

**Initial Environmental Impact Study
Bark Lake Waste Disposal Site,
Township of Madawaska Valley**

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Initial Environmental Impact Study Bark Lake Waste Disposal Site, Township of Madawaska Valley Waste Management Strategic Plan

Introduction

This study was carried out to provide the Township of Madawaska Valley with initial biological information on the aquatic and terrestrial communities at the Bark Lake site in order to assist the municipality in the screening of ‘alternatives to’ and ‘alternative methods’ as established in the townships waste management terms of reference.

The first objective was to determine the significance of natural heritage features on the study area based on available information and on limited field studies carried out in October 2005.

One objective of the initial environmental impact study was to assess the needs for any further biological and ecological studies, to identify features and to possibly further assess the impact of any expanded landfill site at Bark Lake. It was not possible to carry out fieldwork at the appropriate times of the year to provide a completed inventory of significant features such as breeding birds or plant species present.

The presence of significant aquatic or terrestrial features were assessed by applying the Natural Heritage policies (Section 2.1) contained in the Provincial Policy Statement (MMAH 2005) and its guidelines under that policy statement for natural heritage features. Natural heritage features such as wetlands, threatened and endangered species habitat and fish habitat are afforded protection under the Provincial Policy Statement (PPS) (2005) that governs development under the Planning Act. Following the principals of the Natural Heritage policies allowed the study to proceed under a recognized framework used across Ontario in municipal planning to assess aquatic and terrestrial communities and significant features of those communities.

Finally an objective was to determine the impact of the proposed landfill site expansion to any identified significant feature.

Description of the Site

The Bark Lake site is located on Hwy 60 12 km west of Barry’s Bay in lots 127 and 128, Range B in the geographic Township of Sherwood in the amalgamated Township of Madawaska Valley. The site is currently 1.5 hectares in size but could be expanded with the purchase of property if selected to bring the area up to 19.7 ha.

The site is designated appropriately in the Renfrew County Official Plan and appropriately zoned in the Sherwood, Jones and Burns zoning By-law.

The study area was defined as the potential expanded landfill site (2.81 ha) plus the adjacent areas within 120 metres of the landfill site. The distance of 120 metres is a standard adjacent areas distance used in most natural heritage impact studies in Ontario.

During the study information was obtained from adjacent to the defined study area where it was considered that that information provided insight into conditions on the study area.

The landfill site falls in Ecoregion 5E described by Hill (1959) as a region dominated by Sugar Maple, Hemlock and White Pines on fresh sites. With White Spruce and Balsam Fir on fresh clays in cooler valleys and with mixed hardwoods on higher altitudes. Ecoregion 5E is a region of low land areas of water laid materials broken by bedrock outcrops and upland areas of rolling bedrock.

The geology of the area is Felsic Igneous Rocks (Thurston et al. 1991). The area is in the physiographic region of the Algonquin Highlands (Chapman and Putnam 1984) and in an area of shallow till and rock.

The soils of the area are part of the Monteagle soil complex of sandy loam, rock outcrop interspersed with muck and peat soils in the numerous undrained depressions (Gillespie et al. 1964). The soil parent material is gravely sandy loam glacial till derived from local granitic rock.

Adjacent Features

Bell's Bay Provincial Park is a 404 ha natural environment park (Ontario Parks 1998) located to the west of the site and west of Hwy 60. The park contains two candidate Life Science ANSIs (Areas of Natural Scientific Interest).

The two candidate Life Science ANSIs are the Cub Bay Cliff and Bell Bay Provincial Park Candidate Nature Reserve.

The Cub Bay Cliff is located on the west side of Bell's Bay 6.5 km south west of the landfill site. The Life Science ANSI features a cliff face containing arctic disjunct species. The cliff faces northwest with a sheer vertical drop of up to 250 feet. Significant plants with arctic affinities reported in the ANSI are Encrusted Saxifrage (S4), Three-toothed Cinquefoil (S5), Fragrant Cliff Fern (S4S5) and a grass Narrow False Oats (*Trisetum spicatum*) (S4). These plants are provincially common and secure but at their southern extreme located in a unique isolated habitat. Other species listed for Bells Bay Park that have provincial significance are described later.

The S ranks are provincial ranks used by the NHIC to set protection priorities for rare species and natural communities found in Ontario. The rankings proceed from S1 Extremely rare, S2 Very rare, S3 Rare to uncommon, S4 Common and S5 Very common.

The Bells Bay Provincial Park Candidate Nature Reserve is dominated by young to medium shade intolerant upland mixed deciduous forest (NHIC 2005) on a rugged rolling landscape consisting of ground moraine.

Provincial Policy Statement

The natural features of this project were reviewed under the guidance of the Provincial Policy Statement (PPS) specifically the Natural Heritage policies of section 2.1.

Development and site alteration shall not be permitted in:

- *Significant habitat of endangered species and threatened species
- *Significant wetlands in Ecoregions 5E, 6E and 7E; and
- Significant coastal wetlands

Development and site alteration shall be permitted in:

Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E

*Significant woodlands south and east of the Canadian Shield

*Significant valleylands south and east of the Canadian Shield

*Significant wildlife habitat

*Significant areas of natural and scientific interest (ANSI)

Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Development and site alteration shall not be permitted in:

* Fish habitat except in accordance with provincial and federal requirements.

This study will review the 7 natural heritage features marked with an asterisk. The site is not a Coastal site (Great Lakes shorelines) therefore Coastal Wetlands can be dismissed at this point and the two wetlands located on the study area are in ecoregion 5E.

Table 1

Dates of Field Investigation

Date	Survey focus
Oct 19, 2005	Fish habitat and plant species inventory
Oct 29, 2005	Fish Habitat, Wetland habitat
Oct 30, 2005	Fish Habitat and vegetation communities

Vegetation Communities

Vegetation communities form the foundation of an environmental assessment and permits insight into ecological processes and linkages operating within the study area.

Vegetation communities on the study area both wetland and upland were categorized using the methodology of the Ecological Land Classification (ELC) of Southern Ontario (Lee et al 1998). The ELC is intended specifically for ecoregions 6E and 7E while the landfill site is in the southern portion of ecoregion 5E to the north of ecoregion 6E. A decision was made to utilize the ELC in order to provide a methodology for describing non-forested habitats, which the Field Guide to Forest Ecosystems of Central Ontario (Chambers et al.1997) does not. Therefore the ELC was used to describe vegetation types in the vicinity of the landfill site. Where the community was forested the community was also described according to the Field Guide to Forest Ecosystems of Central Ontario (Chambers et al 1997) as well as the ELC (Lee et al. 1998).

Wetland Communities

Com. 1 Alder Organic Thicket Swamp SWT3-1

This community is located next to Hwy 60. This is a small and variable community dominated by Speckled Alder with other shrubs consisting of Meadowsweet, Sweet Gale, Leather Leaf with a heavy growth of Canada Bluejoint with areas of Wire Sedge. The soils are water saturated mesic organic.

Com. 2 Tamarack Black Spruce Organic Coniferous Swamp Type SWC4-1
(Black Spruce-Tamarack Ecosite ES31 Chambers et al 1997)

The community is located immediately to the east of the alder swamp (Com. 1). This community is dominated by Black Spruce with Tamarack as second species and Balsam Fir as a third component. The community has an understory of patches of Speckled Alder with a few Wild Raisin shrubs with a ground cover component of Goldthread, Canada Bluejoint, Dwarf Raspberry, Bunchberry, with Sphagnum Moss. The soil was mesic organic and was water saturated.

Com. 3 White Cedar Organic Coniferous Swamp Type SWC3-2
(White Cedar-other Conifer Ecosite ES33 Chamber et al 1997)

The community is located to the north of community 2. This community is a solid White Cedar swamp with water saturated mesic organic soils with little undergrowth with a groundcover layer of Goldthread, Creeping Snowberry and Bunchberry

Upland Communities

Com. 4 Dry-Moist Old Field Meadow Type CUM1-1

The licenced footprint area and adjacent roads and cleared areas consists of areas that are unvegetated with the remainder growing in with grasses such as Kentucky Bluegrass and Timothy and forbes such as Canada Goldenrod and Evening Primrose. A landfill site is a source of a large variety of alien plant species and the site has many alien species including Ragweed, Common Plantain, Common Mullin and Horse Radish.

Com. 5 Red Pine Coniferous Plantation Type CUP3-1

A young Red Pine plantation about 6 metres tall with little undergrowth but with Beaked Hazel in some locations and Sweet Fern in other locations.

The Red Pine plantation has been planted along the edge of the highway and shields the landfill site from the highway.

Com. 6 Dry Acidic Open Rock Barren RBO3-1

The rock barren habitat is located on the high hill to the east of the landfill site. The rock barren starts near the bottom of the hill and runs to the top of the 60 metre hill.

This community is an area of largely open rock dominated by Hair Grass. With a shrub component of Service Berry (*Amelanchier spp.*), Red osier Dogwood, Staghorn Sumac but at less than 25% cover. Wild Strawberry and Sweet Fern are two abundant ground cover species.

Com. 7 Fresh Moist Poplar Mixed Forest Type FOM8-1

(Poplar –White Birch-White Spruce-Balsam Fir ES18.1 Chambers et al. 1997)

This community consists of Large-tooth Aspen and White Birch with a conifer component of White Spruce and Balsam Fir with an under story of Balsam Fir and ground cover of Large-leaf Aster and Blueberry. This is a small community on the edge of the wetland.

Com. 8 Dry fresh Poplar Deciduous Forest Type FOD3-1

(Poplar-White Birch Chambers ES17.1 1997)

Large-tooth Aspen dominates this community with a much lower occurrence of White Birch and Red Oak. A shrub layer was present with a large amount of Beaked Hazel, Fly Honeysuckle. The ground cover consists of Large-leaf Aster, Bracken Fern and Winter Green.

All of the vegetation types wetland and upland are considered common and secure within the province (NHIC Community ratings).

Significant Wetlands

For a wetland to be provincially significant it must be identified as provincially significant by the MNR using their evaluation methods. It is possible for the evaluation to be carried out by qualified personnel with the completed evaluation approved by the MNR. The wetland has not been evaluated so it is not possible to know if it is Provincially significant or not. Whether provincially significant or not wetlands are areas of biological diversity and carry out many ecological functions.

The wetland adjacent to the landfill site has not been evaluated. The wetland comes nearly to the edge of the treed buffer on site and within 45 metres of the existing limit of waste.

The wetland includes the open water marsh on the west side of Hwy 60. The open water marsh connects with Bark Lake. The wetland contains important fish habitat, a variety of wetland types, site types and possibly important waterfowl nesting habitat and recreational values that could bring the wetland to provincial status if evaluated.

Significant Woodlands

Significant Woodlands in the Provincial Policy Statement (2005) refers to Significant Woodlands south and east of the Canadian Shield. The significance of the woodlands on the study area were assessed for characteristics that could be interpreted as significant.

The study area is located in a county that has a high level of forested land therefore forest habitat by itself would not be reason for significance. The forest was not found to provide an important linkage. The forest did not appear to be old growth forest an old growth forest would tend to show an abundance of down timber and standing dead trees the upland forests on the site were clearly early succession forests of intolerant hardwoods that appeared to be in a vigorous growth stage the wetland forests could be much older but did not appear to be in an old growth stage. The woodlands did not consist of particularly valuable stands of timber or rare species. The forest vegetation types were rated as most common (NHIC 2005) on a provincial basis.

The forests at the site would not be considered as significant woodlands.

Significant Valleylands

Significant Valleylands in the Provincial Policy Statement (2005) refers to Significant Valleylands south and east of the Canadian Shield. The significance of the Valleylands on site were assessed for characteristics that could be interpreted as significant

recognizing that the Provincial Policy Statement does not consider Valleylands on the Canadian Shield.

“ Valleylands means a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year” (definitions PPS).

A small stream is located to the north of the site and the stream and associated lands drain into nearby Bark Lake and this could be defined as a valleyland. However one criteria for significance is prominence as a distinctive landform and on this criteria it would generally be conceded that the study area is not part of a valleyland that would be considered a distinctive landform.

ANSIs - Areas of Natural and Scientific Interest

Areas of Natural and Scientific Interest are areas identified by the Ministry of Natural Resources as provincially significant using established evaluation criteria. The Natural Heritage Information Centre database website (NHIC 2005) indicated there were no ANSIs at this location either life science or earth science.

Two regional or candidate life science ANSIs occur south of the site within the Bells Bay Provincial Park. These sites provide information on natural features in the general area.

The Cub Bay Cliff ANSI is a 190 ha site located 6.5 km south of the study site on the shores of Bell Bay of Bark Lake. The most significant feature of this regional ANSI is the high cliff system that contains arctic disjuncts such as Encrusted Saxifrage (*Saxifraga aizoon*) (Simpson 1976) and represents a remnant of the flora from the last glaciation.

The other regional ANSI is the Bell Bay Provincial Park Candidate Nature Reserve a 260 ha site also within the Bells Bay Provincial Park. The site is a representative area of Bells Bay Provincial Park (Brunton 1991) consisting of mainly intolerant upland mixed and deciduous forest.

The Bells Bay Provincial Park (Ontario Parks 1998) is a natural environment park of 404 ha. The park contains no existing facilities and management is directed primarily to protection. The parks northern boundary is located just to the west of the landfill site.

No ANSIs are located on the landfill site or within the study area.

Fish Habitat

Bark Lake is located to the south of the study area. Bark Lake is a large lake with a rich fish community. Species identified in the lake by the Pembroke MNR (Tania Baker pers comm.) were Lake Trout, Lake Whitefish, Rainbow Smelt, Smallmouth Bass, Longnose Sucker, White Sucker, Cisco, Burbot, Yellow Perch, Brown Bullhead, Round Whitefish, Pumpkinseed, Creek Chub, Northern Redbelly Dace, Rock Bass, Northern Pike and Walleye other small species presumably exist but were not sampled.

Bark Lake is considered as moderately sensitive to nutrient loading. MOE is presently working on the analysis of new water quality data (Tania Baker pers comm.).

There are two unnamed tributaries to the west of the landfill site. The larger western tributary flows for a distance along the northeast side of Hwy 60 before joining with the second smaller tributary and crossing Hwy 60. The field fish study was focused primarily on the closer smaller tributary because of its proximity to the site and because the larger tributary is outside the study area.

The two tributaries converge just before flowing under Hwy 60 through a 2.4m by 1.5m open bottom concrete box culvert. The stream then flows a short distance before entering the open Peters Marsh at approximately the edge of the Hwy 60 right-of-way. Peters Marsh is directly connected to Bark Lake and is a shallow open water marsh with thick submergent vegetation that would provide habitat to a variety of the warmer water species present in Bark Lake.

There is free access for Bark Lake spawning fish into Peters Marsh such as Northern Pike and Yellow Perch and then into the two unnamed tributaries. The marsh could provide spawning habitat for bass species and pike and the tributaries potential spawning habitat for species such as Walleye, Lake Whitefish, Smelt and Yellow Perch. This would occur in the short stretch of stream from the marsh to the highway culvert and upstream for a short distance. The habitat for gravel or hard substrate spawners only extends a few metres up the eastern tributary and somewhat further in the west tributary.

Bark Lake undergoes a large drawdown each fall as part of a Hydro One reservoir control system. At the time of the field visits it appeared that the drawdown had already occurred and this lowered the water in the tributaries in the vicinity of the hwy up to the vicinity of SW3 (see Figure 1). The rise and fall of Bark Lake besides changing the physical amount of fish habitat in the lower tributaries could have an impact on the hydrostatic pressures changing the locations or quantities of stream upwellings.

The tributaries are small. The water flow was measured Oct 30, 2005 as 0.016 m³/second at the HWY 60 culvert. The flow was measured at the HWY 60 Culvert by SGS on Oct 26, 2005 as 0.02 m³/second. The flow at the downstream end of the east tributary was measured as being in the order of 0.0017 m³/second or 1.7 litres per second or one tenth of the water flowing through the hwy culvert. SGS indicated no flow on the smaller tributary on Oct 26 2005 nor was there any measurable flow in Aug 8 2005 the small tributary did have a flow of 0.093 m³/second (93l/sec) on May 9, 2005.

Azimuth (2001) assessed the fish habitat prior to improvement of Hwy 60 for 20 m upstream and 100 m downstream for all water crossings including this one.

Habitat Description of East Tributary

East Tributary Section 1 (Refer to Fig 1)

This short section of the tributary extends from the confluence with the larger tributary upstream as far as the mineral substrate occurs a distance of 28 metres.

The substrate in this section was mainly sand and gravel with some silt. The water velocity was fairly high with a faster section measured as 19 cm/second. The stream width averaged about 2 m. and depth averaged 3 cm. Aquatic vegetation consisted of mainly the vegetative form of an aquatic grass probably *Glyceria borealis*

This section of stream was located in the Alder Organic Thicket Swamp habitat.

East Tributary Section 2

This section of stream extends upstream from the end of the mineral substrate and has a length of about 113 metres.

The whole stream channel in this section was covered with Water Moss (*Fontinalis spp*). In places within the stream channel there were pools separated by sections choked by water moss and silt. The velocity was negligible, the width averaged 1.6 m and the depth of 0 to 27 cm. Bank cover was primarily a shrub component of Sweet Gale, Leatherleaf and Narrow-leaved Meadowsweet. Canada Bluejoint also provided bank cover in this section of the stream.

This section of stream was located in the Alder Organic Thicket Swamp habitat.

East Tributary Section 3

The stream section occurs above the second section and has a length of 160 metres before the stream ends as evidenced by the loss of any channel or surface water. The stream disappeared within the cedar coniferous swamp. The location where the stream ends is at the very top of fig 1. The first two thirds of this section of the stream is located in Tamarack Black Spruce Organic Coniferous Swamp Type while the uppermost third is located in the White Cedar Organic Coniferous Swamp Type.

The stream throughout this section has a substrate of woody detritus in places covered with alder leaves. There is very little aquatic vegetation consisting of mostly Narrow-leaved Burreed (*Sparganium angustifolium*) but not in significant amounts. The water velocity is negligible, the mean width is 1.3 m with a mean depth of 20 cm. There is a considerable amount of woody debris in the stream including stumps providing excellent fish habitat cover. There are also obstructions in the stream of detritus, silt and woody debris.

Temperatures in the upper portion of the eastern tributary didn't go above 20 °C (SGS SW2) in August while at the lower end of the tributary it reached an August temperature of 24.5 °C. Oxygen levels were low in May with levels below 3 mg/l for all three surface water stations. There were low oxygen levels again in October with oxygen levels just above 3mg/l however there were good oxygen levels in August of over 7mg/l.

Fish Sampling

Fish sampling was undertaken on the watercourse to determine the nature of the fish species present. A fish collector's permit was first obtained from the MNR Pembroke District. Minnow traps were used to sample the species of fish present in the stream.

Table 2 provides the results of minnow trapping that took place on Oct 19 and 30 2005.

Table 2

Fish Capture Results

Location	Date	Habitat	Time	Fish Caught
F1	Oct 19	Hwy 60 culvert Gravel, sand	3 hrs	Nothing caught
F2	Oct 19	Water moss	4 hrs	3 BT* 19cm (believe sexually mature), 13, 13 cm (sexually ?)
F3	Oct 19	Water moss	4 hrs	Nothing caught
F1	Oct 30	Hwy 60 culvert Gravel, sand	12 hrs	Nothing caught
F4	Oct 30	Water moss	12 hrs	2 BT 12 cm , 15 cm both sexually mature
F5	Oct 30	Woody/leafy detritus	12 hrs	2 BT 10, 9 cm both sexually immature 5 other larger BT seen in pool
F6	Oct 30	Leafy detritus	12 hrs	13 BT 13.5, 13, 14, 15.5 12, 15, 11.5, 11.5, 13.5, 11.5 and 12 cm all sexually mature and 9.0, 11.0 non-breeding
F7	Oct 30	Main tributary. Gravel and sand	12 hrs	Nothing caught

* BT Brook Trout

In addition to the Brook Trout caught by minnow traps a dip net was used on Oct 19th to capture 3 Blacknose Dace, a Central Mudminnow and a young of the year Yellow Perch. The dace and mudminnow were caught in the Water Moss below trap station F2. The Yellow Perch caught near the confluence of the east and west tributaries would be from spawning parents out of Peters Marsh or Bark Lake.

All fish were released except for one Blacknose Dace kept to confirm identification.

The Brook Trout caught on October 30th were mostly sexually mature and appeared to be spawned out with only those fish 11 cm and smaller being sexually immature. All but one of the sexually mature fish was male. The larger Brook Trout caught on Oct 19 was considered ripe and unspent. A possible spawning redd was seen in the lower section near trap 2 but no other possible spawning redds were detected. It was considered that the redds were present but could not be detected on the organic detritus or under the Water Moss.

August stream temperatures determined by SGS during a period of hot August weather would be considered marginal quality for Brook Trout. The low dissolved oxygen levels recorded in May and again in October would be considered limiting. During periods of oxygen stress Brook Trout are probably seeking areas of lower temperatures with higher

oxygen levels. The Brook Trout may be finding these conditions in cool local upwellings of groundwater. Upwelling areas of groundwater would be essential (Scott and Crossman 1998) for spawning Brook Trout within the tributary.

In conclusion it appears that the east tributary is a productive Brook Trout habitat. The channel is continuous but appears to be blocked by vegetation, woody debris and silt in many places that may make fish movement difficult. The stream is very small with periods of very low or no water flow during the past year. The low flow is probably responsible for the observed low dissolved oxygen levels. Low oxygen levels were present throughout the stream and therefore not contributable to the present landfill site. Groundwater upwellings are probably a critical aspect for the Brook Trout survival in this tributary.

Threatened and Endangered Species Habitat

The Life Science Inventory of Bells Bay Park (Simpson 1976) was reviewed for threatened and endangered species that may have been identified in this inventory but no threatened or endangered species were identified.

Daryl Coulson (pers comm.) Ecologist for the MNR Pembroke District was not aware of any significant species in the immediate vicinity of the landfill site but provided a list of significant, threatened and endangered species that could possibly occur in the area.

These were:

American Ginseng Endangered
Red-shouldered Hawk Species of Special Concern
Wood Turtle Endangered
Blanding's Turtle Threatened
Northern Ribbon Snake Species of Special Concern
Bald Eagle Endangered.

The Natural Heritage Information Centre (website 2005) has no records for any of these species in the immediate vicinity of the study area.

American Ginseng is at the northern edge of its range in Ontario and is generally found in fresh Sugar Maple sites. There are no Sugar Maple sites in the study area. American Ginseng could occur in other upland habitats found on site. No Ginseng was seen during field work.

Two Bald Eagles visited the landfill site in the spring 2003 (Rane Zelney site manager pers com) scavenging food at the site. Any nesting in the area would probably be known to the MNR. No large stick nests were seen in the study area during this study and large eagle nests would be easy to spot.

The two turtle species could occur in the area. Peters Marsh could be habitat for the Blandings Turtle (threatened). Natural turtle nesting sites, as opposed to nesting sites along road edges, are difficult to identify (MNR 2000). Nesting sites along roadways suffer high mortality and are therefore not preferred nesting sites. Landfill sites with high numbers of predators particularly Raccoons and Skunks and with movement of fill material should not be considered preferred nesting sites.

The Wood Turtle is the most terrestrial of Ontario's turtles and difficult to survey for. No evidence of Wood Turtles was seen in this survey but the habitat did appear to be suitable.

To cast a larger net for Threatened and Endangered species the NHIC database (NHIC 2005) was queried for significant species identified and reported within Renfrew County.

The species identified in the NHIC database (Appendix 1) as occurring in Renfrew County included 3 Endangered species and 4 Threatened species. The Endangered species were 3 bird species: Bald Eagles, Kirtland Warblers and Loggerhead Shrikes. Kirtland Warblers and Loggerhead Shrikes have specific habitat requirements not found within the study area (Cadman et al. 1987).

The 4 Threatened species includes Least Bittern, Redside Dace, Blandings Turtle and Spiny Softshell Turtle. The Least Bittern is more common off the shield in large marshes (Cadman et al. 1987) but could occur in the Peters Marsh area west of Hwy 60. The current Ontario Breeding Bird Atlas (OBBA 2005) data was accessed to determine whether any threatened or endangered species of bird were seen in the 10 X 10 km square during the atlassing period from 2000 to 2005. Because the study area overlaps the boundary of two of these squares both 18TR74 and 18TR84 were searched with no threatened or endangered species seen in these squares however the census results will be further commented on in regards to significant species under significant wildlife habitat.

The Redside Dace has a very limited distribution in Canada. In Ontario it is reported as being limited to clear streams flowing into western Lake Ontario (Scott and Crossman 1998). The observation of Redside Dace for Renfrew County (in the Ottawa River or its vicinity) is clearly outside of this range and appears to be an outlier on the NHIC range map for this species. The Spiny Softshell Turtle has a limited distribution in Ontario being restricted to Lake Erie, the Thames River in the southwest and the Ottawa River in the East (MacCulloch 2002, NHIC website 2005).

Significant Wildlife Habitat

Significant wildlife habitat is not identified by the MNR but is to be identified by the municipality this has not been done by the municipality at present. Significant wildlife habitat includes flora and fauna as well as significant habitat communities such as rare prairie or alvar habitats. The MNR has provided Ontario's municipalities guidance in identifying significant wildlife habitat in several documents (MNR 1999, 2000).

Significant wildlife guidelines are wide ranging providing diverse options for municipalities wishing to protect this feature. The MNR's significant wildlife habitat is described in the Natural Heritage Reference Manual (MNR 1999) as a general guideline under four categories:

- 1) seasonal concentrations of animals
- 2) rare vegetation communities or specialized habitats for wildlife
- 3) habitats of species of conservation concern and
- 4) wildlife movement corridors

These 4 categories will be investigated in how they could be assessed for significance in the municipality of the Madawaska Highlands

Seasonal concentrations of animals

At certain times of the year some species of wildlife are highly concentrated within relatively small areas. Examples of seasonal concentrations provided by the MNR (MNR 2000) are; bird breeding colonies, hibernation sites for bats or snakes, migration stopover spots for both birds and butterflies and winter deer yards.

Winter deer yards are one type of seasonal concentration that has importance in central Ontario (MNR 2000) that is most often considered. MNR districts generally have mapping or knowledge of traditional winter deer yards. The Pembroke District has not identified the area as a winter deer yard (Tania Baker pers. comm.). Field investigations indicated that the habitat within the study area was not preferred winter deer habitat and no intensive winter browsing was noted.

No other information or field sighting suggested a significant seasonal concentration for other wildlife species or group.

Rare vegetation communities or specialized habitats for wildlife

Rare vegetation communities could be prairie or savannah habitat or alvar or wetland community type.

The ELC vegetation types within the study area although not strictly applicable to ecoregion 5E all appeared to be common vegetation types as referenced in the Natural Heritage Information Centre (NHIC 2005). The cliff faces with the arctic disjunct species described by Simpson (1976) did not occur within the study area but some distance away on Bark Lake.

Habitats of species of conservation concern

Species of conservation concern can include provincially rare species (i.e. S1, S2 and S3 species as well as species of Special Concern (designated by the province), species that are rare within the planning area, species that are considered important to the municipality, species that are subject to recovery programs (e.g. Black Duck) species whose populations are experiencing substantial declines in Ontario. Significant species that Daryl Coulson (pers comm.) identified included the Northern Ribbon Snake, and the Red-shouldered Hawk two species of Special Concern.

The Northern Ribbon Snake occur on forest edges and in meadows and often on the edges of marshes, ponds, rivers and lakes (MacCulloch 2002). The Northern Ribbon Snake is at the northern edge of its Ontario range but could be using the wetland habitat within the study area.

The Red-shouldered Hawk often utilizes the edge of wetlands (Cadman et al. 1987). Stick nests of nesting hawk species including the Red-shouldered Hawk were searched for but none were seen during the study.

Simpson (1976) sighted the Milk Snake (S2S3) a species of Special Concern in Bells Bay Provincial Park. This old sighting indicates the possible occurrence of the Milk Snake.

Simpson (1976) noted only common mammals within Bells Bay Provincial Park. None of the bird species identified by Simpson (1976) were provincially rare however she

observed the Horned Lark a species considered regionally rare in Ecoregion 5E. Regional bird lists were determined by the NHIC assessment of the first breeding bird atlas (Cadman et al 1987) data on an ecoregion basis.

The Life Science inventory of Bells Park (Simpson 1976) identified species of vascular plants in the nearby provincial park. Simpson (1976) identified 306 species of plants all of these were not assessed for current status according to present day NHIC rankings because of the amount of time that would be required to update many of the taxonomic classifications. However a sub list of 16 species identified by Simpson as “uncommon, rare, locally rare” etc. was compiled (Appendix 2) and assessed for current status (NHIC 2005). There were 3 species in this list that would be considered provincially significant. The Large Water-starwort an S2 species was found in community 16 b an aquatic community in deeper water.

Two rare hybrid ferns *Dropteris X boottii* and *Dryopteris X triploidea* were located in wetland habitats within the park.

Another hybrid fern species *Dryopteris x uliginosa* was not found by Simpson (1976) but Simpson thought it could possibly occur given the occurrence of Spinulose Woodfern and Crested Woodfern in the area. The two fern species *Dropteris X boottii* *Dryopteris x uliginosa* are provincially rare or questionably rare.

The 2 identified rare fern hybrids and the possible occurrence of a third rare fern hybrid may be found in the wetland habitats next to the landfill site. The aquatic Water Starwort (*Callitriche heterophylla*) could occur in the open water of Peters Marsh south of Hwy 60 and outside the specific study area.

The NHIC database was queried to provide a list of provincially significant species and species of Special Concern identified within Renfrew County. There were 7 species of birds, 3 fish species, 3 mammals, 2 reptiles, 21 insects and 25 plants (Appendix 1).

Two of these 3 mammal species would be difficult to detect. The two bats are difficult to detect and identify. The southern Flying Squirrel is most commonly found in Carolinian Forests but does occur as far north as Deep River and Parry Sound (Dobbyn 1994).

There were 2 species of provincially significant fish identified as occurring in the county. The River Redhorse has a very limited distribution and occurs in the St. Lawrence River and the Ottawa River. Similarly the Lake Sturgeon is limited to large lakes and rivers (Scott and Crossman 1998).

The current Ontario Breeding Bird Atlas (OBBA 2005) data was accessed to determine what provincially significant species of birds were seen in the 10 X10 km square during the atlassing period from 2000 to 2005. Atlas census squares are large covering an area of 100 km² that would involve a variety of habitats.

The Bark Lake site is on the edge of two squares 18TR74 and 18TR84 in the first square there were 43 possible, 25 probable and 23 confirmed breeding species while in 18TR84 there were 31 possible, 37 probable and 28 confirmed breeding species. In the 2 squares combined there was only one provincially significant species identified as a possible breeder this was the Red-shouldered Hawk listed by the province as a Species Special Concern. In addition there was one regionally significant species the Blue-winged Warbler a possible breeder.

Wildlife movement corridors

Wildlife movement corridors are elongated naturally vegetated parts of the landscape used by animals to move from one habitat to another (MNR 2000). The area is a largely naturally vegetated landscape and has not been reduced to vegetated riparian zones or narrow natural vegetation connections that are often considered as wildlife movement corridors.

The stream and wetlands could provide an aquatic corridor for amphibians moving to an aquatic environment to breed and for turtles moving to a terrestrial environment to breed as well as spawning fish. The aquatic corridor would probably not merit being considered as significant on a county basis.

Significant wildlife habitat conclusions

Significant wildlife habitat guidelines are wide ranging being designed to be of value for municipalities across the province in many different ecological settings both urban and rural. The intent is for municipalities to select criteria that best suits there particular needs. Present evidence indicates that wildlife habitat present on and adjacent to the site is not significant in terms of features, functions, representation or amount. Certain significant species have been identified as occurring nearby and some of these may occur within the study area but their presence would not be considered as sufficient on their own to warrant a significant wildlife habitat designation.

However appropriate seasonal studies would be required for the full assessment of significant flora and fauna within the study area.

Summary of 7 Natural Heritage Features

The summary of findings in this study as applied to the 7 natural heritage features is presented below.

Table 3 **Status of Natural Heritage Features Within Study Area**

Natural Heritage Feature	On Study Area	Comments
Significant Wetland	Possibly	Unevaluated wetland adjacent to site
Threatened or Endangered Species Habitat	None known – not likely	Complete seasonal studies not conducted
Fish Habitat	Yes	Sensitive Brook Trout habitat present
Significant Woodlands	No	
Significant Valleylands	No	
Significant Wildlife Habitat	None known – not likely	Complete seasonal studies not conducted
Significant ANSI	No	

Impacts

The potential expanded area of the landfill site will remove a small amount of natural vegetation consisting of Poplar deciduous forest (community 8) and open rock barren (community 6). This type of loss of natural habitat is small and not considered significant unless there happened to be significant species habitat located here. It was considered unlikely to be significant species habitat but that seasonal studies would be required to confirm.

The significant features found on the adjacent areas of the study site relate to the wetland and to fish habitat. The wetland is an unevaluated wetland but was considered as potentially provincially significant if evaluated. The small stream was found to be Brook Trout habitat and Brook Trout are a sensitive coldwater species.

This study was not able to find evidence of threatened or endangered species habitat or habitat of any significant species within the study area or in the general area. To exclude the possibility of the presence of threatened or endangered or significant species habitat seasonal studies would need to be done (see recommendations).

The wetland in the vicinity of the landfill site appears to be palustrine meaning that it is receiving its water largely as surface water drainage and groundwater. The functioning of this wetland is dependent on the quantity and quality of the waters supplying it. Groundwater flows from the area of the landfill site toward the wetland. The quality of the surface water in the surface water monitoring stations located in the stream can be used as an indicator of potential impact or impairment of wetland functioning. Water quality can be compared with PWQO that were determined in order to protect aquatic life and surface water stations S1 and S3 that are downstream of the landfill site can be compared with the upstream surface water station S2 which represents a background station.

Presently materials like plastic containers and plastic bags and scraps of food are being spread from the refuse site to the buffers and into the poplar forest and into the wetlands.

Bears are a major cause of the spread of these materials from the site either directly by carrying off items into the surrounding area but more significantly by digging down through the covering fill and exposing previously buried material that is then blown off site or removed by other scavengers. Ravens, Crows, Ring-billed Gulls were seen and Turkey Vultures were reported to regularly visit the site. Evidence of Raccoons, Foxes and Skunks were seen at the landfill site.

Bears heavily use the landfill site for feeding and have become the dominant wildlife feature of the site as they have in other (Poulin et al. 2003) landfill sites. Bear trails were evident in the wetland and in the Poplar forest and on the rock barrens. Fresh tracks were seen but intensity of use was down at the time of the field visits. The landfill manager (Raney Zelney pers com) stated that the bears leave the site each year at the start of the bear hunt but that prior to the hunt he would see many bears at a time at the site.

Bears in addition to removing material and exposing materials to the wind and other scavengers tramp down vegetation in the areas adjacent to the landfill site into resting spots and packed down trails. Bears may be having a possible impact of adding nutrients to the wetland and Brook Trout habitat.

The concentration of wildlife species presently being drawn to scavenge at the landfill site could possibly be having an impact on the small mammals and birds utilizing the surrounding habitat through predation or competition.

These potential impacts would be considered as potential problems of many or most small rural landfill sites across Ontario. The recent implementation of electric fences at several landfill sites in Ontario offers an opportunity to reduce these potential problems.

An electric bear fence will be built to keep bears out of the landfill site. It will be built to MNR specifications (Jeremy Inglis MNR Pembroke pers comm.) these specifications can be found at www.bears.mnr.gov.on.ca. Removing bears from the site will stop the digging down through the covering fill and exposing material to the wind and other scavengers. The fence if it works properly should go a long way towards stopping the movement of materials and nutrients off site. The bear fence by stopping the digging actions of bears should discourage the presence of most of the other scavengers that could be having an impact on small bird and mammal populations in the area.

Brook Trout inhabit the small stream immediately to the north of the landfill site and partially in the adjacent area. Brook Trout is a sensitive species requiring cool well oxygenated water to survive. Brook Trout also require ground water upwellings for successful spawning to occur.

Groundwater monitoring (SGS data) has shown that groundwater flows from the direction of the present landfill site towards the creek. This groundwater is probably providing some of the required groundwater needs for the existing Brook Trout population along with groundwater from other areas in the watershed.

Surface water monitoring conducted by SGS indicates that the water within the Brook Trout stream meets most of the PWQO objectives with one notable exception of dissolved oxygen that fell significantly below the 5 ppm PWQO standard for a coldwater stream. Low oxygen levels are a characteristic of many natural watercourses. The low dissolved oxygen could be the result of the very low flow of water in the stream. Surface water station S2 is the furthest upstream station and is a background station and it also has low oxygen.

The observed dissolved oxygen values of 3 mg/l could be a potentially limiting factor for the Brook Trout present in this stream. Brook Trout are the most sensitive of all Ontario's salmonid species to low oxygen levels.

Anything that increases temperature or oxygen demand could impact the Brook Trout population. Oxygen demand could be increased by nutrients getting into this small stream or from a reduction of groundwater upwellings.

The landfill site will be capped by an impervious layer to prevent infiltration of rain into the landfill site. It is important that surface drainage off the landfill cap is managed to allow infiltration off site and not allowed to flow directly into the wetland.

Recommendations

That the Bear fence be built maintained and monitored to reduce the spread of materials from the landfill area into the adjacent areas and to also assist in the reduction of other associated scavengers.

The existing limit of landfill and the potential landfill expansion area both come to within approximately 40 metres of the edge of the wetland. It is important to ensure that natural vegetation is protected and increased in this 40 metre buffer. That overland flow of water from the landfill site towards the wetland is not allowed to carry sediment and other substances into the wetland but is managed in a way to allow infiltration within the buffer strip.

The Brook Trout in the adjacent stream are available for human food to sport fishers and are near the top of the food chain. It is therefore advisable to sample these fish under the Sport Fish Guidelines program for contaminant levels. It is important to recognize that the amount of habitat is very small and therefore the number of fish in the population would be small. Only a small number of fish can be safely sacrificed to avoid over exploitation.

The wetland should be evaluated to better understand the features and the functions of the wetland in order to assess the impacts to these attributes. The wetland should also be evaluated to determine whether the wetland is provincially significant.

An inventory of the plant species should be carried out to determine the presence of provincially significant species within the study area. Particular attention should be paid to the presence of any significant hybrid ferns within the wetland.

A breeding bird inventory should be done to determine the presence of any provincially significant species breeding within the study area.

It is recommended that a study be undertaken to determine locations of groundwater upwellings in the stream course. This could be carried out with an electronic temperature probe. If this were done during a warm weather period in August the importance of the upwelling areas could be related to location of adult and young of the year Brook Trout seeking refuge from high water temperatures. These upwelling areas would provide the potential spawning locations in the stream. It is probably not feasible to attempt to locate spawning redds in the fall because they are difficult to spot when located on woody or leafy detritus. Sampling of habitat in the summer could provide locations of important nursery habitat.

Proposed Studies

Wetland Evaluation

Carry out a wetland evaluation using the methodology described in the Ontario Wetland Evaluation System: Northern Manual (MNR 1993 updated). Due to the presence of an extensive open water marsh south of Hwy 60 a midsummer evaluation period would be recommended to properly assess the extensive aquatic vegetation (July and August).

Breeding Bird Survey

A breeding bird survey of the study area in order to assess for the presence of Threatened or Endangered species habitat and to assess the potential of Significant Wildlife Habitat primarily the habitat of species of conservation concern.

Five minute bird counts taken shortly after dawn to mid-morning should be taken following the methodology used by the breeding bird atlas. Emphasis to be placed on provincially significant and at risk species with the survey modified to detect these species. Carry out during the breeding period as described in OBBA (2005). Focus on marsh species utilizing tape calls such as Least Bittern. Utilize tape calls for Red-shouldered Hawks. Focus on the peak breeding period from May 24 to July 3.

Vascular Plant Survey

Carry out plant survey within study area focusing on the significant plant species to be found in the wetland such as hybrid ferns and Water Starwort. It is recommended that voucher specimens and photographs be taken of any hard to identify hybrid fern species to ensure accurate identification.

Plant surveys should be carried out in early August to hit the peak of flowering herbs and late August to early September to span late-season flowering plants, including aquatics.

Fish Habitat Survey

Carry out fish habitat study of the small tributary in August during a period of hot weather to assess limiting habitat conditions suspected of occurring for Brook Trout. Measure groundwater upwellings using an electronic temperature probe. Use electro fishing to assess the presence and location of nursery habitat based on the presence of young of the year Brook Trout.

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Appendix 1

Significant Species Found in Renfrew County – NHIC database 2005

<u>Scientific Name</u>	<u>Common Name</u>	<u>COSEWIC</u>	<u>MNR</u>	<u>S rank</u>	<u>G rank</u>
Birds					
<i>Ixobrychus exilis</i>	Least Bittern	THR	THR	S3B,SZN	G5
<i>Haliaeetus leucocephalus</i>	Bald Eagle	NAR	END-R	S4B,SZN	G4
<i>Buteo lineatus</i>	Red-shouldered Hawk	SC	SC	S4B,SZN	G5
<i>Chlidonias niger</i>	Black Tern	NAR	SC	S3B,SZN	G4
<i>Lanius ludovicianus</i>	Loggerhead Shrike	END	END-R	S2B,SZN	G4
<i>Dendroica kirtlandii</i>	Kirtland's Warbler	END	END-R	SHB,SZN	G1
<i>Dendroica discolor</i>	Prairie Warbler	NAR	NAR	S3S4B,SZN	G5
Fish					
<i>Acipenser fulvescens</i>	Lake Sturgeon	NAR	NAR	S3	G3G4
<i>Clinostomus elongatus</i>	Redside Dace	SC	THR	S3	G4
<i>Moxostoma carinatum</i>	River Redhorse	SC	SC	S2	G4
Mammals					
<i>Myotis leibii</i>	Small-footed Bat			S2S3	G3
<i>Myotis septentrionalis</i>	Northern Long-eared Bat			S3?	G4
<i>Pipistrellus subflavus</i>	Eastern Pipistrelle			S3?	G5
Reptiles					
<i>Emydoidea blandingii</i>	Blanding's Turtle		THR	S3	G4
<i>Apalone spinifera</i>	Spiny Softshell	THR	THR	S3	G5
Butterflies					
<i>Erynnis brizo</i>	Sleepy Duskywing			S1	G5
Odonata					
<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail			S3	G5
<i>Cordulegaster obliqua</i>	Arrowhead Spiketail			S1	G4
<i>Gomphus borealis</i>	Beaverpond Clubtail			S2	G4
<i>Gomphus desertus</i>	Harpoon Clubtail			S3	G4
<i>Gomphus adelphus</i>	Moustached Clubtail			S3	G4
<i>Stylogomphus albistylus</i>	Least Clubtail			S3	G5
<i>Ophiogomphus anomalus</i>	Extra-striped Snaketail			S2	G3
<i>Ophiogomphus rupinulensis</i>	Rusty Snaketail			S3	G5
<i>Aeshna clepsydra</i>	Mottled Darner			S3	G4
<i>Boyeria grafiana</i>	Ocellated Darner			S3	G5
<i>Gomphaeschna furcillata</i>	Harlequin Darner			S2	G5
<i>Somatochlora franklini</i>	Delicate Emerald			S4	G5
<i>Somatochlora walshii</i>	Brush-tipped Emerald			S3	G5
<i>Somatochlora williamsoni</i>	Williamson's Emerald			S3	G5
<i>Celithemis eponina</i>	Halloween Pennant			S3	G5
<i>Nannothemis bella</i>	Elfin Skimmer			S3	G4
<i>Stylurus notatus</i>	Elusive Clubtail			S2	G3
<i>Stylurus scudderii</i>	Zebra Clubtail			S3	G4
<i>Stylurus spiniceps</i>	Arrow Clubtail			S1S2	G5
<i>Arigomphus cornutus</i>	Horned Clubtail			S3	G4

Appendix 1

Significant Species Found in Renfrew County – NHIC database 2005

Scientific Name	Common Name	COSEWIC	MNR	S rank	G rank
Plants					
Anacamptodon splachnoides	Knothole Moss			S2	G3G5
Gnaphalium sylvaticum	Woodland Cudweed			S3?	G5
Ceratophyllum echinatum	Prickly Hornwort			S3	G4?
Hudsonia tomentosa	Sand-heather			S2S3	G5
Elatine triandra	Long-stemmed Waterwort			S3	G5
Euphorbia commutata	Spurge			S1	G5
Astragalus neglectus	Cooper's Milkvetch			S3	G4
Pteropora andromedeia	Giant Pinedrops			S2	G5
Polygonella articulata	Coast Jointweed			S3	G5
Hedyotis caerulea	Bluets			SH	G5
Carex conoidea	Field Sedge			S3	G5
Carex haydenii	Cloud Sedge			S3	G5
Carex novae-angliae	New England Sedge			S3	G5
Carex trisperma var. billingsii	Sedge			S2S3	G5T?
Cyperus houghtonii	Houghton's Umbrella-sedge			S3?	G4?
Cyperus schweinitzii	Schweinitz's Flatsedge			S3	G5
Scirpus expansus	Woodland Bulrush			S1	G4
Najas gracillima	Thread-like Naiad			S2	G5?
Cypripedium arietinum	Ram's-head Lady's-slipper			S3	G3
Listera auriculata	Auricled Twayblade			S3	G3
Platanthera flava var. herbiola	Pale Green Orchid			S3	G4T4Q
Danthonia compressa	Flat-stemmed Danthonia			S3	G5
Sporobolus heterolepis	Northern Dropseed			S3	G5
Stipa spartea	Porcupine Grass			S3	G5
Pellaea atropurpurea	Purple-stemmed Cliffbrake			S3	G5

Appendix 2

Species of Plants Found in Bells Bay Park and Referred to as 'Rare, Unusual or Uncommon' by Simpson (1976)

Scientific Name	Common Name	G rank	S rank	COSEWIC	MNR
<i>Callitriche heterophylla</i>	Large Water-starwort	G5)	S2?		
<i>Carex brunnescens</i>	Brownish Sedge	G5	S5		
<i>Carex canescens</i>	Hoary Sedge	G5	S5		
<i>Carex magellanica</i>	Boreal Bog Sedge	G5	S5		
<i>Carex pauciflora</i>	Few-flowered Sedge	G5	S5		
<i>Carex stipata</i>	Stalk-grain Sedge	G5	S5		
<i>Carya cordiformis</i>	Bitter-nut Hickory	G5	S5		
<i>Dryopteris fragrans</i>	Fragrant Cliff Wood-fern	G5	S4S5		
<i>Dryopteris x boottii</i>	Hybrid	HYB	S2		
<i>Dryopteris x triploidea</i>	Wood Fern	HYB	S3S4		
<i>Dryopteris x uliginosa</i> **		HYB	S2?		
<i>Hypericum mutilum ssp. boreale</i>	Northern St. John's-wort	G5	S5		
<i>Lemna minor</i>	Lesser Duckweed	G5	S5		
<i>Nasturtium officinale</i>	True Watercress	G?	SE		
<i>Potamogeton berchtoldii</i>	Slender Pondweed	G5	S4S5		
<i>Potentilla tridentata</i>	Three-toothed Cinquefoil	G5	S5		
<i>Pyrola asarifolia</i>	Pink Wintergreen	G5	S5		
<i>Saxifraga aizoides</i>	Yellow Mountain Saxifrage	G5	S4		
<i>Schoenoplectus subterminalis</i>	Swaying Club-rush	G4G5	S4		
<i>Schoenoplectus torreyi</i>	Torrey's Club-rush	G5?	S4		
<i>Sparganium angustifolium</i>	Many-stalked Burweed	G5	S4?		
<i>Spirodela polyrhiza</i>	Common Water-flaxseed	G5	S5		
<i>Trisetum spicatum</i>	Narrow False Oats	G5	S4		
<i>Typha angustifolia</i>	Narrow-leaved Cattail	G5	SE5		
<i>Utricularia gibba</i>	Humped Bladderwort	G5	S4		
<i>Utricularia minor</i>	Lesser Bladderwort	G5	S5		
<i>Viburnum trilobum</i>	Highbush Cranberry	G5T5	S5		

** *Dryopteris x uliginosa* Not seen but considered a possible occurrence (Simpson 1976)