

**HALIFAX REGIONAL MUNICIPALITY
BIOPHYSICAL INVENTORY AT
BIOSOLIDS FACILITY
DRAFT REPORT**

PROJECT NO. NSD18631

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REPORT TO

HALIFAX REGIONAL MUNICIPALITY

ON

**BIOPHYSICAL INVENTORY FOR THE BIOSOLIDS FACILITY
AT AEROTECH PARK**

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April 5, 2004

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1.0 INTRODUCTION

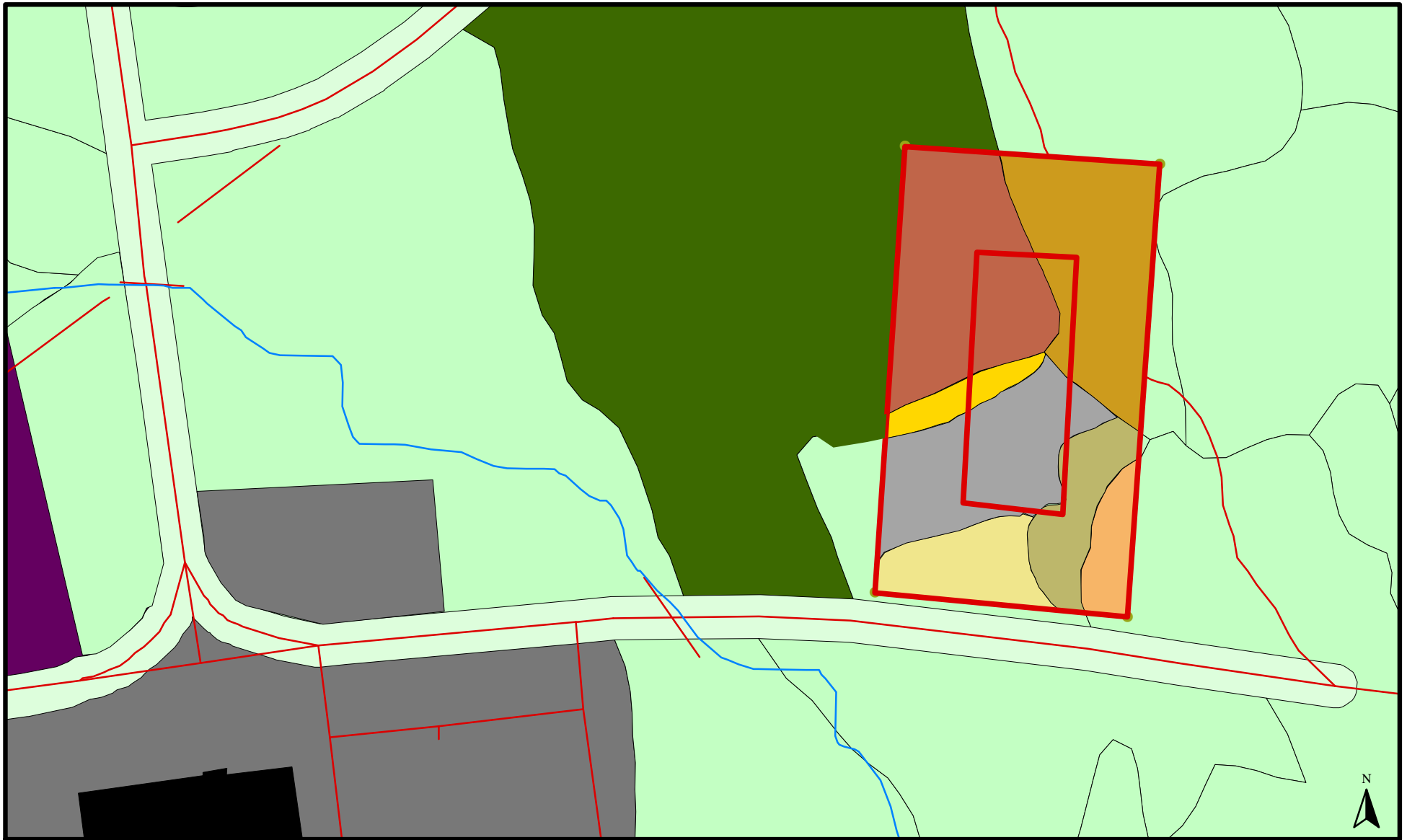
A screening pursuant to the *Canadian Environmental Assessment Act* was completed and approved for the Halifax Harbour Solutions Project (HHSP) including the biosolids facility at Aerotech Park in the Halifax Regional Municipality (HRM). Construction of the biosolids facility could begin as early as Spring 2004. A follow-up study was required as a condition of EA approval for the facility, which included:

1. Consultation with Atlantic Canada Conservation Data Centre (ACCDC) regarding the presence of rare species;
2. Conduct a breeding bird survey and a rare plant survey in consultation with Environment Canada; and
3. Ensure that construction activities occur outside of the bird breeding season as well as ensuring that winter breeding birds are not disturbed.

HRM retained Jacques Whitford to undertake a survey at the proposed site in Aerotech Park (Figure 1) and consult with Environment Canada.

In order to begin construction in the Spring of 2004 it will be necessary to complete clearing of the site by no later than April 15th in order to avoid the breeding season for most bird species. However, this schedule will not allow completion of a breeding bird survey or rare plant survey since the earliest a breeding bird survey could be conducted would be late May and the earliest a rare plant survey could be conducted would be late June. The bird breeding season is finished by mid-August. Given the time constraints for the project and the fact that HHSP will benefit the environment we have prepared a combination desktop study combined with limited field surveys which will provide the information required in order to permit site construction in Spring 2004. In this approach a list of breeding bird species and rare plant species that can be expected to be present at the proposed sludge management facility were derived from a modelling exercise that incorporates the habitat types present at the property on which the facility is to be sited, the species of birds and rare plants found in the general area and the habitat preferences of these species.

The desktop review consisted of a review of available mapping and air photography of the site, and information from ACCDC and NSDNR databases and other studying conducted at the site (*i.e.*, Dillon Consulting 2003). Site visits were conducted by a field biologist in late March, 2004. The biologist's experience with other surveys in the site area provided additional knowledge regarding the potential presence of rare species.



Legend

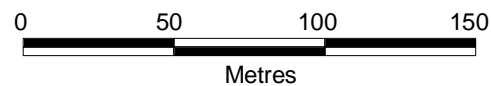
- Study Area
- Rivers & Streams
- Roads
- Buildings
- Urban
- Forest
- Old Field
- Gravel Pit

Study Area Land Cover

- Abandoned Pasture
- Alder Thicket
- Balsam Fir/Red Spruce/Red Maple Forest
- Red Maple/Balsam Fir/White Birch Forest
- Red Maple/Yellow Birch/White Ash Forest
- Trembling Aspen/Balsam Fir/Grey Birch Forest
- Trembling Aspen/Balsam Fir/Red Maple Forest

Figure 1

Aerotech Park Biosolids Facility Location



Map Parameters
 Projection: Universal Transverse Mercator (UTM)
 Zone: 20
 Datum: NAD83
 Scale: 1:2,500
 Project Number: NSD18631
 Date: March 31, 2004



The Manager of the Environmental Assessment Section of Environment Canada, Atlantic Region (Mr. Barry Jeffrey) was advised of the approach proposed by HRM to satisfy the follow up requirements of the HHSP CEEA screening (teleconference March 31, 2004). Mr. Jeffrey generally agreed that the proposed approvals demonstrated diligence on the part of HRM and was generally acceptable even though a full breeding bird and rare plant survey would have been preferable prior to site clearing. In lieu of pre clearing surveys, Mr. Jeffrey recommended that HRM conduct follow up rare plant surveys at the site and surrounding area.

2.0 RESULTS AND DISCUSSION

2.1 Habitat Types on the Property

The property is 2.4 ha in size and is located on a low drumlin. Seven plant communities are found on the property; these can be subdivided into three general categories, forest, shrub thicket and abandoned pasture. Approximately 31 % of the property is occupied by forest, which extends in an arc along the southern and eastern margins of the property (Figure 1). Abandoned pasture is found in the north-western corner of the property on the top of the drumlin. Shrub thicket forms a transitional zone between the abandoned pasture and the forest plant communities near the center of the property.

2.1.1 Forest

There are five forest plant communities in the study area including red maple/balsam fir/white birch forest, red maple/balsam fir/white ash forest, balsam fir/red spruce/red maple forest, trembling aspen/balsam fir/red maple forest, and trembling aspen/balsam fir/grey birch forest. An analysis of air photos of the study area indicates that the forest cover on the property has been subjected to two major disturbance events in the past. Photography from 1964 indicates that the south-eastern corner of the property was burned by a forest fire and had begun to regenerate. The rest of the forested area of the property was covered in mature softwood forest. This mature forest is present in photography from 1982, however, it is replaced by a dense cover of young trees in the 1992 photography suggesting that the property was logged shortly after 1982.

Red Maple/Balsam Fir/White Birch Forest

This plant community is found at the south-eastern corner of the property. It is the most mature forest stand on the property with an estimated average age of 40 years. This is the portion of the property that was burned prior to 1964. The tree canopy is relatively dense and is composed of a mixture of red maple (*Acer rubrum*), balsam fir (*Abies balsamea*), white birch (*Betula papyrifera*), and yellow birch (*Betula allegheniensis*). The shrub understory is sparse and consists mainly of advanced regeneration of balsam fir.

Red Maple/Balsam Fir/White Ash Forest

This forest plant community contains a mixture of trees of various age classes. Most trees are estimated to be 20 years of age but older trees are scattered throughout the stand. This stand was probably harvested in the early 1980's and the older trees are small trees or trees of low value or poor form that were not harvested. The tree canopy is composed of a mixture of red maple, balsam fir, white ash (*Fraxinus americana*), yellow birch, white birch, and grey birch (*Betula populifolia*). The understory is moderately dense and consists of young balsam fir, white ash and red maple. The presence of white ash indicates that the soils are moderately fertile.

Balsam Fir/Red Spruce/Red Maple Forest

This plant community is located near the south-eastern corner of the property. It also consists of a mixture of various age classes of trees. Most trees are estimated to be 20 years of age. This would suggest that this stand originated at the same time as the red maple/balsam fir/white ash forest. The tree canopy is very dense in most areas and consists largely of balsam fir with lesser quantities of red spruce (*Picea rubens*), red maple, white birch, and grey birch also present. The understory is sparse and consists mostly of balsam fir and red spruce that have been overtopped by faster growing trees.

Trembling Aspen/Balsam Fir/Red Maple Forest

This forest plant community is found along the edge of Aerotech Drive at the southern edge of the property. The estimated age of this stand is 20 years. The canopy of this stand is low and relatively uniform in height suggesting that almost all of the trees were harvested. Trembling aspen (*Populus tremuloides*) is the most abundant tree species. Balsam fir and red maple are also common and small numbers of yellow birch and white ash are present.

Trembling Aspen/Balsam Fir/Grey Birch Forest

Trembling aspen/balsam fir/grey birch forest is found in the north-eastern corner of the property. Like most stands on the property it appears to have been harvested approximately 20 years ago. This forest plant community differs only slightly from the trembling aspen/balsam fir/red maple forest plant community. In this stand grey birch and white birch are more abundant than red maple. This stand also differs in that it contains a larger number of unharvested trees.

2.1.2 Abandoned Pasture

Analysis of historical air photos of the property reveal that the north-western corner of the property was used as hay fields until at least 1964. By 1982, small patches of young trees and shrubs can be seen in the hay field suggesting that it was no longer being mowed. In the 1992 photography, the house and

outbuildings of the farm have been demolished and there is evidence of off road vehicle use on the fields. At the present time the abandoned pasture still supports a cover of forage grasses and ruderal forbs; however, approximately 50% of the vegetation cover is composed of trees and shrubs. The most abundant grass and ruderal forb species include bent-grass (*Agrostis capillaris*), Timothy (*Phleum pratense*), black knapweed (*Centaurea nigra*), rough goldenrod (*Solidago rugosa*), and New York aster (*Aster novi-belgii*). A variety of shrub species have begun to invade the pasture and displace the grasses and forbs. Low shrubs including meadowsweet (*Spiraea alba*), late lowbush blueberry (*Vaccinium angustifolium*), Canada blueberry (*Vaccinium myrtilloides*), lambkill (*Kalmia angustifolia*), and rhodora (*Rhododendron canadense*) are the most abundant shrub species. Tall shrub species such as speckled alder (*Alnus incana*) and witherod (*Viburnum nudum*) are present in low numbers. Trees are scattered about the abandoned pasture. The most abundant tree species are white spruce (*Picea glauca*), tamarack (*Larix laricina*), grey birch, and apple (*Pyrus malus*). Eventually, a mixture of speckled alder, white spruce and tamarack will dominate the site. In time, the white spruce and tamarack will overtop and eliminate the speckled alder resulting in the establishment of a white spruce/tamarack forest stand.

2.1.3 Shrub thicket

A narrow band of shrub thicket is present along the southern edge of the abandoned pasture. This shrub thicket is visible in the 1964 air photography and has persisted for the past 40 years. The shrub thicket consists of a dense cover of speckled alder that is punctuated by white spruce and tamarack trees. Small patches of meadowsweet are present in gaps in the tall shrub canopy. This plant community represents an intermediate stage in succession from abandoned pasture to white spruce/tamarack forest.

2.2 Rare Plants

Given the need to begin construction of the biosolids plant as soon as possible, it was not possible to conduct a rare plant survey on the property. Instead, a rare plant modelling exercise was undertaken to determine whether there was a high probability of rare plant species being present on the property. In the model, the habitat preferences of all the rare plant species that have been recorded within a 5 km radius of the property were compared to the habitats present on the property. If habitat suitable for any of the rare species is present on the property then the probability of that species being present on the property was considered to be high.

Table 1 lists the uncommon and rare plant species that have been recorded within a 5 km radius of the property, the habitats they are typically found in, and the Atlantic Canada Conservation Data Centre (ACCDC 2004) and Nova Scotia Department of Natural Resources (NSDNR 2004a) status ranks. None of the species on the list are nationally at risk species (COSEWIC 2003) nor are any species protected under the Nova Scotia Endangered Species Act present in the list (NSDNR 2004b). Four uncommon or rare species have been found in the vicinity of the property including swamp birch (*Betula nana*),

variegated horsetail (*Equisetum variegatum*), Loesel's twayblade (*Liparis loeselii*), and southern twayblade (*Listera australis*) (ACCDC 2004).

Table 1 Habitat Preferences and Population Status of Uncommon and Rare Vascular Plants Found in the General Vicinity of the Study Area			
Species	Preferred Habitat	ACCDC Status	NSDNR Status
<i>Betula nana</i>	Bogs	S2	Yellow
<i>Equisetum variegatum</i>	Streambanks, bogs, wet thickets, ditches, quarries, and gold tailings	S3	Green
<i>Liparis loeselii</i>	Bogs, peaty meadows, moist ditches, cobbly lake shores, the edges of ponds and bogs, and behind coastal barrier beaches.	S3S4	Green
<i>Listera australis</i>	Associated with sphagnum moss in bogs or damp woods.	S1	Red
Note: Red = At Risk; Yellow = Sensitive to Human Activities or Natural Events; Green = Population Secure; S1 = extremely rare; S2 = rare; S3 = uncommon; S4 = fairly common; S5 = abundant.			

Southern twayblade is the rarest of these species. It is considered to be very rare (S1) by ACCDC and is considered to be a species at risk in Nova Scotia (red) by NSDNR. Southern twayblade is typically found in acidic swamps and bogs. It has been found approximately 800 m to the north of the property in mixedwood treed swamp at the Halifax International Airport. There is no wetland habitat present on the property, consequently, the probability of this species being present is extremely low.

Swamp birch is considered to be rare (S2) by ACCDC and vulnerable to human activities or natural events (yellow) by NSDNR. Swamp birch is typically found in open bogs. It has been recorded from two locations near Bennery Lake approximately 4 km north-west of the property. It is highly unlikely that this species is present on the property given the lack of wetland habitat.

Variegated horsetail is listed as uncommon (S3) by ACCDC and the Nova Scotia population is considered to be secure (green) by NSDNR. This species has been found at Oldham approximately 5 km north of the property. This population is found on damp gold mine tailings deposited in Black Brook. Several other populations of variegated horsetail are found near Miller Lake approximately 8 km south-west of the property. These populations are found in ditches and seepy roadside embankments. The roadside ditch at the southern edge of the property could provide suitable habitat for this species. This species is evergreen and is easily identified during the winter, however, the presence of heavy snow cover during the site visit made it impossible to determine if variegated horsetail was present in the ditch.

Loisel's twayblade is listed as uncommon to common (S3S4) by ACCDC and NSDNR considers the Nova Scotia population to be secure (green). This species was found near the Old Guyborough Road approximately 4 km south-west of the property. This population was found growing in a sphagnum moss mat in a poorly drained ditch. The ditch found along the southern edge of the property could provide suitable habitat for this species. Given the presence of deep snow at the time of the site visit it was not possible to determine whether this ditch is wet enough to provide suitable habitat.

The results of the rare plant modelling exercise suggest that there may be potential for two uncommon plant species, variegated horsetail and Loisel's twayblade to be present in the ditch found along the southern edge of the property. Given the time constraints associated with the project, it will not be possible to confirm whether or not these species are present. However, several mitigative measures could be employed to minimize any potential adverse effects to these species. Wet areas in the ditch should be avoided when accessing the property for clearing and grubbing. This would include approximately 70 m of ditch along the western end of the southern boundary of the property. The site could be accessed from either the north along an existing road that runs along the edge of the field and intercepts the Old Guysborough Road or from the south along the same road at a point where it intercepts Aerotech Drive. There is no ditch at this location so neither variegated horsetail or Loisel's twayblade should be present at this location. Erosion and sedimentation control measures should be employed while the site is cleared and grubbed. This will minimize sediment deposition in the ditch that could smother variegated horsetail or Loisel's twayblade if they are present. This will also prevent damage to a small stream located approximately 40 m south of the property that receives drainage from the property. A survey should be conducted in June to determine if these species are actually present.

2.3 Rare or Sensitive Birds

Given the need to expedite the construction of the proposed biosolids facility, it was not possible to conduct a breeding bird survey on the property. Instead a bird habitat modelling exercise was conducted to determine whether there was a high probability that rare or sensitive bird species would be present on the property. In the modelling exercise, a list of birds found in the 10 km x 10 km Maritime Breeding Bird Atlas (Erskine 1992) square within which the property is located was used to represent the avifauna in the vicinity of the property. The property was surveyed on March 25, 2004 and all habitat types present on the property were identified and described. The habitat preferences of the bird species recorded from the general area were compared to the suite of habitat types present on the property to determine which of the species found in the general area could be expected to nest on the property. Particular attention was paid to bird species considered to be at risk or sensitive by NSDNR (2004a) or species considered to be rare or uncommon by ACCDC (2004). Additional sources of data on sensitive bird species in the study area were derived from a review of the NSDNR Significant Habitat Database (2004), Dillon Consulting (2003) and an information request from ACCDC (2004).

There is some potential for early nesting bird species such as Gray Jay, Common Raven, Red Crossbill, White-winged Crossbill, and Great Horned Owl to be nesting on the property. Only the two crossbill species are protected under the *Migratory Birds Convention Act*. The other species are protected under the provincial *Wildlife Act*. If these species were found nesting on the site, mitigative measures would be required to protect the nests until the young have fledged. A field survey was conducted on March 25, 2004 to determine whether or not these species were present on or near the property. During the survey, all bird species detected on or near the property were identified by visual sightings, calls, songs or spoor such as the distinctive excavations of various woodpecker species. Any evidence that might indicate

that a particular species was nesting on the property was collected. This included territorial behaviour, breeding displays, singing, agitated behavior, the carrying of food, nesting material or faecal sacs, or the presence of a nest structure. In addition, the site was visited on the nights of March 24 and 29, 2004 to determine if any owls were present. During each of these surveys the observer listened for owl calls over a period of 20 minutes.

Table 2 lists the 80 species of bird that have been recorded in the atlas square within which the property is located. The list also includes one species Eastern Bluebird that has not been recorded in the atlas square. Eastern Bluebirds have been recorded in the area north of the airport and have been expanding their distribution in recent years (Dillon Consulting 2003). None of the species on the list are listed as nationally at risk species (COSEWIC 2003) nor are any species protected under the *Nova Scotia Endangered Species Act* present in the list. Five of the species recorded in the atlas square are considered to be sensitive to anthropogenic activities or natural events (yellow) by NSDNR. These species include Common Loon, Northern Goshawk, Common Tern, Eastern Bluebird, and Bobolink. The ACCDC considers nine species to be uncommon or rare in Nova Scotia. These include Northern Goshawk (uncommon), Common Tern (uncommon), Black-backed Woodpecker (uncommon to common), Eastern Bluebird (rare to uncommon), Horned Lark (rare), Boreal Chickadee (uncommon to common), Bobolink (uncommon), Rusty Blackbird (uncommon to common), and Red Crossbill (uncommon to common).

Common Name	Binomial	NSDNR Status	ACCDC Status (Breeding Season)	Breeding Status of Birds found in Atlas Square (20,000 ha)	Species Expected To Nest in Study Area (2.4 ha)
Common Loon	<i>Gavia immer</i>	Yellow	S4	Confirmed Nester	
American Bittern	<i>Botaurus lentiginosus</i>	Green	S4	Possible Nester	
American Black Duck	<i>Anas rubripes</i>	Green	S5	Confirmed Nester	
Ring-necked Duck	<i>Aythya collaris</i>	Green	S5	Possible Nester	
Osprey	<i>Pandion haliaetus</i>	Green	S5	Confirmed Nester	
Northern Harrier	<i>Circus cyaneus</i>	Green	S5	Probable Nester	X
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Green	S4	Possible Nester	
Northern Goshawk	<i>Accipiter gentilis</i>	Yellow	S3	Possible Nester	
Broad-winged Hawk	<i>Buteo platypterus</i>	Green	S4	Possible Nester	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Green	S5	Possible Nester	
Ruffed Grouse	<i>Bonasa umbellus</i>	Green	S5	Probable Nester	X
Killdeer	<i>Charadrius vociferus</i>	Green	S5	Confirmed Nester	
Spotted Sandpiper	<i>Actitis macularia</i>	Green	S5	Probable Nester	
Common Snipe	<i>Gallinago gallinago</i>	Green	S5	Probable Nester	X
American Woodcock	<i>Scolopax minor</i>	Green	S4S5	Probable Nester	X
Herring Gull	<i>Larus argentatus</i>	Green	S5	Possible Nester	
Great Black-backed Gull	<i>Larus marinus</i>	Green	S5	Confirmed Nester	
Common Tern	<i>Sterna hirundo</i>	Yellow	S3	Confirmed Nester	
Rock Dove	<i>Columba livia</i>	Introduced	SE	Confirmed Nester	
Barred Owl	<i>Strix varia</i>	Green	S5	Possible Nester	
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	Green	S4	Probable Nester	

Table 2 Breeding Birds Known from the Atlas Square Within Which the Proposed Facility is Located, their Population Status and those Species Expected to Nest on the Property

Common Name	Binomial	NSDNR Status	ACCDC Status (Breeding Season)	Breeding Status of Birds found in Atlas Square (20,000 ha)	Species Expected To Nest in Study Area (2.4 ha)
Common Nighthawk	<i>Chordeiles minor</i>	Green	S4	Probable Nester	
Chimney Swift	<i>Chaetura pelagica</i>	Green	S5	Possible Nester	
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Green	S5	Probable Nester	X
Belted Kingfisher	<i>Ceryle alcyon</i>	Green	S5	Confirmed Nester	
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Green	S5	Probable Nester	
Downy Woodpecker	<i>Picoides pubescens</i>	Green	S5	Confirmed Nester	X
Hairy Woodpecker	<i>Picoides villosus</i>	Green	S5	Confirmed Nester	X
Black-backed Woodpecker	<i>Picoides arcticus</i>	Green	S3S4	Possible Nester	
Northern Flicker	<i>Colaptes aureus</i>	Green	S5	Confirmed Nester	X
Pileated Woodpecker	<i>Dryocarpus pileatus</i>	Green	S5	No Evidence of Nesting	
Olive-sided Flycatcher	<i>Contopus borealis</i>	Green	S4S5	Probable Nester	
Eastern Wood Pewee	<i>Contopus virens</i>	Green	S5	Probable Nester	
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Green	S5	Possible Nester	
Alder Flycatcher	<i>Empidonax alnorum</i>	Green	S5	Confirmed Nester	X
Least Flycatcher	<i>Empidonax minimus</i>	Green	S5	Possible Nester	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Green	S4S5	Probable Nester	
Horned Lark	<i>Eremophila alpestris</i>	Green	S2	Confirmed Nester	
Tree Swallow	<i>Tachycineta bicolor</i>	Green	S5	Confirmed Nester	X
Bank Swallow	<i>Riparia riparia</i>	Green	S5	Possible Nester	
Cliff Swallow	<i>Hirundo pyrrhonota</i>	Green	S4	Confirmed Nester	
Barn Swallow	<i>Hirundo rustica</i>	Green	S5	Confirmed Nester	
Gray Jay	<i>Perisoreus canadensis</i>	Green	S5	Probable Nester	
Blue Jay	<i>Cyanocitta cristata</i>	Green	S5	Confirmed Nester	X
American Crow	<i>Corvus brachyrhynchos</i>	Green	S5	Confirmed Nester	
Common Raven	<i>Corvus corax</i>	Green	S5	Probable Nester	
Black-capped Chickadee	<i>Parus atricapillus</i>	Green	S5	Confirmed Nester	X
Boreal Chickadee	<i>Parus hudsonicus</i>	Green	S3S4	Probable Nester	X
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Green	S5	Confirmed Nester	X
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Green	S4	Possible Nester	
Brown Creeper	<i>Certhia americana</i>	Green	S5	Possible Nester	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Green	S5	Probable Nester	
Ruby-crowned Kinglet	<i>Regulus calendula</i>	Green	S5	Confirmed Nester	X
Eastern Bluebird	<i>Sialia sialis</i>	Yellow	S2S3	No Evidence of Nesting	
Veery	<i>Catharus fuscescens</i>	Green	S5	Probable Nester	
Swainson's Thrush	<i>Catharus ustulatus</i>	Green	S5	Probable Nester	
Hermit Thrush	<i>Catharus guttatus</i>	Green	S5	Confirmed Nester	X
American Robin	<i>Turdus migratorius</i>	Green	S5	Confirmed Nester	X
Gray Catbird	<i>Dumetella carolinensis</i>	Green	S5	Confirmed Nester	X
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Green	S5	Confirmed Nester	X
European Starling	<i>Sturnus vulgaris</i>	Introduced	SE	Confirmed Nester	
Blue-headed Vireo	<i>Vireo solitarius</i>	Green	S5	Confirmed Nester	X
Red-eyed Vireo	<i>Vireo olivaceus</i>	Green	S5	Confirmed Nester	X
Tennessee Warbler	<i>Vermivora peregrina</i>	Green	S5	Confirmed Nester	X

Table 2 Breeding Birds Known from the Atlas Square Within Which the Proposed Facility is Located, their Population Status and those Species Expected to Nest on the Property

Common Name	Binomial	NSDNR Status	ACCDC Status (Breeding Season)	Breeding Status of Birds found in Atlas Square (20,000 ha)	Species Expected To Nest in Study Area (2.4 ha)
Nashville Warbler	<i>Vermivora ruficapilla</i>	Green	S5	Confirmed Nester	
Northern Parula	<i>Parula americana</i>	Green	S5	Confirmed Nester	
Yellow Warbler	<i>Dendroica petechia</i>	Green	S5	Confirmed Nester	X
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	Green	S5	Confirmed Nester	
Magnolia Warbler	<i>Dendroica magnolia</i>	Green	S5	Confirmed Nester	X
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	Green	S5	Probable Nester	
Yellow-rumped Warbler	<i>Dendroica coronata</i>	Green	S5	Confirmed Nester	X
Black-throated Green Warbler	<i>Dendroica virens</i>	Green	S5	Confirmed Nester	
Blackburnian Warbler	<i>Dendroica fusca</i>	Green	S4S5	Possible Nester	X
Palm Warbler	<i>Dendroica palmarum</i>	Green	S5	Confirmed Nester	
Bay-breasted Warbler	<i>Dendroica castanea</i>	Green	S5	Probable Nester	
Black-and-white Warbler	<i>Mniotilta varia</i>	Green	S5	Confirmed Nester	X
American Redstart	<i>Setophaga ruticilla</i>	Green	S5	Confirmed Nester	X
Ovenbird	<i>Seiurus aurocapillus</i>	Green	S5	Confirmed Nester	
Common Yellowthroat	<i>Geothlypis trichas</i>	Green	S5	Confirmed Nester	X
Wilson's Warbler	<i>Wilsonia pusilla</i>	Green	S4	Probable Nester	
Canada Warbler	<i>Wilsonia canadensis</i>	Green	S5	Confirmed Nester	
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Green	S5	Probable Nester	X
Chipping Sparrow	<i>Spizella arborea</i>	Green	S5	Confirmed Nester	X
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Green	S5	Probable Nester	X
Song Sparrow	<i>Melospiza melodia</i>	Green	S5	Confirmed Nester	X
Lincoln's Sparrow	<i>Melospiza lincolni</i>	Green	S5	Probable Nester	
Swamp Sparrow	<i>Melospiza georgiana</i>	Green	S5	Confirmed Nester	
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Green	S5	Confirmed Nester	X
Dark-eyed Junco	<i>Junco hyemalis</i>	Green	S5	Confirmed Nester	X
Bobolink	<i>Dolichonyx oryzivorus</i>	Yellow	S3	Probable Nester	X
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Green	S5	Confirmed Nester	
Rusty Blackbird	<i>Euphagus carolinus</i>	Green	S3S4	Confirmed Nester	
Common Grackle	<i>Quiscalus quiscula</i>	Green	S5	Confirmed Nester	X
Pine Grosbeak	<i>Pinicola enucleator</i>	Green	S5	Probable Nester	
Purple Finch	<i>Carpodacus purpureus</i>	Green	S5	Probable Nester	X
Red Crossbill	<i>Loxia curvirostra</i>	Green	S3S4	Possible nester	
White-winged Crossbill	<i>Loxia leucoptera</i>	Green	S5	Possible nester	
Pine Siskin	<i>Carduelis pinus</i>	Green	S5	Probable Nester	
American Goldfinch	<i>Carduelis tristis</i>	Green	S5	Probable Nester	X
Evening Grosbeak	<i>Coccothraustes vespertina</i>	Green	S5	Possible nester	
House Sparrow	<i>Passer domesticus</i>	Introduced	SE	Confirmed Nester	

Source: Erskine 1992 and M. Crowell pers. comm. 2004

Note: Red = At Risk; Yellow = Sensitive to Human Activities or Natural Events; Green = Population Secure; S1 = extremely rare; S2 = rare; S3 = uncommon; S4 = fairly common; S5 = abundant.

Common Loons nest on lakes. The property is not located on or near a lake so this species will not nest there. Common Terns typically nest in colonies on coastal islands or islands in lakes. They may also nest on sand spits or in salt marshes. None of these habitat types are present on or near the property.

Northern Goshawks nest in mature mixedwood or coniferous forest typically in areas remote from human activity. The property and adjacent areas do not provide mature forest habitat and the area is subject to constant human activity. It is unlikely that Northern Goshawks would nest on or near the property.

Eastern Bluebirds are cavity nesters, which typically nest in abandoned woodpecker holes or in man-made nest boxes. They most frequently nest in open deciduous woodlands, orchards or clear-cuts. The property is unlikely to provide suitable habitat for this species since there are few trees large enough to provide nesting cavities and the woodlands present on the site are young dense stands.

Black-backed Woodpeckers typically nest in mature softwood forest although they are often found nesting in small islands of coniferous forest in clear-cuts. Neither of these habitat types are present on the property so it is unlikely that this species would nest there.

Horned Larks prefer to nest in open areas with large areas of short or sparse grass cover. Most nesting records in the Maritime Provinces are associated with airfields, which provide this habitat. The Halifax International Airport provides this habitat type and the Horned Lark records for the atlas square come from the airport. The abandoned pasture is too heavily overgrown to provide suitable nesting habitat for this species.

Boreal Chickadees nest in coniferous forest and mixedwood forest. It is a cavity nester and nests in rotted branch stubs, stumps and woodpecker holes. Boreal Chickadees prefer to nest in mature forest but can nest in relatively young stands. The forest habitats on the property, particularly the balsam fir/red spruce/red maple forest could be used as nesting habitat by Boreal Chickadees although it is not ideal habitat.

It is unlikely that Bobolinks nest on the property. Bobolinks nest in grasslands, particularly grasslands having a heavy grass cover as well as some forb cover. Hay fields are a favourite nesting habitat for this species. Bobolinks prefer grasslands with a low cover of shrubs. They are also area sensitive and prefer to nest in large areas of grassland. A study in Nebraska found that a minimum habitat patch size of 40 ha was required to attract nesting Bobolinks (Montana Partners in Flight 2000). The abandoned pasture found in the north-west corner of the property would provide only marginal habitat for Bobolinks. The habitat patch size, which includes all of the contiguous abandoned pasture habitat both inside and outside the property, is small (6.7 ha). The cessation of mowing has resulted in the establishment of shrubs and trees, which cover approximately half of the surface of the abandoned pasture. In addition, grass cover consists mainly of low grass species and the cover of ruderal shrubs is high in relation to grass cover. The likelihood that Bobolinks nest in the abandoned pasture is therefore low.

Rusty Blackbirds typically nest in tall shrub swamps or wooded swamps, often along sluggish streams. Rusty Blackbirds prefer to nest in areas remote from human habitation. No wetland habitats of this type

are found on or immediately adjacent to the property so there is no potential for this species to nest there.

Red Crossbills nest in mature coniferous forest. They typically nest in areas where there are good cone crops that provide their primary food source. The property contains relatively few mature conifers and no cone production was evident during the site visit. As such, it is unlikely that this species nests on the property.

The nesting habitat preferences of the common species (ACCDC S4 and S5) were also compared to the habitats present on the property to determine which species are likely to nest on the property. Table 2 presents the results of this modelling exercise. A total of 39 bird species could reasonably be expected to nest on the site.

Eight species of bird were detected on or near the property during the March 25, 2004 site visit. These included Hairy Woodpecker, Pileated Woodpecker, Ruffed Grouse, American Crow, Common Raven, Black-capped Chickadee, Golden-crowned Kinglet, and American Robin. Only one of these species, Common Raven, is a late winter/early spring nesting species. Ravens generally begin to construct nests in early March. A Common Raven was observed flying near the property and was chased away by a pair of American Crows. There was no evidence to indicate that there was a raven nest nearby. Raven nests are relatively large and bulky and are typically constructed in large trees or on cliff faces. No large nest structures or potential nesting sites were found on the property during the site visit. No owls were detected during the evening owl surveys.

American Crows were observed flying over the property on several occasions during the site visit. American Crows generally nest in tall conifers or occasionally in tall deciduous trees. Tall trees are uncommon on the property and it is unlikely that American Crows nest on the site.

The two woodpecker species were identified based on characteristic excavations. Fresh excavations of both species were found. There are trees large enough to provide nest sites for Hairy Woodpeckers but none large enough to provide nest sites for Pileated Woodpeckers.

Ruffed Grouse tracks were found in the trembling aspen/balsam fir/grey birch forest. This plant community provides ideal nesting habitat for this species.

Black-capped Chickadees and a Golden-crowned Kinglet were observed foraging at various locations in forested portions of the property. Suitable nesting habitat is present for Black-capped Chickadees; however, there are relatively few large conifers on the property that would provide good nesting sites for Golden-crowned Kinglets indicating that it is unlikely that this species would nest there.

Two American Robins were observed flying over the property during the field survey. American Robins nest in a wide range of habitat types. All of the habitat types present on the property are suitable nesting sites. As such, it is highly likely that this species nests on the property.

The results of the breeding bird modelling exercise and field visit suggest that the property may be used by as many as 39 bird species. One uncommon species Boreal Chickadee may nest on the property. Boreal Chickadees populations in Nova Scotia are considered to be secure by NSDNR and it is listed as uncommon to common by ACCDC. The property provides only marginal habitat for this species. Loss of this habitat is not expected to have a significant adverse effect on local populations of Boreal Chickadee. No mitigative measures are recommended for this species.

2.4 Other Rare or Sensitive Species

Three records of four-toed salamanders (*Hemidactylium scutatum*) have been reported within a 5 km radius of the property (ACCDC 2004). The ACCDC lists the four-toed salamander as an uncommon species and NSDNR considers the Nova Scotia population to be sensitive to anthropogenic activities or natural events. Four-toed salamanders are highly cryptic and are only rarely encountered away from their nesting habitats. They nest in sphagnum moss hummocks in swamps and to a lesser extent bogs. The sphagnum moss hummocks are typically located at the edge of small sluggish streams or pools. This species is believed to be more abundant and widespread than records would indicate since it is only found above ground at night, nests under dense moss cover and nests in areas where humans seldom venture. There is no wetland habitat on the property, so the potential for four-toed salamanders to be present is very low.

Wood turtle (*Glyptemys insculpta*) is a species of special concern (COSEWIC 2003) that has been recorded within watersheds situated within a 5 km radius of the property. All of these watersheds drain into the Shubenacadie River. The property is located outside of the Shubenacadie River watershed where wood turtles have not been recorded.

Five rare odonates have been reported within a 5 km radius of the property. These include twelve-spotted skimmer (*Libellula pulchella*) (ACCDC status rare; NSDNR status secure), taiga bluet (*Coenagrion resolutum*) (ACCDC status extremely rare; NSDNR status undetermined), Martha's pennant (*Celithemis martha*) (ACCDC status rare; NSDNR status undetermined), prince baskettail (*Epithea princeps*) (ACCDC status rare; NSDNR status sensitive), and green-striped darner (*Aeshna verticalis*) (ACCDC status rare; NSDNR status sensitive). All of these species have been reported from quarry ponds. These species spend most of their lives in aquatic habitats. There is no surface water present on the property so these species are not likely to be present.

Dillon Consulting (2003) conducted a background literature search for the vicinity of the proposed biosolids facility that included a review of the NSDNR Significant Habitat Database (2003) and

consultation with the Nova Scotia Museum of Natural History. No other species of concern were identified as a result of that literature search.

3.0 CONCLUSIONS

The results of the rare plant modelling exercise suggests that two uncommon species, variegated horsetail and Loesel's twayblade may be present in the ditch at the southern end of the property. The breeding bird modelling exercise suggests that 39 species can be expected to nest on the property including one uncommon species, Boreal Chickadee. If clearing occurs prior to April 15, it is recommended that the western half of the ditch not be disturbed to prevent possible disturbance to variegated horsetail and Loesel's twayblade. In addition, erosion and sedimentation control measures should be implemented to minimize potential adverse effects on these species and on the stream that the ditch drains into. A survey of the ditch area should be conducted in June to determine if these species are actually present. If they are present, mitigative measures should be developed to minimize adverse affects to these species associated with construction activity.

No mitigative measures are recommended for Boreal Chickadee other than ensuring that clearing is conducted outside of the breeding season. The property provides only marginal nesting habitat for this species.

In the event that clearing occurs in the early spring, Environment Canada (B. Jeffrey pers. comm. March 2004) has requested that rare plant surveys be conducted in adjacent HRM lands as compensation for not conducting rare plant and breeding bird surveys on the proposed sludge management facility site. Emphasis would be placed on searching for populations of southern twayblade, an at risk species that has a known population located 800 m north of the proposed facility. If the site clearing does not take place before April 15 it will be necessary to delay clearing and site construction until after mid-August. In this instance, breeding bird surveys and rare plant surveys should be conducted on the proposed facility site and no supplemental rare plant surveys would be conducted on adjacent HRM lands.

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