

**HALIFAX REGIONAL MUNICIPALITY
BIOPHYSICAL INVENTORY AT
PROPOSED BIOSOLIDS FACILITY**

PROJECT NO. NSD18631-1

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FINAL REPORT TO

HALIFAX REGIONAL MUNICIPALITY

ON

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

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1.0 INTRODUCTION

An environmental screening pursuant to the *Canadian Environmental Assessment Act (CEAA)* was completed and approved for the Halifax Harbour Solutions Project (HHSP) including a biosolids facility at Aerotech Park in the Halifax Regional Municipality (HRM). Construction of the biosolids facility could begin as early as Fall 2004. Because the location of the biosolids facility was not finalized during the screening, a follow up study for the biosolids facility was required as a condition of EA approval for the HHSP, 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.

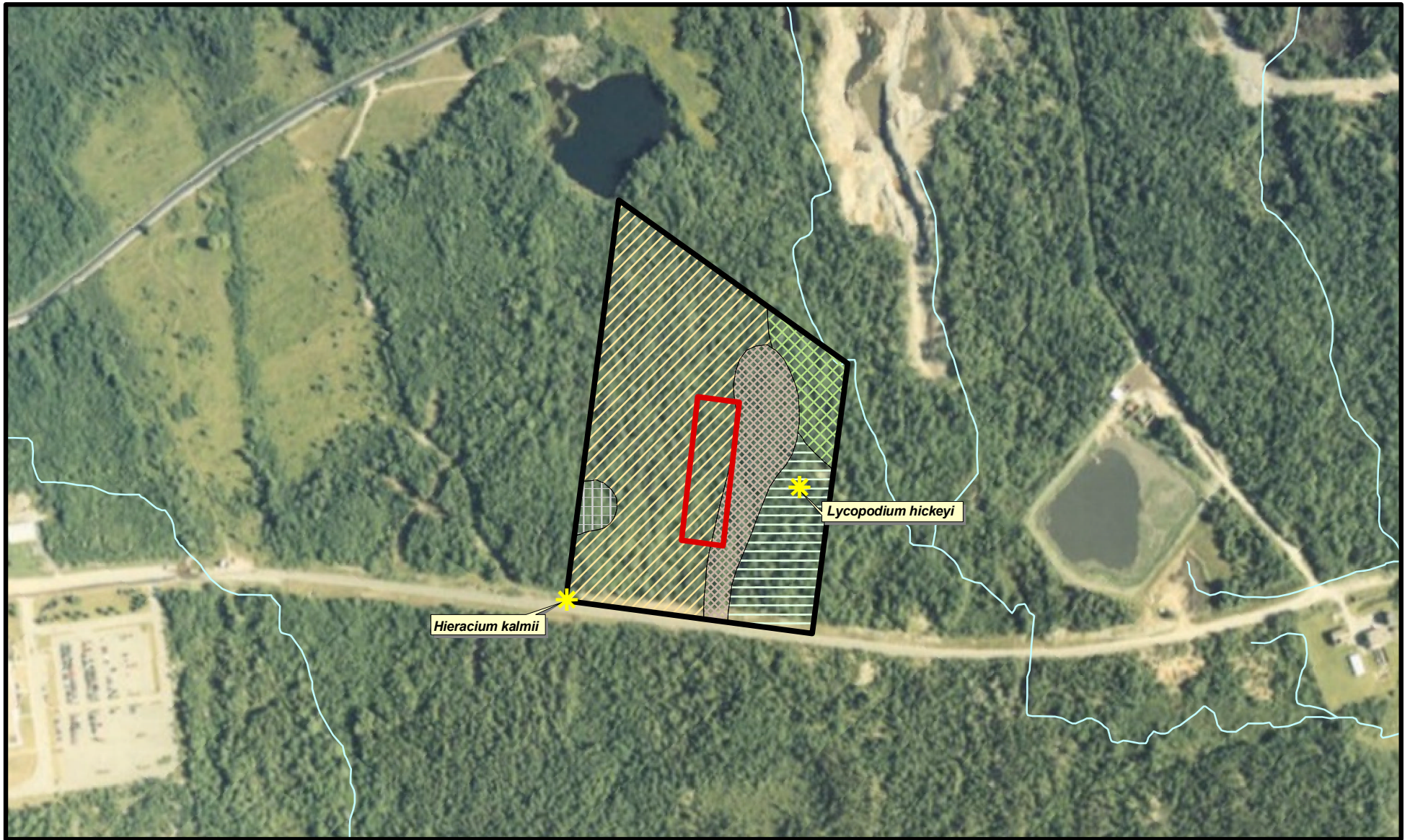
HRM retained Jacques Whitford to undertake a survey at the proposed site in Aerotech Park (Figure 1) and consult with Environment Canada.

With regard to the protection of breeding bird habitats, 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. The bird breeding season is finished by mid-August. Given the timing of the field survey (August 27, 2004), it was not possible to conduct a complete breeding bird survey. However, a rare plant survey was conducted at the appropriate time of year (August 2004).



Given the time constraints for the project, and the fact that the HHSP will fundamentally benefit the environment, a combination desktop study has been combined with limited field surveys to provide the information required in order to permit site construction to begin in Fall 2004. It is believed that the desktop investigation for bird and plant species, the rare plant survey and incidental observation of birds during the survey, and habitat modelling will satisfy the HRM requirements for the EA condition of approval.

In this approach, a list of breeding bird species and rare plant species that can be expected to be present at the proposed 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 studies conducted at the site (*i.e.*, Dillon Consulting 2003). Site visits were conducted by a field biologist on August 27, 2004. The biologist's experience with other surveys in the site area provided additional knowledge regarding the potential presence of rare species.



Legend

-  Facility Location
-  Study Area Boundary

Forest Classification






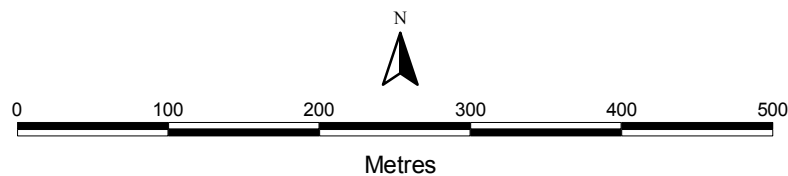
-  Red Maple / Balsam Fir Forest
-  Red Spruce / Balsam Fir Forest
-  White Pine / White Birch Forest
-  Red Maple / White Birch Forest
-  Red Maple / Yellow Birch Forest

Figure 1

Aerotech Park Biosolids Facility Location



Map Parameters
 Projection: UTM
 Zone: 20
 Datum: NAD83
 Scale: 1:5,000
 Project NSD18631
 Date: September 28, 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 CEAA 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 survey would have been preferable prior to site clearing.

2.0 RESULTS AND DISCUSSION

2.1 Habitat Types on the Property

The property is 7.1 ha in size and is located on rolling terrain. The entire property is forested and the forest plant communities present on the site can be subdivided into five types including red maple/balsam fir forest, red spruce/balsam fir forest, white pine/white birch forest, red maple/white birch forest, and red maple/yellow birch forest. Forests in the study area are of relatively uniform age and appear to have developed following a forest fire. Aerial photography from 1964 shows a regenerating burn that encompasses the study area. Based on the air photo evidence, the age of the forest in the study area is estimated to be approximately 50 years.

Red Maple/Balsam Fir Forest

This plant community is the most common community in the study area and is found throughout the western half of the study area (Figure 1). It is associated with mesic conditions. The tree canopy is relatively open and is composed of a mixture of red maple (*Acer rubrum*), balsam fir (*Abies balsamea*), red spruce (*Picea rubens*), and American larch (*Larix laricina*). The shrub understory consists mainly of ericaceous shrubs including sheep laurel (*Kalmia angustifolia*), velvetleaf blueberry (*Vaccinium myrtilloides*) and late lowbush blueberry (*Vaccinium angustifolium*). Other species characteristic of the shrub layer include possum-haw viburnum (*Viburnum nudum*) and advanced regeneration of balsam fir and red spruce. The ground vegetation layer is rather sparse and is composed mainly of dwarf dogwood (*Cornus canadensis*), wild lily-of-the-valley (*Maianthemum canadense*), and bracken fern (*Pteridium aquilinum*).

Red Spruce/Balsam Fir Forest

This forest plant community is found near the center of the study area on imperfectly drained soils (Figure 1). The tree canopy is composed of a mixture of red spruce, balsam fir, red maple, and yellow birch (*Betula alleghaniensis*). The shrub layer is very sparse and consists of scattered advanced regeneration of balsam fir, red maple and mountain maple (*Acer spicatum*). The ground vegetation layer is characterized by a patchy cover of mosses and liverworts. The most abundant species are Sphagnum moss (*Sphagnum* spp.), bazzania (*Bazzania* sp.) and stair-step moss (*Hylocomium splendens*). Other

common ground vegetation species include New York fern (*Thelypteris noveboracensis*), cinnamon fern (*Osmunda cinnamomea*), wild sarsaparilla (*Aralia nudicaulis*), and goldthread (*Coptis trifolia*).

White Pine/White Birch Forest

This plant community is located near the south-eastern corner of the property (Figure 1). It is associated with dry stony soils and areas of rock outcropping. The tree canopy is dominated by white pine (*Pinus strobus*), white birch (*Betula papyrifera*), red spruce, and red maple. Ericaceous shrubs dominate the shrub understory, the most abundant of which are sheep laurel and late lowbush blueberry. Possum-haw viburnum and red spruce seedlings are also common constituents of the shrub layer. The ground vegetation layer consists mainly of bracken fern, dwarf dogwood and teaberry (*Gaultheria procumbens*).

Red Maple/White Birch Forest

Red maple/white birch forest is found in the riparian zone along a stream that flows across the northeastern corner of the study area (Figure 1). This area is moist and underlain by relatively fertile soils in comparison to adjacent forest stands. The canopy consists almost entirely of red maple with a few scattered white birch. The shrub understory is poorly developed and is composed mainly of speckled alder (*Alnus incana*) and saplings of red maple and balsam fir. The ground vegetation is lush, consisting mostly of a mixture of blue-joint reedgrass (*Calamagrostis canadensis*), lady-fern (*Athyrium filix-femina*) and bearded short-husk (*Brachyelytrum erectum*) along with lesser quantities of wild sarsaparilla, sphagnum moss, parasol white-top (*Aster umbellatus*), cinnamon fern, and bracken fern.

Red Maple/Yellow Birch Forest

This is the smallest plant community in the study area. It is found only in an imperfectly drained area near the southwestern corner of the study area (Figure 1). The species composition of this plant community suggests that this site is relatively fertile. The tree canopy consists of a mixture of red maple, yellow birch and white ash (*Fraxinus americana*). The shrub understory consists mainly of tree seedlings and saplings, the most abundant of which are balsam fir, large-tooth aspen (*Populus grandidentata*), red maple, and white ash. The ground vegetation layer is well developed and consists of a variety of species including lady-fern, dwarf red raspberry (*Rubus pubescens*), bristly dewberry (*Rubus hispidus*), whorled aster (*Aster acuminatus*), interrupted fern (*Osmunda claytonina*), rough-leaf goldenrod (*Solidago rugosa*), and parasol white-top.

2.2 Rare Plants

Information regarding the presence of rare or uncommon vascular plant species in the study area was derived from an information request to the Atlantic Canada Conservation Data Centre (ACCDC) as well as a field survey conducted on August 27, 2004. 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 2004) 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 previously 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).

Species	Preferred Habitat	ACCDC Status	NSDNR Status
<i>Betula nana</i> (swamp birch)	Bogs	S2	Yellow
<i>Equisetum variegatum</i> (variegated horsetail)	Streambanks, bogs, wet thickets, ditches, quarries, and gold tailings	S3	Green
<i>Liparis loeselii</i> (Loesel's twayblade)	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> (southern twayblade)	Associated with sphagnum moss in bogs or swamps	S1	Red
<i>Hieracium kalmii</i> (Kalm's Hawkweed)	Roadsides, rough ground, clearings and thickets	S2?	Undetermined
<i>Lycopodium hickeyi</i> (Hickey's clubmoss)	Shrubby second growth areas and deciduous forests	S2?	Not Assessed
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 flowers in June and senesces in July. This species would not be detected during the August field survey. It 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. Jacques Whitford staff are familiar with the habitat preferences of this species having conducted the southern twayblade monitoring program at the Halifax International Airport and have found this species elsewhere in Nova Scotia. The field survey did not reveal the presence of habitat suitable for southern twayblade; consequently, the probability of this species being present in the study area 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 at all times of the year. The ditch and roadside embankment along the southern edge of the study area as well as the edge of the abandoned quarry at the northwestern corner of the study area were searched during the field survey, however, variegated horsetail was not found.

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 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. Although this species flowers earlier in the summer it has distinctive vegetative characteristics that permit it to be readily identified throughout the summer. Loisel's twayblade was not found during the field survey.

Two species listed as rare in Nova Scotia and not previously recorded in the general area were found in the study area during the field survey. These included Kalm's Hawkweed (*Hieracium kalmii*) and Hickey's clubmoss (*Lycopodium hickeyi*). Both species are listed as S2? indicating that there are fewer than 10 records for the province, however, the status of the species is poorly known. The NSDNR population status assigned to Kalm's hawkweed is undetermined indicating that the status of the Nova Scotia population is poorly known. The population status of Hickey's clubmoss has not been assessed by NSDNR.

Kalm's hawkweed is difficult to distinguish from the more common Canada hawkweed (*Hieracium canadense*) and may tend to be overlooked. Until recently, Hickey's clubmoss was considered a variety of ground pine (*Lycopodium obscurum*) a common forest understory species in Nova Scotia. The two species are very similar and until the existing collections are examined and further collections are made the status of this species will remain uncertain.

Kalm's hawkweed is typically found in disturbed areas, often at the edges of disturbed areas where they abut forested habitats. In the study area it was found in disturbed roadside habitat at the southwest corner of the property (Figure 1). Three plants were found at this location. A voucher specimen was collected for identification. This specimen will be submitted to the Nova Scotia Museum to confirm the identification.

Hickey's clubmoss is typically found in second growth woodlands and deciduous forest. One Hickey's ground pine was found in the study area under a cover of spruce and pine at the edge of a rock outcrop near the eastern boundary of the study area (Figure 1).

Both species were found around the margins of the study area. These areas will be maintained as a buffer so construction and operation of the facility is not expected to adversely affect these species. Construction of an access road to the site could affect Kalm's hawkweed if the road is constructed in the southwest corner of the property. It is anticipated that an access road can be constructed further east to avoid this population.

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 August 27, 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).

Additional information regarding use of the property by birds was derived from a field survey conducted on August 27, 2004. This survey was conducted after the end of the breeding season but before most terrestrial bird species had begun to migrate. The information collected provides a partial list of bird species that can be expected to nest on 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 behaviour, 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 are listed as nationally at risk species (COSEWIC 2004) 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 (7.1 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	
*Sharp-shinned Hawk	<i>Accipiter striatus</i>	Green	S4	Possible Nester	X
Northern Goshawk	<i>Accipiter gentilis</i>	Yellow	S3	Possible Nester	
*Broad-winged Hawk	<i>Buteo platypterus</i>	Green	S4	Possible Nester	X
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	
American Woodcock	<i>Scolopax minor</i>	Green	S4S5	Probable Nester	
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	
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	X
*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	X
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	X
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	Green	S5	Possible Nester	
Alder Flycatcher	<i>Empidonax alnorum</i>	Green	S5	Confirmed Nester	
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	

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 (7.1 ha)
Tree Swallow	<i>Tachycineta bicolor</i>	Green	S5	Confirmed Nester	
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	X
*Common Raven	<i>Corvus corax</i>	Green	S5	Probable Nester	X
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	X
Golden-crowned Kinglet	<i>Regulus satrapa</i>	Green	S5	Probable Nester	X
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	
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	
Nashville Warbler	<i>Vermivora ruficapilla</i>	Green	S5	Confirmed Nester	X
Northern Parula	<i>Parula americana</i>	Green	S5	Confirmed Nester	X
Yellow Warbler	<i>Dendroica petechia</i>	Green	S5	Confirmed Nester	
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	X
*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	X
*Black-and-white Warbler	<i>Mniotilta varia</i>	Green	S5	Confirmed Nester	X
American Redstart	<i>Setophaga ruticilla</i>	Green	S5	Confirmed Nester	
Ovenbird	<i>Seiurus aurocapillus</i>	Green	S5	Confirmed Nester	X
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	
Chipping Sparrow	<i>Spizella arborea</i>	Green	S5	Confirmed Nester	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	Green	S5	Probable Nester	
Song Sparrow	<i>Melospiza melodia</i>	Green	S5	Confirmed Nester	
Lincoln's Sparrow	<i>Melospiza lincolni</i>	Green	S5	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 (7.1 ha)
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	
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	
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	X
White-winged Crossbill	<i>Loxia leucoptera</i>	Green	S5	Possible nester	X
Pine Siskin	<i>Carduelis pinus</i>	Green	S5	Probable Nester	X
*American Goldfinch	<i>Carduelis tristis</i>	Green	S5	Probable Nester	X
Evening Grosbeak	<i>Coccothraustes vespertina</i>	Green	S5	Possible nester	X
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.

*= Species observed during site visit

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 are 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 the forest stands present on the property are denser than those preferred by Eastern Bluebirds.

Black-backed Woodpeckers typically nest in mature softwood forest although they are often found nesting in small islands of coniferous forest in clear-cuts. Black-backed Woodpecker workings were found within the study area during the field survey. There was no evidence to indicate that this species was nesting in the area but there is suitable nesting habitat.

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 study area is completely forested and would not 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 red spruce/balsam fir forest could be used as nesting habitat by Boreal Chickadees.

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. The study area is completely forested and would not provide suitable nesting habitat.

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 the property so there is no potential for this species to nest there.

Red Crossbills nest in mature coniferous forest. They are unusual in that they nest during both the winter and summer. Crossbills typically nest in areas where there are good cone crops that provide their primary food source. Crossbills often shift their distribution widely over the landscape in search of good cone crops. The property contains large numbers of mature spruce trees that would provide a good winter food source. The area surrounding the study area produced a large cone crop in 2004, which will probably attract large numbers of White-winged Crossbills and potentially some of the rarer Red Crossbills to the general area. As such, there is potential for the study area to be nesting habitat for Red Crossbills, particularly during the winter of 2004/2005.

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 42 bird species could reasonably be expected to nest on the site.

Twenty species of bird were detected on or near the property during the August 27, 2004 site visit. These species are listed in Table 2. No owls were detected during the evening owl surveys conducted in late March. All of these species with the exception of Northern Harrier could be expected to nest on the property. Northern harriers typically nest in marshes, swamps and dense grasslands which are not present in the study area. The Northern Harrier observed during the field survey was probably transiting through the study area to feeding areas around the airport.

The results of the breeding bird modelling exercise and field visit suggest that the property may be used by as many as 42 bird species. Three uncommon species, Black-backed Woodpecker, Boreal Chickadee and Red Crossbill may nest on the property. The populations of all three species in Nova Scotia are

considered to be secure by NSDNR and they are listed as uncommon to common by ACCDC. Loss of this habitat is not expected to have a significant adverse effect on local populations of Black-backed Woodpecker, Boreal Chickadee or Red Crossbill.

The intentional killing of migratory birds or the destruction of their eggs, or young is an offence under the *Migratory Birds Convention Act*. As such, it is recommended that site clearing be conducted during the period from September to February when no nesting activity occurs. If clearing occurs during the period from February to April, a survey should be conducted to determine if early nesting species such as crossbills and owls are nesting in the study area. If nests are found, a buffer zone should be established around the nest and no activity would be permitted inside the buffer zone. The size of the buffer zone will vary depending on the sensitivity of the species and will be determined in consultation with the Canadian Wildlife Service (migratory birds) or NSDNR (species not protected by the *Migratory Birds Convention Act*). It is recommended that no clearing be conducted after April 15.

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 2004) 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. There is an abandoned quarry located at the northwestern corner of the property that would provide suitable habitat. This quarry is up slope of the proposed site of the facility and the

facility is surrounded by a vegetated buffer zone. Construction and operation of the facility are not expected to adversely affect water quality in the quarry. There is a small stream that passes through the northeastern corner of the property. It is located outside of the area to be cleared.

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

Two rare plant species, Kalm's hawkweed and Hickey's clubmoss, were encountered in the study area during the field survey. Both species were found around the periphery of the property and can easily be avoided during the construction phase of the project. The operational phase of the project is not expected to affect these species.

The breeding bird modelling study indicates that there is potential for three bird species listed as uncommon to fairly common by ACCDC to nest in the study area. These include Black-backed Woodpecker, Boreal Chickadee and Red Crossbill. All of these species are considered to be secure in Nova Scotia by NSDNR. No mitigative measures are recommended for these species other than ensuring that clearing is conducted outside of the breeding season. If clearing is scheduled for the period between February and April, a survey should be conducted to determine if any early nesting bird species such as Red Crossbill are nesting on the site.

4.0 LITERATURE CITED

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