Valleyland	Function	Landform-Related Functions and Attributes	Ecological Features	Restored Ecological Functions
2	• short-term storage for storm and melt waters • sediment transport • contain small seepage area • provides wildlife movement corridor	Surface Water Functions - Low • shifting patters of erosion and deposition observed in the form of exposed soils. • no associated wetlands • channel contained an average of 1 cm (range 0-3 cm) during July 8th 2010 visit. Water present was the result of groundwater seep.	Degree of Naturalness – Moderate • the valleyland itself was well vegetated with native species • riparian vegetation width on each side of surface water feature <30 m Linkage Functions – High • valleyland width is >100 m (valleys of #2 and 3 are combine) • well connected to woodlands to the west	• no restoration projects are underway or planned
3		Surface Water Functions - Low • shifting patters of erosion and deposition observed in the form of exposed soils. • no associated wetlands • channel contained an average of 1 cm (range 1-3 cm) during July 8th 2010 visit. Water present was the result of groundwater seep.	Degree of Naturalness – Moderate • the valleyland itself was well vegetated with native species • riparian vegetation with is <30 m on each side of surface water feature Linkage Functions – High • valleyland width is > 100 m (valleys of 2 & 3 are combined) • well connected to woodlands to the west	
4		Surface Water Function - Low • no exposed soils were associated with this valleyland • the valley slopes and bottom were fully vegetated • channel contained little water <1cm. Water present was the result of the groundwater seep.	Degree of Naturalness – Low-Moderate • within the forested section the valleyland was well vegetated with native species, closer to the REGF project location, the valleyland was impacted by the berm, agricultural uses • riparian vegetation width is < 30m on either side of surface water feature Linkage Functions – Low- High • valleyland width is >100 m • well connected to woodlands to the west	

Figure 6 Location of Candidate Significant Valleylands



4.4 Wildlife Habitat

Wildlife habitat is defined in REA (O. Reg. 359/09) as:

> *"…where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory of non-migratory species."*

OMNR recommends that the significant wildlife habitat be evaluated based on information available in the SWHTG and the *Draft Significant Wildlife Habitat Ecoregion Criteria Schedules* (January 2009) both created by OMNR. The study area consisted primarily of row crops with small patches of deciduous forest and a larger woodland patch consisting of both coniferous and deciduous communities. A pipeline passes through the middle of the study area, fragmenting the habitat. Notable features encountered during the site investigations were: the valleys and seeps that form part of the headwaters of Brook Creek. A summary of the habitat types discussed in the SWHTG guides and their presence/absence from the subject lands (REGF lands) and the adjacent lands (120 m from subject lands) is provided in the table below.

Conclusion: Based on the available habitat and guidelines regarding species specific requirements (Appendices G and Q of SWHTG and *Draft Significant Wildlife Habitat Ecoregion Criteria Schedules* (January 2009)) the significant wildlife habitat that will be brought forward to the EIS report are: white-tail deer wintering habitat, wild turkey winter range, foraging areas with abundant mast, amphibian breeding habitat, seeps and springs, and wildlife movement corridor.

Table 5 Potential for the Presence/Absence of Significant Wildlife Habitat

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
Seasonal Concentrations of Animals				
White-tailed deer wintering habitats		✓	While the entire study area is located within a white-tailed deer overwintering habitat based on mapping obtained from LIO (stratum 2), the majority of the site includes deciduous forests and row crops (Figure 4). Potential deer overwintering habitat is present outside of the REGF project location within polygon 6 which consists of a coniferous plantation. However based on the *Significant Wildlife Habitat Technical Guide* (2009) Stratum 2 yards are not considered significant.	no
Moose late winter habitat			No significant numbers of moose are known to occur within this general area.	no
Colonial bird nesting sites			Site was visited four times before July 10th. Typically applies to bird species such as gulls, terns, cormorants. These species nest on islands, shoals, peninsulas and shorelines. None of these habitats are present. Other types of colonial nesters include swallows. The list of colonial species in Appendix G of the SWHTG was compared to the observed bird species list for the initial surveyed area. No colonial nesters other than common grackles were observed. No nests colonies of the grackles were observed.	no
Waterfowl habitat (sites known and mapped, sites not mapped and based on population status,			Tend to require large wetlands and water bodies with emergent vegetation and grassy/shrubby areas for nesting. The aquatic features and wetlands within this area are marginal in terms of habitat. No waterfowl or their nests were observed within the	no

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
sites not mapped and based on landform type)			study area. Also use cultural meadows and thickets during the spring which are flooded from the spring melt. Topography of the sites does not lend itself to flooding. No large flooding of the fields were observed.	
Waterfowl stopover and staging areas				
Waterfowl nesting				
Shorebird migratory stopover area			No shorebirds were observed within the study area. The only aquatic habitat within the study area consisted of the intermittent stream in valleyland 4 (Figure 3) and the small wetland pond in polygon 3 (96 m^2). There shorelines within the study area provide little habitat to attract shorebirds. No mud flats or shorebirds were observed at this location.	no
Landbird migratory stopover area		✓	Study area is located just over 5 km of Lake Ontario and as such is not considered candidate habitat based on the *Draft Significant Wildlife Habitat Ecoregion Criteria Schedules* (January 2009).	no
Raptor winter feeding and roosting areas			The study area does not contain any large trees for roosting.	no
Turkey vulture summer roosting areas			No concentrations of turkey vulture were observed.	no
Reptile hibernacula and maternity sites	✓	✓	Rock piles and walls were observed within the study area. No snakes or their shedded skins were observed during any of the site visits. No snakes were	no

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
			observed on the roads within the general area. While no hibernaculas or maternity sites were observed, the documentation of use is notoriously difficult and as such the potential remains possible. It has been noted that snakes can utilize a wide variety of habitats as hibernation or maternity sites. These habitats range from rooting logs, sand piles, compost, boards, old buildings, foundations and rock walls (Cosewic 2002). Old rock walls and piles were observed within the windrows. These areas could potentially provide habitat for reptiles. The lack of observations of individuals indicates that there are no snake concentrations within the study area.	
Bats hibernacula sites			No caves were observed.	no
Bullfrog concentration areas			No bullfrogs were observed within the study area. The only aquatic habitat within the study area consisted of the intermittent stream in valleyland 4 (Figure 3) and the small wetland pond in polygon 3 (96 m^2). Despite frequent site visits between June and August and minnow trapping of the small wetland pond (which did not catch any tadpoles) no bullfrogs, eggs or tadpole were observed.	no
Migratory butterfly stopover areas		✓	Study area is located just over 5km of Lake Ontario and as such is not considered candidate habitat based on the *Draft Significant Wildlife Habitat Ecoregion Criteria Schedules* (January 2009)	no

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
Rare Vegetation Communities				
Alvars			These habitats were not observed during the site investigations.	no
Savannahs				
Rare forest types				
Talus slopes				
Rock barrens				
Sand barrens				
Tall-grass prairies				
Great lakes sand dunes			not applicable	
Specialized Wildlife Habitats				
Habitat for area-sensitive species		✓	The majority of the REGF project location is active row crops and is not considered SWH. No large tracks of grassland or shrub/early successional habitats are present. The average DBH within most of the polygons were between 15-30 cm. These are young forests that do not meet the minimum of 60 years old to be considered significant for forest area-sensitive species based on the *Draft Significant Wildlife Habitat Ecoregion Criteria Schedules* (January 2009) (age based on Swiecki and Bernhardt 2001). There were two smaller polygons (patch B (portion of 4a within the valleylands only); Patch E – polygon 8) that contained trees that were over 60 years old. These two pockets of mature forest do not provide 30 ha of mature habitat and have no interior habitat (total size of Patch B is 6.6 ha and of Patch E is 1.9 ha). Patch B showed signs of	no

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
			disturbance (an old abandoned dam structure was located within the valley).	
Forests providing a high diversity of habitats		✓	see above	no
Old-growth or mature forest stands			Woodlands were young to mature.	no
Foraging areas with abundant mast		✓	While there was no significant deer yards because of the stratum 2 designation, it is noted that both the beech forest and the corridors which facilitate movement between the low quality winter deer year and this forest will be protected. Polygon 8, while small (1.9 ha) provides a stand of almost pure beech.	**yes**
Amphibian woodland breeding ponds			Site was visited between June and July and no vernal pools were observed.	no
Amphibian breeding habitat (wetland)		✓	The one small wetland pond (96 m^2) is located in polygon 3. The site was visited several times between June and August. Lots of green frogs were observed within this pond and there was a presence of logs however, this constructed pond was not connected to other larger wetlands, and no other species were observed.	no
Turtle nesting and over-wintering areas		✓	The one small wetland pond (96 m^2) is located in polygon 3. The site was visited several times between June and August. No turtles or turtle nests were observed within the study area. This site did not provide sand and/or gravel suitable for nesting. This small, isolated, shallow (<75 cm max depth) man-made pond does not provide good overwinter or nesting habitat.	no

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
Specialized raptor nesting habitat			Site was visited multiple times. No raptors were observed and no raptor nests (abandoned or in use), white-washing were observed.	no
Moose calving areas			not applicable	no
Moose feeding areas				
Mineral licks				
Mink, otter, marten and fisher denning sites			No evidence of use observed (no individuals, tracks, feces, dens).	no
Cliffs			None observed.	no
Seeps and springs		✓	There were several groundwater upwellings observed, most were confined to the valleylands (Figure 6) and observations of the species such as wild turkey that are expected to utilize these habitats. The *Draft Significant Ecoregion Criteria Schedules* (January 2009) identifies those areas with more than 2 seeps/springs that are present during dry summers in areas that are mostly forested as being significant. All but the southern valley meet these requirements. There was also an isolated seep in the coniferous plantation (polygon 6).	**yes (those located in valleylands labeled as 2-4 on Figure 6 and those in polygon 6 on Figure 7)**
Habitats of Species of Conservation Concern (excluding habitat of provincially endangered and threatened species)				
Habitat of species of conservation concern		✓	Appendix B provides a list of potential species for the general area. No species of conservation concern were observed with the exception of the monarch. Furthermore the fauna species and many of the flora species in Appendix B require aquatic, wetland or prairie habitats which were not present. None of the	no
Habitat of species with a large percentage of their				

Feature	Potential Presence? Project Location	Potential Presence? Adjacent Lands	Comments	Confirmed as Significant (yes/no)
global range in Ontario			flora species were observed. No concentrations of monarchs were observed. In terms of significant wildlife habitat in Ontario, only large tracks of milkweed should be considered as significant. This was not present within the study area. This feature will not be brought forward.	
Wildlife Movement Corridors				
Wildlife movement corridors (deer)		✓	As discussed above low quality deer overwintering yards are present within the adjacent lands (polygon 6) and foraging areas with abundant masts (polygon 8). The valleylands located within the study area likely provide movement corridor for deer.	**yes (Valleylands 2-4)**

✓ Indicates presence or potential to occur

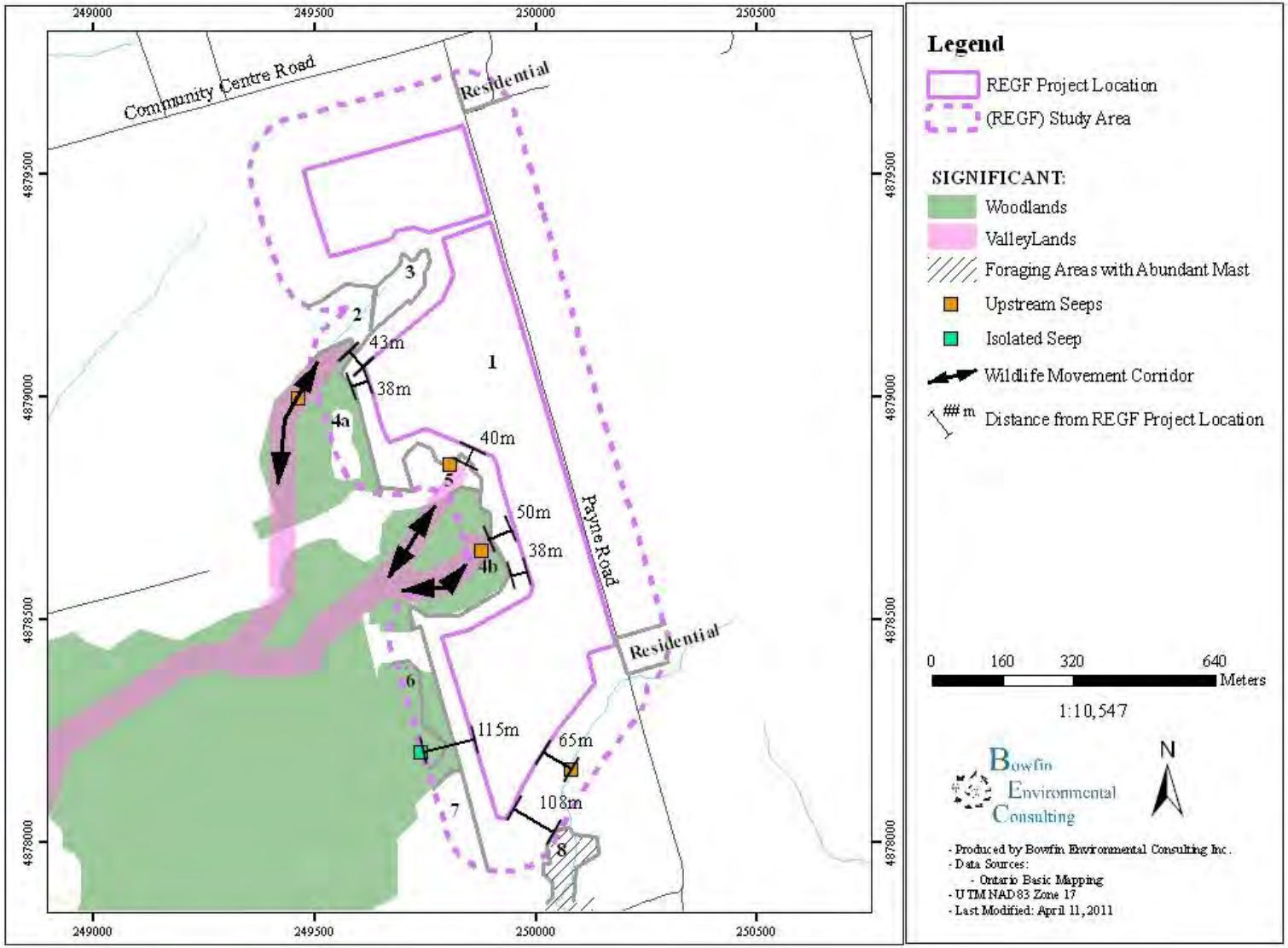
4.5 Summary of the Evaluation of Significance

Based on the accepted methods for determining significance of natural features (i.e. NHAG, SWTHG, NHRM, OWES), the natural features that are being brought forward as significant are: woodlands, valleylands and wildlife habitat (Table 6). These features require an Environmental Impact Study which is provided in a separate report.

Table 6 Summary of Significance of Natural Heritage Features Identified within the Study area and Setback Requirement

Natural Heritage Feature	Present in or within 120 m of Project Location?	Significant? (yes/no)	Min. Setback for the Natural Feature (yes = EIS not required no = project located within setback, EIS required)
Wetlands	Yes	No	n/a
Woodlands	Yes	Yes	No (120 m setback not met)
Valleylands - valleylands 2-4	Yes	Yes	No (120 m setback not met)
ANSIs	No	No	n/a
Wildlife Habitat - foraging areas with abundant mast - seeps/springs - wildlife movement corridor	Yes	Yes	No (120 m setback not met)

Figure 7 Location of Significant Natural Heritage Features



5.0 REFERENCES

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Appendix A – 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 (AIAI), 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, Butternut 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 WTTP 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 WWP.
- 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 Casselmen, 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 Valleye 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 elecrofishing 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 macroinvetebrate 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 7th International Symposium on Environmental Concerns in Right-of-Way Management.
- Created and conducted environmental education programs in French for children and the general public.