# APPENDIX I

# WETLAND EVALUATIONS

## TABLE OF CONTENTS

Page No.

# 1.0 Introduction

In Nova Scotia, wetlands are protected by the NSDEL Wetlands Directive. Any loss of wetland requires preparation of a wetland evaluation to establish the value of the wetland in relation to the merits of the development. Wetland evaluations are required if a project will physically disturb a wetland or if the hydrology of the wetland will be altered by construction or operation of the project. Wetlands greater than two hectares in size are evaluated using the North American Wetlands Conservation Council (Canada) wetland evaluation technique. Wetlands less than two hectares in size can be evaluated using a ten-step evaluation process used by NSDEL.

The RoW for the proposed section of 100 Series Highway at Antigonish passes through 20 wetlands. Wetland surveys were conducted in all of these wetlands with the exception of Wetland 5 which had been infilled prior to wetland field surveys. The wetland surveys were conducted to provide the information required to conduct wetland evaluations for any of these wetlands which may be adversely affected by construction and operation of the highway. The wetland surveys collected a variety of information including the type of wetland and a description of its hydrology, a description of the wetland habitat types present in the wetland, inventories of vascular plants, birds, mammals, reptiles and amphibians present in the wetland, any evidence of anthropogenic use of the wetland, and any evidence of damage to the wetland caused by anthropogenic activities. The information collected for each wetland was derived largely from field surveys since there is little existing information for most wetlands in Nova Scotia. Each wetland was visited twice, once in June and once in August 2002. The sizes and locations of the wetlands were determined from 1:10,000 scale topographic mapping of the highway route and 1:10,000 scale air photography. The topographic mapping was used as the base mapping and the air photos in conjunction with the field surveys were used to more precisely define the boundaries of the wetlands. Wetland 19 did not appear on the topographic mapping and was delineated using the air photography. The location of the wetlands along the RoW are presented in Figure 5.4 (a and b) in the main portion of the EA report.

A summary of wetland characteristics have been provided in Table I1. The results of the vascular plant surveys conducted in each wetland are presented in Table I2. Wetland evaluations were conducted for all wetlands found within the RoW of the highway. Four of the 19 wetlands evaluated are greater than two hectares in size and were evaluated using the North American Wetlands Conservation Council (Canada) wetland evaluation technique. The remaining 15 wetlands were evaluated using the NSDEL ten-step evaluation process. The wetland evaluations are presented in the following text.

## 2.0 Wetland Descriptions

A summary description is provided for each of the 19 wetlands in Table I1 below. Table I2 lists the vascular plant species encountered in each wetland.

| **Table I1 Wetland Evaluations** | |
|---|---|
| **Wetland 1** | |
| Wetland Type: | Wetland complex composed of stream marsh, low shrub dominated stream swamp, tall shrub dominated stream swamp, and mixedwood treed stream swamp. |
| Size: | 11.23 ha |
| Dominant Vegetation: | Stream marsh (Type 1) |
| Trees: | None |
| Shrubs: | *Spiraea alba* <1 % |
| Ground Vegetation: | *Typha latifolia* 40 %, *Proserpinaca palustris* 25 %, *Cicuta bulbifera* 5 %, *Potentilla palustris* 2 %. |
| Dominant Vegetation: | Stream marsh (Type 2) |
| Trees: | None |
| Shrubs: | *Myrica gale* 6 %, *Spiraea alba* 5 %, *Alnus incana* 2 %. |
| Ground Vegetation: | *Carex canescens* 30 %, *Carex nigra* 25 %, *Carex echinata* 10 %, *Cicuta bulbifera* 8 %, *Scirpus cyperinus* 5 %. |
| Dominant Vegetation: | Low shrub dominated stream swamp (Type 1) |
| Trees: | None |
| Shrubs: | *Spiraea alba* 40 %, *Myrica gale* 10 %, *Salix pyrifolia* 3 %, *Alnus incana* 2 %. |
| Ground Vegetation: | *Carex echinata* 25 %, *Carex scoparia* 5 %, *Cicuta bulbifera* 2 %. |
| Dominant Vegetation: | Low shrub dominated stream swamp (Type 2) |
| Trees: | None |
| Shrubs: | *Myrica gale* 40 %, *Chamaedaphne calyculata* 10 %, *Spiraea alba* 5 %. |
| Ground Vegetation: | *Typha latifolia* 35 %, *Proserpinaca palustris* 10 %. |
| Dominant Vegetation: | Tall shrub dominated stream swamp |
| Trees: | None |
| Shrubs: | *Alnus incana* 50 %, *Spiraea alba* 5 %. |
| Ground Vegetation: | *Onoclea sensibilis* 20 %, *Calamagrostis canadensis* 15 %, *Glyceria canadensis* 7 %, *Cicuta bulbifera* 5 %, *Sium suave* 2 %. |
| Dominant Vegetation: | Mixedwood treed stream swamp |

| **Table I1 Wetland Evaluations** | |
|---|---|
| Trees: | *Picea mariana* 20 %, *Acer rubrum* 5 %. |
| Shrubs: | *Alnus incana* 25 %, *Spiraea alba* 10 %, *Acer rubrum* 7 %. |
| Ground Vegetation: | *Sphagnum* spp. 90 %, *Osmunda cinnamomea* 40 %, *Calamagrostis canadensis* 10 %, *Carex trisperma* 10 %, *Bidens cernua* 1 %. |
| Vascular plant list: | See Table I2. Two uncommon vascular plant species, *Proserpinaca palustris* and *Lysimachia thyrsiflora* present. Both species are listed as S3 by ACCDC. Nova Scotia populations of both species are considered to be secure by NSDNR. |
| Wildlife: | No rare or sensitive species present. |
| Birds: | Common Snipe, Blue Jay, Cedar Waxwing, Blue-headed Vireo, Common Yellowthroat, Red-winged Blackbird, Swamp Sparrow, American Goldfinch. |
| Mammals: | Beaver, Red Squirrel, Varying Hare, White-tailed Deer. |
| Herpetiles: | Leopard Frog, Northern Spring Peeper, Green Frog. |
| Hydrology: | Probably has moderate value in regards to surface flow regulation (augments stream flows during dry periods and helps to control flooding by storing flood water and slowing the flow of water). |
| Anthropogenic uses: | A small portion of the wetland was infilled during construction of Highway 104. |
| Comments: | Receives potentially contaminated drainage from Highway 104. |
| **Wetland 2** | |
| Wetland Type: | Tall shrub basin swamp/basin marsh complex |
| Size: | 0.42 ha. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Picea glauca* 5% |
| Shrubs: | *Alnus incana* 70% |
| Ground Vegetation: | *Impatiens capensis* 20%, *Osmunda cinnamomea 15%, Onoclea sensibilis* 10 %, *Glyceria striata* 7%, and *Aster puniceus* 3%. |
| Dominant Vegetation | Basin marsh |
| Trees: | None |
| Shrubs: | *Alnus incana* 5% |
| Ground Vegetation: | *Typha latifolia* 40%, *Onoclea sensibilis* 30%, *Thelypteris palustris* 15%, *Solidago canadensis* 7%, and *Cicuta bulbifera* 5%. |
| Vascular plant list: | See Table I2. One uncommon vascular plant species, *Asclepias incarnata* present. *Asclepias incarnata* is listed as S3 by ACCDC. Nova Scotia population considered to be secure by NSDNR. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| Wildlife: | No rare or sensitive species present. |
| Birds: | Red-breasted Nuthatch, Ovenbird, Swamp Sparrow, and American Goldfinch |
| Mammals: | Racoon and White-tailed Deer |
| Herpetiles: | Northern Spring Peeper |
| Hydrology: | A small wetland located near the headwaters of a small brook. Appears to be a groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | Wetland is surrounded by roads. May receive contaminated drainage. Dry ephemeral pool present. |
| | **Wetland 3** |
| Wetland Type: | Coniferous treed basin swamp/tall shrub basin swamp |
| Size: | 0.95 ha. |
| Dominant Vegetation: | Coniferous treed basin swamp |
| Trees: | *Picea mariana* 15%, *Larix laricina* 7%, *Acer rubrum* 5% |
| Shrubs: | *Rubus hispidus* 15 %, *Spiraea alba* 7 %, *Alnus incana* 5%, *Nemopanthus mucronata* 2%, *Ilex verticillata* 2% |
| Ground Vegetation: | *Sphagnum spp.* 80%, *Carex echinata* 25%, *Eriophorum virginicum* 7 %, *Lysimachia terestris* 5 %, *Triadenum fraseri* 4 %, *Aster umbellatus* 2 % |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Picea mariana* <1 %, *Larix laricina* <1 % |
| Shrubs: | *Alnus incana* 60%, *Ilex verticillata* 20 % |
| Ground Vegetation: | *Sphagnum spp.* 30%, *Calamagrostis canadensis* 25 %, *Lycopus uniflorus* 10 %, *Glyceria canadensis* 10 %, *moss sp.* 10 %, *Osmunda cinnamomea* 5 %, *Smilacina trifolia* 5 %, *Galium sp.* 4 % |
| Vascular plant list: | See Table I2. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Common Grackle, American Goldfinch |
| Mammals: | White-tailed Deer |
| Herpetiles: | None |
| Hydrology: | Basin swamp with no inflow and poorly developed outflow. Headwater of tributary to West River. Probable groundwater discharge site. |
| Anthropogenic uses: | Some timber harvesting has occurred around the margins of the wetland. |
| Comments: | None |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| | **Wetland 4** |
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.71 ha. |
| Dominant Vegetation: | |
| Trees: | *Acer rubrum* 10%, *Picea glauca* 5% |
| Shrubs: | *Alnus incana* 60 %, *Rubus hispidus* 20 %, *Ilex verticillata* 10 %. |
| Ground Vegetation: | *Sphagnum* spp. 70 %, *Osmunda cinnamomea* 30 %, *Iris versicolor* 8 %, *Osmunda regalis* 5 %, *Carex trisperma* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Black-capped Chickadee, Cedar Waxwing. |
| Mammals: | White-tailed Deer, Racoon, Striped Skunk, Varying Hare. |
| Herpetiles: | None |
| Hydrology: | Basin swamp at the headwater of a small stream. Probable groundwater discharge area. |
| Anthropogenic uses: | Timber harvesting has occurred in the area surrounding the wetland. |
| Comments: | None |
| | **Wetland 5** |
| Wetland Type: | Shallow anthropogenic pond which has recently been infilled. |
| | **Wetland 6** |
| Wetland Type: | Wetland complex composed of shallow basin marsh, tall shrub basin swamp, deciduous treed basin swamp |
| Size: | 4.27 ha |
| Dominant Vegetation: | Shallow basin marsh (Type 1) |
| Trees: | None |
| Shrubs: | None |
| Ground Vegetation: | *Typha latifolia* 40 %, *Calamagrostis canadensis* 35 %, *Impatiens capensis* 5 %. |
| Dominant Vegetation: | Shallow basin marsh (Type 2) |
| Trees: | None |
| Shrubs: | None |
| Ground Vegetation: | *Calamagrostis canadensis* 90 %. |
| Dominant Vegetation: | Tall shrub basin swamp |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| Trees: | *Acer rubrum* 1 %. |
| Shrubs: | *Alnus incana* 60 %, *Cornus sericea* 5 %, *Prunus virginiana* 2 %. |
| Ground Vegetation: | *Onoclea sensibilis* 30 %, *Calamagrostis canadensis* 20 %, *Impatiens capensis* 10 %. |
| Dominant Vegetation: | Deciduous treed basin swamp |
| Trees: | *Acer rubrum* 40 %. |
| Shrubs: | *Alnus incana* 5 %, *Acer rubrum* 5 %, *Spiraea alba* 2 %, *Ilex verticillata* 2 %. |
| Ground Vegetation: | *Osmunda cinnamomea* 70 %, *Carex gynandra* 10 %, *Calamagrostis canadensis* 8 %, *Impatiens capensis* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Cedar Waxwing, American Robin, Swamp Sparrow, American Goldfinch. |
| Mammals: | Red Squirrel, White-tailed Deer, Racoon. |
| Herpetiles: | Northern Spring Peeper. |
| Hydrology: | The wetland receives surface water inflow from a developed area (residential and light industry) on the west side of Trunk 7. Water discharges from the wetland near Highway 104 and flows through the town of Antigonish. Drainage course through wetland poorly developed. A few small scattered pools at the time of the field survey. Wetland probably has moderate value in regards to surface flow regulation (augments stream flows during dry periods and helps to control flooding by storing flood water and slowing the flow of water). |
| Anthropogenic uses: | Timber harvesting conducted in the northwestern quarter of the wetland. Causeway has been constructed across the eastern end of the wetland. |
| Comments: | Receives potentially contaminated drainage from Highway 104, Trunk 7 and residential areas along Trunk 7. |
| **Wetland 7** | |
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.09 ha. |
| Dominant Vegetation: | |
| Trees: | None |
| Shrubs: | *Alnus incana* 70 %, *Ilex verticillata* <1 %, *Picea glauca* <1 % |
| Ground Vegetation: | *Rubus pubescens* 17 %, *Sphagnum* spp. 15 %, *Osmunda cinnamomea* 10 %, *Glyceria striata 10 %, Onoclea sensibilis* 8 %, *Poa palustris* 7 %, *Calamagrostis canadensis* 5 %. |

| **Table I1 Wetland Evaluations** | |
|---|---|
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, American Goldfinch, Red-eyed Vireo, Black-and-white Warbler, Cedar Waxwing |
| Mammals: | White-tailed Deer |
| Herpetiles: | None encountered. |
| Hydrology: | The wetland receives surface water flow from a hay field to the west. This drainage appears to occur intermittently after precipitation events. Water discharges from the wetland into a small tributary of the West River. No surface water was present at the time of the field surveys (June 18 and August 20). Wetland does not appear to be a groundwater recharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | Wetland may receive contaminants including pesticides, nutrients and sediment from the hay field. |
| **Wetland 8** | |
| Wetland Type: | Wetland complex composed of tall shrub basin swamp, and basin marsh. |
| Size: | 0.42 ha. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Larix laricina* 5 %, *Acer rubrum* 3 %, *Picea glauca* 1 %. |
| Shrubs: | *Alnus incana* 40 %, *Spiraea alba* 30 %, *Rubus hispidus* 5 %. |
| Ground Vegetation: | *Sphagnum* spp. 70 %, *Carex echinata* 10 %, *Solidago uliginosa* 5 %, *Dryopteris cristata* 2 %, *Viola cucculata* 1 %. |
| Dominant Vegetation: | Basin Marsh |
| Trees: | None |
| Shrubs: | *Alnus incana* 5 %, *Spiraea alba* 2 %. |
| Ground Vegetation: | *Dulichium arundinacea* 70 %, *Typha latifolia* 15 %, *Iris versicolor* 8 %, *Triadenum fraseri* 7 %, *Juncus canadensis* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Northern Flicker, Black-capped Chickadee, Common Yellowthroat, American Goldfinch. |
| Mammals: | Racoon, Red Squirrel, White-tailed Deer. |
| Herpetiles: | Northern Spring Peeper. |

| **Table I1 Wetland Evaluations** | |
|---|---|
| Hydrology: | Wetland forms the headwater for a small tributary which drains into the West River. No surface water present at time of survey. Probable groundwater discharge site. |
| Anthropogenic uses: | The basin marsh habitat appears to have been created by human activity. |
| Comments: | None. |
| **Wetland 9** | |
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.31 ha. |
| Dominant Vegetation: | |
| Trees: | *Larix laricina* 5 %, *Picea glauca* 2 % |
| Shrubs: | *Alnus incana* 40 %, *Spiraea alba* 25 %. |
| Ground Vegetation: | *Carex nigra* 20 %, *Carex echinata* 20 %, *Solidago gigantea* 18 %, *Agrostis stolonifera* 15 %, *Carex panicea* 10 %, *Iris versicolor* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | One provincially uncommon species, Boreal Chickadee, recorded. |
| Birds: | Ruby-crowned Kinglet, Boreal Chickadee, Cedar Waxwing, Yellow-rumped Warbler, Magnolia Warbler, Common Yellowthroat, Evening Grosbeak. |
| Mammals: | Red Squirrel, White-tailed Deer |
| Herpetiles: | None noted. |
| Hydrology: | Basin swamp which forms the headwater for a small tributary which drains into the West River. No surface water present at time of survey. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None. |
| **Wetland 10** | |
| Wetland Type: | Wetland complex composed of tall shrub stream swamp, and stream marsh. |
| Size: | 0.50 ha. |
| Dominant Vegetation: | Tall shrub stream swamp |
| Trees: | None |
| Shrubs: | *Alnus incana* 70 %, *Ilex verticillata* 5 %. |
| Ground Vegetation: | *Sphagnum* spp. 60%, *Onoclea sensibilis* 10 %, *Agrostis stolonifera* 7 %, *Impatiens capensis* 5 %, *Polygonum sagitta*um 2 %, *Polygonum robustius* 2 %. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| Dominant Vegetation: | Stream marsh |
| Trees: | None |
| Shrubs: | None |
| Ground Vegetation: | *Juncus canadensis, Agrostis stolonifera, Leersia oryzoides, Eleocharis obtusa, Scirpus cyperinus.* (Cover estimates unavailable). |
| Vascular Plant List: | See Table I2. One uncommon species, marsh mermaid-weed (*Proserpinaca palustris*) was found in the wetland. This species is rated S3 by ACCDC and Nova Scotia population is considered secure by NSDNR. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Rock Dove, Northern Flicker, Black-capped Chickadee, Cedar Waxwing, Common Yellowthroat, American Goldfinch. |
| Mammals: | Racoon, Muskrat, White-tailed Deer. |
| Herpetiles: | Green Frog, Northern Leopard Frog, Northern Spring Peeper, probable breeding habitat for Yellow-spotted Salamander and Blue-spotted Salamander. |
| Hydrology: | The wetland has developed on the banks of a small stream which flows into the West River. |
| Anthrpogenic uses: | None noted |
| Comments: | Wetland is located within the highway RoW but not in the footprint of the road. |
| | **Wetland 11** |
| Wetland Type: | Tall shrub stream swamp |
| Size: | 2.93 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 8 %, *Abies balsamea* 5 %. |
| Shrubs: | *Alnus incana* 50 %, *Spiraea alba 15 %.* |
| Ground Vegetation: | *Senecio aurea* 20%, *Calamagrostis canadensis* 15 %, *Lysimachia ciliolata* 10 %, *Rubus pubescens* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Belted Kingfisher, Red-breasted Nuthatch, Common Yellowthroat, Common Grackle, American Goldfinch. |
| Mammals: | Red Squirrel, Beaver, Racoon, White-tailed Deer. |
| Herpetiles: | Mink Frog, Green Frog, Leopard Frog. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| Hydrology: | Wetland has developed on the banks of an unnamed brook which flows into Antigonish Harbour. Wetland probably has moderate value in regards to surface flow regulation (augments stream flows during dry periods and helps to control flooding by storing flood water and slowing the flow of water). |
| Anthrpogenic uses: | None noted. |
| Comments: | None |
| | **Wetland 12** |
| Wetland Type: | Wetland complex composed of tall shrub stream swamp and coniferous treed stream swamp. |
| Size: | 7.22 ha. |
| Dominant Vegetation: | Tall shrub stream swamp (in beaver flooding). |
| Trees: | *Acer rubrum* 2 %. |
| Shrubs: | *Alnus incana* (stressed) 40 %, *Abies balsamea* (dying) 10 %, *Cornus sericea* 2 %. |
| Ground Vegetation: | *Calamagrostis canadensis* 30 %, *Glyceria striata* 5 %, *Scirpus cyperinus* 2 %, *Carex viridula* 2 %. |
| Dominant Vegetation: | Tall shrub stream swamp (area not flooded). |
| Trees: | *Acer rubrum* 10 %, *Abies balsamea* 5 %, *Picea glauca* 5 %. |
| Shrubs: | *Alnus incana* 50 %, *Cornus sericea* 5 %, *Prunus virginiana* 1 %. |
| Ground Vegetation: | *Impatiens capensis* 40 %, *Onoclea sensibilis* 20 %, *Clematis virginiana* 15 %, *Eupatorium maculatum* 8 %, *Aster puniceus* 5 %, *Solidago gigantea* 5 %. |
| Dominant Vegetation: | Coniferous treed stream swamp (harvested). |
| Trees: | *Acer rubrum* 10 %, *Abies balsamea* 5 %. |
| Shrubs: | *Alnus incana* 25 %, *Ilex verticillata* 15 %, *Acer rubrum* 5 %. |
| Ground Vegetation: | *Osmunda cinnamomea* 60 %, *Sphagnum* spp. 40 %, *Rubus pubescens* 12 %, *Onoclea sensibilis* 10 %, *Eupatorium maculatum* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Great Blue Heron, Common Snipe, American Woodcock, Mourning Dove, Belted Kingfisher, Ruby-throated Hummingbird, Northern Flicker, Hairy Woodpecker, Downy Woodpecker,Alder Flycatcher, Olive-sided Flycatcher, Cedar Waxwing, American Robin, Common Yellowthroat, Common Grackle, Song Sparrow, Purple Finch, American Goldfinch. |
| Mammals: | Meadow Vole, Beaver, Red Squirrel, Coyote, White-tailed Deer. |
| Herpetiles: | Northern Spring Peeper, Leopard Frog, Green Frog. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| Hydrology: | Wetland has developed on the banks of an unnamed brook which flows into Antigonish Harbour. Wetland probably has moderate value in regards to surface flow regulation (augments stream flows during dry periods and helps to control flooding by storing flood water and slowing the flow of water). |
| Anthrpogenic uses: | The northeastern quarter of the wetland has been clear-cut in the past few years. |
| Comments: | The western end of the wetland has been flooded by recent beaver activity which has created pools, killed trees and reduced amount of shrub cover. This has made this portion of the wetland attractive to fish eating birds such as Great Blue Heron and Belted Kingfisher, species which prefer more open wetland habitats such as Common Snipe and woodpeckers such as Northern Flicker, Hairy Woodpecker and Downy Woodpecker. The pools and wheel ruts from timber harvesting provide amphibian breeding habitat. |
| | **Wetland 13** |
| Wetland Type: | Wetland Complex composed of mixedwood treed basin swamp and tall shrub basin swamp. |
| Size: | 0.94 ha. |
| Dominant Vegetation: | Mixedwood treed basin swamp. |
| Trees: | *Acer rubrum* 50%, *Abies balsamea* 20 %, *Betula papyrifera* 5 %, *Fraxinus americana* 5 %. |
| Shrubs: | *Alnus incana* 25 %, *Cornus sericea* 5 %, *Abies balsamea* 2 %, *Ribes hirtellum* <1 %. |
| Ground Vegetation: | *Impatiens capensis* 30 %, *Osmunda cinnamomea* 25 %, *Rubus pubescens* 20 %, *Onoclea sensibilis* 15 %, *Aster puniceus* 5 %. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | None |
| Shrubs: | *Alnus incana* 40 %, *Abies balsamea* 2 %. |
| Ground Vegetation: | *Impatiens capensis* 70 %, *Onoclea sensibilis* 15 %, *Polygonum sagittatum* 10 %, *Aster puniceus* 5 %, *Glyceria striata* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Pileated Woodpecker, American Robin, White-throated Sparrow, American Goldfinch. |
| Mammals: | Deer Mouse, Red Squirrel, White-tailed Deer. |
| Herpetiles: | None |

| **Table I1 Wetland Evaluations** | |
|---|---|
| Hydrology: | Basin swamp located along a small tributary to an unnamed stream which enters Antigonish Harbour. Probable groundwater discharge area. |
| Anthropogenic uses: | Some timber harvesting adjacent to wetland. |
| Comments: | None |
| **Wetland 14** | |
| Wetland Type: | Tall shrub basin swamp. |
| Size: | 0.23 ha. |
| Dominant Vegetation: | Tall shrub basin swamp (undisturbed). |
| Trees: | *Abies balsamea* 3 %, *Picea glauca* 2 %. |
| Shrubs: | *Alnus incana* 60 %, *Ilex verticillata* 2 %, *Abies balsamea* <1 %. |
| Ground Vegetation: | *Onoclea sensibilis* 40 %, *Aster puniceus* 10 %, *Impatiens capensis* 8 %, *Solidago canadensis* 5 %, *Sphagnum* spp. 5 %. |
| Dominant Vegetation: | Tall shrub basin swamp (heavily disturbed). |
| Trees: | None |
| Shrubs: | *Alnus incana* <1 %, *Rubus idaeus* <1 %. |
| Ground Vegetation: | *Polygonum sagittatum* 40 %, *Carex lurida* 25 %, *Juncus effusus* 20 %, *Glyceria grandis* 15 %, *Scirpus microcarpus* 10 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Black-capped Chickadee, Red-breasted Nuthatch, Cedar Waxwing, Common Grackle, Common Yellowthroat, White-throated Sparrow, American Goldfinch. |
| Mammals: | Racoon, Varying Hare. |
| Herpetiles: | None observed. |
| Hydrology: | Basin swamp located along a small tributary of the South River. Probable groundwater discharge site. |
| Anthropogenic uses: | Merchantable timber in the wetland has been harvested. No other uses noted. |
| Comments: | None |
| **Wetland 15** | |
| Wetland Type: | Tall shrub stream swamp. |
| Size: | 0.57 ha. |
| Dominant Vegetation: | |
| Trees: | *Acer rubrum* 2 %, *Picea mariana* 1 %. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| Shrubs: | *Alnus incana* 60 %, *Spiraea alba* <1 %. |
| Ground Vegetation: | *Sphagnum* spp. 35 % *Onoclea sensibilis* 30 %, *Onoclea sensibilis* 30 %, *Aster puniceus* 10 %, *Equisetum sylvaticum* 5 %, *Solidago gigantea* 5 %, *Dryopteris cristata* 3 %. |
| Vascular plant list: | See Table I2. One uncommon species, large purple-fringed orchid (*Platanthera grandiflora*), found in wetland. This species is classed as S3 by the ACCDC and the Nova Scotia population is considered secure by NSDNR. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Common Yellowthroat. |
| Mammals: | Red Squirrel, White-tailed Deer, Coyote. |
| Herpetiles: | Wood Frog, Northern Spring Peeper. |
| Hydrology: | Stream swamp located along an intermittent stream (not shown on topographic mapping). Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None. |
| **Wetland 16** | |
| Wetland Type: | Coniferous treed basin swamp. |
| Size: | 0.80 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 30 %, *Larix laricina* 5 %, *Acer rubrum* 2 %. |
| Shrubs: | *Nemopanthus mucronata* 35 %, *Ilex verticillata* 20 %, *Alnus incana* 10 %, *Viburnum nudum* 10 %, *Gaylussacia baccata* 10 %. |
| Ground Vegetation: | *Sphagnum* spp. 90 %, *Smilacina trifolia* 10 %, *Gaultheria hispidula* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Red-breasted Nuthatch, Common Yellowthroat. |
| Mammals: | Red Squirrel, Varying Hare, White-tailed Deer. |
| Herpetiles: | Wood Frog, Northern Spring Peeper. |
| Hydrology: | Basin swamp located along a small tributary of the South River. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| | **Wetland 17** |
| Wetland Type: | Tall shrub basin swamp. |
| Size: | 0.71 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 1 %, *Betula populifolia* <1 %. |
| Shrubs: | *Ilex verticillata* 40 %, *Nemopanthus mucronata 15 %, Alnus incana* 15 %, *Spiraea alba* 15 %, *Viburnum nudum* 5 %. |
| Ground Vegetation: | *Sphagnum* spp. 80 %, *Smilacina trifolia* 10 %, *Osmunda cinnamomea* 2 %, *Dryopteris cristata* 1 %. |
| Vascular plant list: | See Table I2. One uncommon species, large purple-fringed orchid (*Platanthera grandiflora*), found in wetland. This species is classed as S3 by the ACCDC and the Nova Scotia population is considered secure by NSDNR. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Magnolia Warbler, Black-and-white Warbler, Common Yellowthroat, White-throated Sparrow. |
| Mammals: | Varying Hare, Coyote. |
| Herpetiles: | Maritime Garter Snake. |
| Hydrology: | Basin swamp located along an intermittent stream. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None. |
| | **Wetland 18** |
| Wetland Type: | Mixedwood treed basin swamp (clear-cut). |
| Size: | 1.13 ha. |
| Dominant Vegetation: | |
| Trees: | *Acer rubrum* <1 %. |
| Shrubs: | *Betula populifolia* 20 %, *Gaylussacia baccata* 20 %, *Picea mariana* 18 %, *Kalmia angustifolia* 15 %, *Nemopanthus mucronata* 12 %, *Ledum groenlandicum* 10 %. |
| Ground Vegetation: | *Sphagnum* spp. 90 %, *Osmunda cinnamomea* 10 %, *Smilacina trifolia* 7 %, *Cornus canadensis* 5 %, *Scirpus cyperinus* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Cedar Waxwing, White-throated Sparrow, American Goldfinch. |

| **Table I1 Wetland Evaluations** | |
|---|---|
| Mammals: | None |
| Herpetiles: | Eastern Smooth Green Snake. |
| Hydrology: | Basin swamp located along a small intermittent stream. Probable groundwater discharge site. |
| Anthropogenic uses: | Merchantable timber in the wetland has been harvested. No other uses noted. |
| Comments: | Wetland is much smaller than portrayed on topographical mapping. |
| **Wetland 19** | |
| Wetland Type: | Wetland complex composed of mixedwood treed basin swamp and tall shrub basin swamp. |
| Size: | 0.54 ha. |
| Dominant Vegetation: | Mixedwood treed basin swamp |
| Trees: | *Acer rubrum* 25 %, *Abies balsamea* 15 %, *Picea mariana* 5 %. |
| Shrubs: | *Alnus incana* 15 %, *Abies balsamea* 10 %. |
| Ground Vegetation: | *Glyceria striata* 25 %, *Rubus pubescens* 20 %, *Onoclea sensibilis* 6 %, *Equisetum sylvaticum* 5 %, *Cornus canadensis* 5 %, *Osmunda cinnamomea* 2 %. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Picea glauca* 10 %, *Acer rubrum* 5 %, *Picea mariana* 2 %. |
| Shrubs: | *Alnus incana* 50 %, *Ilex verticillata* 5 %, *Rubus hispidus* 2 %. |
| Ground Vegetation: | *Rubus pubescens* 60 %, *Sphagnum* spp. 40 %, *Osmunda cinnamomea* 15 %, *Onoclea sensibilis* 5 %, *Solidago canadensis* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Black-capped Chickadee, Cedar Waxwing. |
| Mammals: | Red Squirrel, Porcupine, Racoon. |
| Herpetiles: | Northern Spring Peeper. |
| Hydrology: | Basin swamp located along a small tributary to an unnamed stream. Probable groundwater discharge area. |
| Anthropogenic uses: | Some timber harvesting adjacent to wetland as well as blueberry fields. |
| Comments: | Wetland receives potentially contaminated runoff from ditches along Highway 104. |

| **Table I1** | **Wetland Evaluations** |
|---|---|
| | **Wetland 20** |
| Wetland Type: | Mixedwood treed basin swamp |
| Size: | 0.99 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 40 %, *Acer rubrum* 15 %, *Abies balsamea* 10 %, *Betula papyrifera* 5 %. |
| Shrubs: | *Ilex verticillata* 30 %, *Nemopanthus mucronata* 10 %, *Alnus incana* 15 %. |
| Ground Vegetation: | *Osmunda cinnamomea* 60 %, *Sphagnum* spp. 25 %, *Cornus canadensis* 5 %, *Maianthemum canadense* 2 %, *Coptis trifolia* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Black-capped Chickadee, Blue Jay, American Robin, Cedar Waxwing, Evening Grosbeak, American Goldfinch. |
| Mammals: | Red Squirrel, White-tailed Deer, Striped Skunk, Racoon. |
| Herpetiles: | Green Frog, Wood Frog. |
| Hydrology: | Basin swamp located at headwaters of small intermittent stream. Probable groundwater discharge area. |
| Anthropogenic uses: | Some timber harvesting adjacent to wetland. |
| Comments: | Wetland not delineated on topographic mapping. Field identified and delineated using air photography. |

## Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way

| Species | | Wetland Identification Number (note: Wetland #5 has been infilled) p=present | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **Trees** | | | | | | | | | | | | | | | | | | | | |
| *Abies balsamea* | Balsam fir | | p | | | p | | | | | p | p | p | p | | | p | p | p | p |
| *Acer rubrum* | Red maple | p | p | p | p | p | | p | | | p | p | p | p | p | p | p | p | p | p |
| *Betula allegheniensis* | Yellow birch | | | | | | | | | | | | | | p | | | | p | |
| *Betula cordifolia* | Mountain white birch | p | | | | p | | p | | | | p | | | | | | p | | |
| *Betula papyrifera* | White birch | | | | | | | | | | | p | p | | | | | | p | p |
| *Betula populifolia* | Wire birch | | | p | p | | | p | | | p | | | | | p | p | p | | |
| *Fraxinus americana* | White ash | | | | | | | | | | | | p | | | | | | p | |
| *Fraxinus nigra* | Black Ash | | | | | | | | | | | | | | | | | | p | |
| *Larix laricina* | Tamarack | | | p | | p | p | p | p | | p | | | | | p | p | p | | |
| *Ostrya virginiana* | Hop-hornbeam | | | | | | | | | | | p | | | | | | | | |
| *Picea glauca* | White spruce | | p | | p | p | p | p | p | | | | p | | | | | | p | |
| *Picea mariana* | Black spruce | | | p | | | | p | | | p | p | | p | p | p | p | p | p | p |
| *Picea rubens* | Red spruce | | | | | | | | | | | p | | | | | | | | |
| *Pinus strobus* | White pine | | | | | | | | | | | p | | | | | | p | | |
| *Populus tremuloides* | Trembling aspen | | p | | | | | | | | | | | | | | | p | | |
| *Prunus serotina* | Black cherry | | | | | | | | | | | p | | | | | | | | |
| **Shrubs** | | | | | | | | | | | | | | | | | | | | |
| *Alnus incana* | Speckled alder | p | p | p | p | p | p | p | p | | p | p | | p | p | p | p | | p | p |
| *Amelanchier sp.* | Shadbush | | | | | | | | | | | | p | p | | | p | p | | |
| *Aronia arbutifolia* | Red chokeberry | | | | | | p | | | | | | | | | p | | | | |
| *Aronia melanocarpa* | Black chokeberry | | | p | | | | | | | | | | | | | | p | | |
| *Chamaedaphne calyculata* | Leather leaf | p | | | | | | | | | | | | | | | | | | |
| *Cornus sericea* | Red-osier dogwood | p | p | | | p | | | p | p | p | p | p | | | | | | | |
| *Corylus cornuta* | Beaked hazelnut | | | | | | | | | | | p | | | | | | | | |
| *Crataegus sp.* | Hawthorn | | | | | | | | | | p | | | | | | | | | |
| *Diervilla lonicera* | Bush honeysuckle | | | | | | | | | | p | | | | | | | | | |
| *Gaylussacia baccata* | Huckleberry | | | | | | | | | | | | | | | p | | p | | |
| *Ilex verticillata* | Black alder | p | p | p | p | p | p | p | | p | p | p | | p | p | p | p | | p | p |
| *Kalmia angustifolia* | Lambkill | p | | p | | | | p | | | p | p | | | | p | p | p | p | |
| *Ledum groenlandicum* | Labrador tea | | | | | | | p | | | | | | | | p | p | p | | |
| *Lonicera caerulea* | Mountain fly-honeysuckle | | | | p | | | | | | | p | | | | | | | | |
| *Lonicera canadesis* | American fly-honeysuckle | | | | | | | | | | p | p | | | | | | | | |
| *Myrica gale* | Sweet gale | p | | | | | | | | | | | | | | | | | | |
| *Myrica pensylvanica* | Bayberry | | | | | | | | | | p | | | | | p | | p | | |
| *Nemopanthus mucronata* | False holly | p | | | | | | | | | p | | | | | p | p | p | | p |
| *Prunus pensylvanica* | Pin-cherry | | | | | | | | p | | | p | | | | | | p | | |

| **Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way** | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Prunus virginiana* | Choke-cherry | | p | | | | | | | | | p | p | | | | | | | |
| *Rhamnus frangula* | Buckthorn | | | | | | | p | | | | | | | | | | | | |
| *Rhododendron canadense* | Rhodora | p | | | | | | p | | | p | | | | | p | | | | |
| *Ribes glandulosum* | Skunk-currant | | p | | | | | | | | | | | | | | | | p | |
| *Ribes hirtellum* | Gooseberry | | p | p | | p | p | | | | p | p | p | | | | | | p | |
| *Ribes lacustre* | Bristly black currant | | | | | | | | | | | | p | | | | | | | |
| *Ribes triste* | Wild red currant | | | | | | | | | | | | p | | | | | | | |
| *Rosa nitida* | Swamp-rose | p | p | p | | p | p | | p | p | | p | p | p | p | p | p | | p | |
| *Rosa virginiana* | Common wild rose | p | | | | p | | p | p | p | | | p | | p | | | | | |
| *Rubus canadensis* | Smooth blackberry | | | | | | p | | | | | | | | p | | | | | |
| *Rubus hispidus* | Trailing blackberry | | | p | p | | | p | p | | p | | | p | p | p | p | p | p | |
| *Rubus idaeus* | Garden raspberry | | | | p | | | p | p | | | p | p | p | | | | | | |
| *Rubus setosus* | Blackberry | | | | | | | | | | p | | | | | | | p | | |
| *Salix discolor* | Pussy-willow | p | | | | | | | | | | p | p | | | | | p | | |
| *Salix eriocephala* | Willow | | p | | | p | | | | | | p | | | | | | | p | |
| *Salix humilis* | Small pussy-willow | p | | | | | | | | | | p | p | | | | | | | |
| *Salix pyrifolia* | Bog willow | p | p | p | p | p | | | | | | | | | | p | p | | | |
| *Sambucus canadensis* | Common elder | | | | | p | | | p | | p | p | | | | | p | | p | |
| *Sambucus racemosa* | Red-berried elder | | | p | | | | | | | | | | | | | | | | |
| *Spiraea alba* | Meadowsweet | p | | p | | p | p | p | p | | p | p | | | p | p | p | | | |
| *Taxus canadensis* | Yew | | | | | | | | | | | p | | | | | | | | |
| *Toxicodendron rydbergii* | Western Poison Ivy | | | | | | | | | | p | p | | | | | | | | |
| *Vaccinium angustifolium* | Late lowbush blueberry | | | | | | | | | | p | | | | p | p | | p | | |
| *Vaccinium macrocarpon* | Large cranberry | | | | | | | | | | | | | | | p | | | | |
| *Vaccinium myrtilloides* | Canada blueberry | | | | p | | | p | | | p | | | | p | | | p | | p |
| *Vaccinium oxycoccos* | Small cranberry | | | | | | | | | | | | | | | | | p | | |
| *Viburnum nudum* | Witherod | p | | p | p | | | p | | | p | p | | p | p | p | p | p | p | p |
| **Ground Vegetation** | | | | | | | | | | | | | | | | | | | | |
| *Achillea millefolium* | Yarrow | | | | | | | | | | | | | p | | | | | | |
| *Achillea ptarmica* | Sneezeweed | | | | | | | | | | | | | | | | | | | |
| *Actaea rubra* | Red baneberry | | | | | | | | | | | | p | | | | | | | |
| *Agrimonia striata* | Agrimonia | | | | | p | | | | | | | | | | | | | | |
| *Agrostis capillaris* | Bent-grass | | | | | | | | | | | | | | | | | | | |
| *Agrostis gigantea* | Red-top | | | | | | | | | | | | | p | | | | | | |
| *Agrostis hyemalis* | Tickle-grass | | | | | | | p | p | | p | p | | | | | | p | | |
| *Agrostis perennans* | Bent-grass | | p | | | | | | p | | p | p | p | p | p | | | | | p |
| *Agrostis stolonifera* | Creeping bent-grass | p | p | | | | | p | p | p | | p | | | | | | | | |

| **Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way** | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Alisma triviale* | Water plantain | | | | | | | | | | p | | | | | | | | | |
| *Ambrosia artemisiifolia* | Common ragweed | | | | | | | | | | | | | | | | | | | |
| *Amphicarpaea bracteata* | Hog-peanut | | | | | | | | | | | | | | | | | | | |
| *Anaphalis margaratacea* | Pearly everlasting | | | | | | | | | | | | | | | | | | | |
| *Anthoxanthum odoratum* | Sweet vernal-grass | | | | | | | | | | | | | p | | | | | | |
| *Apocynum cannabinum* | Indian hemp | | | | | | | | | | | | | | | | | | | |
| *Aralia hispida* | Bristly aralia | | | | | | | | | | | | | | | | | | | |
| *Aralia nudicaulis* | Wild sarsaparilla | | p | | | | | p | | | p | p | p | p | | | | | p | p |
| *Arctium minus* | Common burdock | | | | | | | | | | | | | | | | | | | |
| *Arisaema triphyllum* | Jack-in-the-pulpit | | | | | p | | | | | | p | p | | | | | | | |
| *Asclepias incarnata* | Swamp-milkweed | | p | | | | | | | | | | | | | | | | | |
| *Aster acuminatus* | Wood aster | | | | | | | | | | | | p | | | | | p | p | |
| *Aster cordifolius* | Heart-leaved aster | | | | | | | | | p | | | | | | | | | | |
| *Aster lanceolatus* | Aster | p | | | | p | | | | p | | | p | | | | | | | |
| *Aster lateriflorus* | Calico aster | | | | | | | | | | p | p | p | | p | | | | p | |
| *Aster macrophyllus* | Large-leaved aster | | | | | | | | | | | | | | | | | | | |
| *Aster novae-angliae* | New England Aster | | | | | | | | | | | p | | | | | | | | |
| *Aster novi-belgii* | New york aster | p | | | | | | p | p | | | p | | | | | | p | p | |
| *Aster puniceus* | Rough aster | | p | p | | p | p | | | p | p | p | p | p | p | | | | p | |
| *Aster radula* | Aster | | | | | | | | | | | p | | | | | | | | |
| *Aster umbellatus* | Tall white aster | p | p | p | p | p | p | p | p | | p | p | p | p | | | p | p | p | |
| *Athyrium filix-femina* | Lady fern | | p | | | p | | | | | | p | p | | p | | | | p | |
| *Bidens cernua* | Nodding Bur-marigold | p | p | | | p | | | | p | p | | | p | | | | | | |
| *Bidens frondosa* | Beggar ticks | p | p | p | p | p | | | | | | p | | | | | | | | |
| *Brachyelytrum erectum* | Long-awned wood grass | p | | | | | | | | | | p | | | | | | | p | |
| *Bromus ciliatus* | Brome grass | | | | | | | | | | | p | p | | | | | | | |
| *Bromus inermis* | Smooth brome-grass | | | | | | | | | | | | | | | | | | | |
| *Calamagrostis canadensis* | Blue-joint | p | p | | p | p | p | p | | | p | | | | | p | | p | p | p |
| *Callitriche palustris* | Water-starwort | | | | | | | | | | p | p | | | | | | | | |
| *Calystegia sepium* | Bindweed | | | | | | | | | | | | | | | | | | | |
| *Cardamine pensylvanica* | Bitter-cress | | | | | | | | | | | p | | | | | | | | |
| *Carex aquatilis* | Sedge | | | | | | | | | | | | | | p | | | | | p |
| *Carex atlantica* | Sedge | | | | | | | | | | | | | | | p | | | | |
| *Carex canescens* | Sedge | p | | | | | | | | | | | | | | | | | | p |
| *Carex debilis* | Sedge | | | | | | | | | | | | | | p | | | | | |
| *Carex echinata* | Sedge | p | | p | p | p | | p | p | p | p | p | p | | p | | | p | p | |
| *Carex flava* | Sedge | | | | | | | | | | p | p | | | | | | | | |

| Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Carex folliculata* | Sedge | | | | | | | | | | | | | | | | | | p | |
| *Carex gracillima* | Sedge | | | | | | | | | | p | | p | | | | | | | |
| *Carex gynandra* | Sedge | p | p | | | p | | | | p | p | p | p | p | p | | p | p | p | |
| *Carex intumescens* | Sedge | p | p | p | p | | | | | | p | p | p | p | p | | p | | p | p |
| *Carex lasiocarpa* | Sedge | p | | | | | | | | | | | | | | | | | | |
| *Carex leptalea* | Sedge | | | | | | | | | | | | p | | | | | | | |
| *Carex leptonervia* | Sedge | | | | | | | | | | | | p | | | | | | | |
| *Carex lurida* | Sedge | | | | | p | | | | p | p | p | p | p | p | | p | p | p | p |
| *Carex nigra* | Sedge | p | | p | p | | | p | p | | | p | p | | | p | p | | p | |
| *Carex panicea* | Sedge | | | | | | | | p | | | | | | | | | | | |
| *Carex paupercula* | Sedge | | | | | | | | | | | | | | | p | | p | | |
| *Carex projecta* | Sedge | | | | | | | p | | | | p | p | | | | | | p | |
| *Carex pseudo-cyperus* | Sedge | p | p | | | p | | | | p | p | p | p | | | | | | | |
| *Carex scoparia* | Sedge | p | | | | p | p | | p | p | p | p | p | p | p | | | | | |
| *Carex stipata* | Sedge | p | | p | p | p | p | | | | | p | p | p | p | | p | | p | |
| *Carex stricta* | Sedge | p | | | | | | | | | | | | | | | | | | |
| *Carex trisperma* | Sedge | p | | p | p | p | p | | | | | p | p | p | p | p | p | p | p | |
| *Chelone glabra* | Turtlehead | p | p | | | p | | | | p | | p | p | | | | | | p | |
| *Chrysosplenum americanum* | Golden saxifrage | | p | | | | p | | | | | p | p | | | | | | | |
| *Cicuta bulbifera* | Bulbous water-hemlock | p | p | | | | | | | p | | | | | | | | | | |
| *Cicuta maculata* | Water-hemlock | | | p | | p | | | | p | | | | | | | | | | |
| *Cinna latifolia* | Wood-reed | | | | | | | | | | | | | p | | | | | | p |
| *Circaea alpina* | Small enchanter's night-shade | | p | | | | | | | | | | | | | | | | | |
| *Cirsium arvense* | Canada thistle | p | | | | p | | | | | | p | p | | | | | | | |
| *Cirsium vulgare* | Bull Thistle | | | | | | | | | | p | p | | | | | | | | |
| *Clematis virginiana* | Virgin's-bower | | p | | | p | p | | | | p | p | | | | | | | | |
| *Coptis trifolia* | Goldthread | p | | p | | | | | | | | | p | | p | | | | p | p |
| *Cornus canadensis* | Bunchberry | p | | | p | | | | | | p | p | p | | p | | | p | p | p |
| *Cypripedium acaule* | Common lady's-slipper | | | | | | | | | | | | | | | p | | | | |
| *Dennstaedtia punctilobula* | Hay-scented fern | | | | | | | | | | | p | | | | | | | | |
| *Drosera intermedia* | Narrow-leaved sundew | p | | | | | | | | | | | | | | | | | | |
| *Drosera rotundifolia* | Round-leaved sundew | p | | | | | | | | | | | | | | | | | | |
| *Dryopteris carthusiana* | Spinulose wood fern | | p | p | p | | p | | p | | | | p | p | | | p | | p | |
| *Dryopteris cristata* | Crested wood fern | p | p | | p | p | p | p | | | p | p | p | p | p | | p | | p | |
| *Dryopteris intermedia* | Evergreen Wood Fern | | | | | | p | | | | | | | p | | | | | | |
| *Dulichium arundinaceum* | Dulichium | p | | | | | | p | | p | | | | | | | | | | |
| *Eleocharis acicularis* | Spike rush | | | | | | | | | | p | | | | | | | | | |

| Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Eleocharis obtusa* | Spike rush | p | p | | | | | | | p | p | p | | p | | | | | | |
| *Eleocharis palustris* | Spike rush | | | | | | | | | | p | | | | | | | | | |
| *Elymus repens* | Couch grass | | | | | | | | | | p | | | | | | | | | |
| *Epilobium angustifolium* | Fireweed | | | | | | | | | | | | p | | | | | | | |
| *Epilobium ciliatum* | Willowherb | | p | p | | p | p | | | | | p | p | p | | | p | | p | |
| *Epilobium leptophyllum* | Willow-herb | p | | p | p | p | | p | p | p | | p | p | | | p | | | p | |
| *Epilobium palustre* | Willow-herb | | | | | | | | | | | | | | | | | p | | |
| *Equisetum arvense* | Field horsetail | p | | | | | | | | | | | | | | | | | p | |
| *Equisetum fluviatile* | Water horsetail | | | | | | | | | p | | | | | | | | | | |
| *Equisetum sylvaticum* | Wood horsetail | | p | | | | | | | | p | p | p | | p | p | p | p | p | |
| *Eriophorum virginicum* | Cotton-grass | | | p | | | | | | | p | | | | | p | p | p | | |
| *Eupatorium maculatum* | Joe-pye-weed | p | p | | | p | p | | p | p | | p | p | p | p | | | | p | |
| *Eupatorium perfoliatum* | Boneset | | | p | p | | | | | | | p | | p | | | | p | | |
| *Euthamia graminifolia* | Narrow-leaved goldenrod | p | | | p | p | | | p | | | | p | p | p | | | | | |
| *Fragaria virginiana* | Wild strawberry | | | | | | | | p | | | p | | p | | | | | | |
| *Galium asprellum* | Rough bedstraw | p | p | p | | | | | | | p | p | p | | | | | | | |
| *Galium palustre* | Marsh bedstraw | | | | p | p | p | | | p | p | p | | p | p | | p | | | |
| *Galium tinctorium* | Small bedstraw | | p | | | | | | | p | | | | | | | | | p | |
| *Gaultheria hispidula* | Snowberry | | | | | | | | | | p | p | | | | p | | p | | |
| *Gaultheria procumbens* | Teaberry | | | | | | | | | | | | | | | p | | p | | |
| *Geum aleppicum* | Avens | | | | | | | | | | | p | | | | | | | | |
| *Geum macrophyllum* | Avens | | | | | | | | | | | p | | | | | | | | |
| *Geum sp.* | Avens | | | | | p | | | | | | | | | | | | | | |
| *Glyceria borealis* | Northern manna-grass | | p | | | | | | | p | | | | | | | | | | |
| *Glyceria canadensis var. laxa* | Rattlesnake grass | p | | p | p | p | p | | p | p | p | | | p | p | p | p | p | | |
| *Glyceria grandis* | Reed manna-grass | | p | | | p | p | | p | p | | p | p | p | | | | | | |
| *Glyceria striata var. stricta* | Fowl manna-grass | p | p | | p | p | p | p | | | | p | p | p | p | | | | p | |
| *Gymnocarpium dryopteris* | Oak fern | | | | | | | | | | | | p | | | | | | | |
| *Hieracium caespitosum* | Hawkweed | | | | | | | | | | | | | p | | | | | | |
| *Hydrocotyle americana* | Water-pennywort | | p | | | | | | | | | p | p | | | | | | | |
| *Hypericum canadense* | St. john's-wort | | | | | | | | | | | | | | | | | p | | |
| *Hypericum ellipticum* | St. John's-wort | p | | | | | | | | | | | | | | | | | | |
| *Hypericum mutilum* | St. John's-wort | | | | | | | | | | p | p | | p | | | | | | |
| *Impatiens capensis* | Spotted touch-me-not | p | p | p | | p | p | | p | p | p | p | p | p | | | | | p | |
| *Iris versicolor* | Blue-flag | p | p | p | p | p | p | p | p | p | p | | | p | | p | p | | | p |
| *Juncus brevicaudatus* | Rush | p | p | | | | | | | p | p | p | | p | | | | p | | |
| *Juncus canadensis* | Rush | p | | p | p | | | p | | p | p | p | | | | | | | | |

| **Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way** | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Juncus effusus* | Soft rush | p | | p | p | p | | p | p | p | p | p | | p | p | p | | | | |
| *Juncus filiformis* | Rush | p | | | | | | | | | | | | | | | | | | |
| *Juncus pelocarpus* | Rush | p | | | | | | | | | | | | | | | | | | |
| *Lactuca canadensis* | Wild lettuce | | | | | | | | | | | | p | p | | | | | | |
| *Leersia oryzoides* | Rice cut-grass | p | p | | | | | | | p | p | | | p | | | | | | |
| *Lemna minor* | Lesser duckweed | p | | | | p | | | | | | | | | | | | | | |
| *Linnaea borealis* | Twin-flower | | | | | | | p | | | p | p | | | | | | | | |
| *Ludwigia palustris* | False loosestrife | | | | | p | p | | | p | | | | p | | | | | | |
| *Luzula acuminata* | Woodrush | | | | | | | | | | | | p | | | | | | | |
| *Lycopus americanus* | Water-horehound | p | | | | p | | | p | | p | p | p | | | | | | | |
| *Lycopus uniflorus* | Bugle weed | p | p | p | p | | p | p | p | p | p | p | p | p | p | | p | p | p | p |
| *Lysimachia ciliata* | Fringed loosestrife | | | | | | | | p | | p | p | | | | | | | | |
| *Lysimachia terrestris* | Yellow candle | p | p | p | | p | p | p | p | p | p | | | p | | | | | | |
| *Lysimachia thyrsiflora* | Water Loosestrife | p | | | | | | | | | | | | | | | | | | |
| *Lythrum salicaria* | Purple Loosestrife | | | | | p | | | | p | | | | | | | | | | |
| *Maianthemum canadense* | Wild lily-of-the valley | p | | | p | p | | p | | | p | p | | | p | | p | | p | p |
| *Mentha arvensis* | Field-mint | | p | | | | | | | p | | p | p | | | | | | | |
| *Mitella nuda* | Miterwort | | | | | | | | | | | | p | | | | | | | |
| *Monotropa uniflora* | Indian pipe | | | | | | | | | | p | | | | | p | p | p | | |
| *Myosotis laxa* | Small forget-me-not | p | p | | | p | | | | p | p | p | p | p | | | | | p | |
| *Nuphar variegatum* | Cow-lily | | | | | | | | | | p | | | | | | | | | |
| *Oenothera parviflora* | Small-flowered evening-primrose | | | | | | | | | | p | | | | | | | | | |
| *Onoclea sensibilis* | Sensitive fern | p | p | p | | p | p | | p | p | | p | p | p | p | | p | | p | |
| *Osmunda cinnamomea* | Cinnamon fern | p | p | p | p | | p | | | | | p | p | | | p | p | p | p | |
| *Osmunda claytoniana* | Interrupted fern | | p | | | p | | | | | | | | | | | p | | p | |
| *Osmunda regalis* | Royal fern | p | | | p | p | | | | | | | | | | p | p | | | |
| *Oxalis stricta* | Yellow wood-sorrel | | | | | | | | | | | p | | | | | | | | |
| *Panicum boreale* | Panic grass | | | | | | | | | | p | p | | | | | | | | |
| *Phegopteris connectilis* | Northern beech fern | | p | | | | | | | | | | p | | | | | | | |
| *Platanthera clavellata* | Fringed orchid | | | p | | | | | | | p | | | | | p | p | | p | |
| *Platanthera dilatata* | White bog-orchid | | | | | | | | | | | | | | p | | | | | |
| *Platanthera grandiflora* | Large purple fringed orchid | | | | | | | | | | | | | | p | | p | | | |
| *Platanthera psycodes* | Purple fringed orchid | | p | | | p | | | | | p | p | | | | | | | p | |
| *Poa palustris* | Meadow-grass | | | | | | p | | p | | | | p | p | p | | | | | |
| *Poa pratensis* | Kentucky bluegrass | | | | | | | | | | | | p | p | | | | | | |
| *Polygonum amphibium* | Water Smartweed | p | | | | | | | | | | | | | | | | | | |
| *Polygonum hydropiper* | Water-pepper | | | | | | | | | | | p | p | | | | | | | |

| Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Polygonum hydropiperoides* | Mild Water-pepper | | | | | | | | | | | | | p | | | | | | |
| *Polygonum punctatum* | Water-smartweed | | | | | p | | | | | | | | | | | | | | |
| *Polygonum robustius* | Knotweed | | p | | | p | | | | p | | | | | | | | | | |
| *Polygonum sagittatum* | Tear-thumb | p | p | p | p | p | p | | p | p | p | p | p | p | p | | | | p | p |
| *Polygonum sp.* | Knotweed | | p | | | | | | | | p | | | | | | | | | |
| *Potamogeton epihydrus* | Pondweed | | | | | | | | | | p | | | | | | | | | |
| *Potamogeton foliosus* | Leafy Pondweed | p | | | | | | | | | | | | | | | | | | |
| *Potamogeton sp.* | Pondweed | | | | | | | | | | p | | | | | | | | | |
| *Potentilla palustris* | Marsh cinquefoil | p | p | | | | | | | | | | | | | | | | | |
| *Potentilla simplex* | Cinquefoil | | | | | | | | p | | p | | | | | | | | | |
| *Prenanthes trifoliolata* | Gall-of-the-earth | | p | | | | | | | | | p | p | | | | | p | p | |
| *Proserpinaca palustris* | Mermaid-weed | p | | | | | | | | p | | | | | | | | | | |
| *Prunella vulgaris* | Heal-all | | p | | | | | | | | | | p | | | | | | | |
| *Ranunculus acris* | Tall buttercup | | | | | p | | | | | | | | | | | | | | |
| *Ranunculus aquatilis* | White Water-crowfoot | | | | | | | | | | p | | | | | | | | | |
| *Ranunculus repens* | Creeping buttercup | p | p | | | | | | p | | | | p | p | | | | | | |
| *Rhyncospora alba* | Beak rush | p | | | | | | | | | | | | | | | | | | |
| *Rubus pubescens* | Dewberry | p | p | | | p | p | p | | | p | p | p | p | p | | | | p | |
| *Rumex crispus* | Curled dock | p | | | | | | | | | | | | | | | | | | |
| *Rumex orbiculatus* | Water-dock | | | | | | | | | p | | | | | | | | | | |
| *Scirpus atrovirens* | Bulrush | | | | | | | | | | | | | | | | | p | | |
| *Scirpus cyperinus* | Bulrush | p | p | p | | p | | p | p | p | | p | p | p | p | | | p | p | |
| *Scirpus microcarpus* | Bulrush | p | | | p | | | | p | | | | | p | | | | | | |
| *Scirpus validus* | Bulrush | | p | | | | | | | | | | | | | | | | | |
| *Scutellaria galericulata* | Skullcap | p | | | | | | | | | | p | | | | | | | | |
| *Scutellaria lateriflora* | Skullcap | | | | | p | p | | | p | p | | p | p | | | | | p | p |
| *Senecio aureus* | Golden Ragwort | | | | | | | | | | p | p | p | | | | | | | |
| *Senecio jacobaea* | Stinking willy | | | | | | | | | | | | p | | | | | | | |
| *Sium suave* | Water-parsnip | p | | | | | p | | p | p | p | | | | | | | | | |
| *Smilacina trifolia* | Three-leaved false solomon's seal | | | p | | | | | | | | | | p | | p | p | p | p | p |
| *Solanum dulcamara* | Bittersweet | p | p | p | | p | p | | | p | p | | | | | | | | | |
| *Solidago canadensis* | Canada goldenrod | p | | | | | | | p | | | p | | p | | | | | p | |
| *Solidago gigantea* | Goldenrod | p | p | | | p | | p | | p | p | p | p | | p | | | | p | |
| *Solidago rugosa* | Rough goldenrod | p | p | p | | p | p | | | | p | | p | p | p | | | p | p | p |
| *Solidago uliginosa* | Bog-goldenrod | | | p | p | | | p | p | | p | p | | | p | | p | p | p | |
| *Sonchus arvensis* | Perennial sow-thistle | p | | | | | | | | | | | p | | | | | | | |
| *Sonchus arvensis* | Perennial Sow-thistle | | | | | | | | | | | | | p | | | | | | |

| **Table I2 Vascular Plant Species Found in the Wetlands Present Within the Proposed Highway 104 Right-of-Way** | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Species** | | **Wetland Identification Number (note: Wetland #5 has been infilled) p=present** | | | | | | | | | | | | | | | | | | |
| **Binomial** | **Common Name** | **1** | **2** | **3** | **4** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| *Sparganium americanum* | Bur-reed | p | | | | | | | | p | p | | | | | | | | | |
| *Sparganium angustifolium* | Bur-reed | | | | | | | | | | p | | | | | | | | | |
| *Sparganium emersum* | Bur-reed | | p | | p | | | | | p | p | | | | | | | | | |
| *Sparganium sp.* | Bur-reed | p | | | | | | | | p | | | | | | | | | | |
| *Spartina pectinata* | Broad-leaf | p | | | | | | | | | | | | | | | | | | |
| *Spirodela polyrhyza* | Duckweed | p | | | | | | | | p | | | | | | | | | | |
| *Stellaria borealis* | Northern starwort | | | | | | | | p | | | | | | | | | | | |
| *Taraxacum officinale* | Dandelion | | | p | | | | | | | | | | | | | | | | |
| *Thalictrum pubescens* | Meadow-rue | p | | | | p | | | | | p | p | | | | | | | | |
| *Thelypteris noveboracensis* | New york fern | | | | | | | | | | p | | | | | | | | | |
| *Thelypteris palustris* | Marsh fern | p | p | | p | p | | | | p | p | p | p | | | | p | | | |
| *Triadenum fraserii* | Marsh St. John's-wort | p | p | p | p | | p | p | p | p | p | | | | p | p | p | | | |
| *Trientalis borealis* | Star flower | | | | p | | | | | | | | | | | | p | | p | p |
| *Tussilago farfara* | Coltsfoot | | | | | p | | | | | | p | | | | | | | | |
| *Typha angustifolia* | Narrow-leaved cat-tail | | | | | | | | | | | p | | | | | | | | |
| *Typha latifolia* | Broad-leaved cat-tail | p | p | | | p | | p | | p | p | p | p | | | | | p | p | |
| *Veronica scutellata* | Marsh-speedwell | p | | | | | | | | | p | | | p | | | | | | |
| *Vicia cracca* | Tufted vetch | p | | | | | | | | | | | | | | | | | | |
| *Vicia dasycarpa* | Vetch | | | | | | | | | | | | p | | | | | | | |
| *Viola cucullata* | Blue violet | p | p | | p | | p | | p | | | p | | p | p | | | p | | |
| *Viola macloskeyi* | Small white violet | p | | | p | | p | p | | p | p | | | | | | | p | | |

# 3.0 North American Wetland Conservation Council Wetland Evaluations

Growing evidence clearly demonstrates the very important role that wetlands play in our total environment. The Wetland Evaluation Guide (Bond *et al*. 1992) has been developed to assist planners, municipal administrators, politicians, developers and landowners to make informed land use decisions concerning wetland resources. The Guide provides a tiered, step-by-step evaluation process, moving from basic to more sophisticated analysis, and from known documented and recognized values to more specific values which must be researched in detail for the particular wetland under review. The evaluator could be a planner, administrator, politician or wetland conversion proponent/opponent or a specialist whom they have retained. The evaluator moves from Stage One to Stage Two and finally Stage Three only if the preceding stage is unable to clearly establish a suitable land use preference. In most situations, not all stages will have to be applied. This permits efficient use of resources and time to inventory only the factors which must be addressed to reach a decision.

Land use decisions affecting wetlands have frequently been based primarily on the economic worth of the proposed land use activity. While economic worth is important, other costs or impacts of such activity, for example the loss of wetland functions and their value to society, are often not properly identified. The Guide provides the basis for a comparison of the full range of wetland values.

To apply the Guide it is necessary to proceed sequentially through each step. The evaluation should be undertaken only if the proposed land use or project development may directly or indirectly affect a wetland or wetland system. While many small projects (*e.g.*, agricultural drainage) may not appear to be significant, their effect on a wetland or wetland complex may be as important as large development projects. All projects with potential impacts on wetlands should be screened.

# 3.1 Wetland 1

## 3.1.1 Process

### 3.1.1.1 Background

Name Jacques Whitford Environment Limited

Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Date December 20, 2002

### 3.1.1.2 Project

This section describes the proposed project. It is essential that the project be described before proceeding with this section.

a. **Summary of Project** (fill in and check the boxes)

Name of Project Construction of Highway 104 Antigonish

| | | | |
|---|---|---|---|
| i. | Is it a public or private project? | Public Private | |
| ii. | Does it require land use approval? | Yes | No |
| iii. | Where is it located? Antigonish, Antigonish County, Nova Scotia | | |
| iv. | Is it proposed in or near a wetland? | In | Near |
| v. | Will the wetland be fully or partially drained? | Fully | Partially |
| | fully or partially dredged? | Fully | Partially |
| | completely or partially filled? | Completely | Partially |
| | fully or partially dyked? | Fully | Partially (Temporarily) |
| | fully or partially flooded? | Fully | Partially |
| | fully or partially enhanced/restored? | Fully | Partially |
| | Other | | |

b. **Type of Activity Proposed** (check appropriate boxes; if necessary describe under "other")

| | | |
|---|---|---|
| i. | Industrial | |
| ii. | Commercial | |
| iii. | Residential | |
| iv. | Institutional | |
| v. | Recreational/Tourism | |
| vi. | Agriculture | |
| vii. | Transportation/Utility Corridor | |
| viii. | Habitat Development | |
| ix. | Forestry | |
| x. | Other (describe) | |
| xi. | Statement of Project Purpose | To upgrade the highway near Antigonish to current standards for 100 series highway. |
| xii. | Precise Description of Activity | Construction of 15 km of twinned 100 series highway. |

c. **Status of Project** (land use controls which might affect the project)

i. **Jurisdiction of Approving Authority**

Federal
Territorial/Provincial
Municipal/Regional
Native

ii. **Type of Mandatory Review**

Mandatory review required?

Yes No

Environmental Impact Assessment required?

| | | |
|---|---|---|
| Yes | No | Federal |
| Yes | No | Territorial/Provincial |
| Yes | No | Municipal |
| Yes | No | Native |

iii. **Does the project fall under Municipal Development Control?** (If yes continue, if no go to "iv")

Type of Control:

Approved Development Plan
Approved Zoning By-Law
Approved Environmental Impact Assessment (EIA)
Approved Performance Standards
Other (described) _____

iv. **Status of Proposal**

Not Submitted
Under Review
Approved
Denied
Under Appeal
Requires Zoning

v. **Sources of Funding** (check one or more)

Private Financing
Public Financing
Public Subsidy

If public subsidy, please name program _____

_____

vi. **Level of Project Understanding/Refinement** (check one)

At very preliminary stage; little or no economic cost/benefit analysis
Preliminary stage; conceptual drawings, economic cost/benefit analysis, environmental impact considerations
Detailed design; design drawings, cost/benefit analysis (all components), and Environmental Impact Assessment

vii. **Potential for Stewardship**

Stewardship represents landowner commitment to manage the wetland in society's interest. Does that potential exist for this wetland?

Yes
No
Maybe

If yes or maybe, what steps are needed to institute a stewardship program? _____

_____

d. **Project Production Summary**

This section examines the products (i.e. benefits and disbenefits) which the project might generate.

i. **Has an economic analysis been completed for the project?**

Yes (continue to "ii")
No (go to "iv")

If yes, by whom: by proponent in-house
by professional consultant
other (name/agency/organization) Louis Berger (Canada) Ltd. commissioned by the Atlantic Expressway Committee; Beasy Nicoll Engineering Ltd. commissioned by NSTPW

Information about analyst

Name Louis Berger (Canada) Ltd. / Beasy Nicoll Engineering Ltd.
Address Unknown /80 Eileen Stubbs Avenue Dartmouth NS
Telephone No. Unknown / 902-468-4740
Date Analysis Prepared June 1996/ January 1999

ii. **Status of Economic Findings** (evaluator's opinion only)

Detailed, thorough economic findings
Preliminary economic findings
No economic findings (go to "iv")
Information not available (g to "iv")

iii. **Summary of Findings/Project Benefits** (if no estimates, check box; if estimates are available indicate information on line provided)

Permanent jobs (person/years)
Permanent contribution to new area wages per year
Permanent contribution to new area spending (total per year)
Construction jobs (person/years) 167
Construction contribution to new area wages per year $2 million
Construction contribution to area spending (total per year) $74 million
Increased production by type (e.g. agriculture, forestry, tourism)
Other benefits
Amenity Contribution

iv. **Summary of Potential Disbenefits** (check the appropriate boxes)

There are expected problems that may occur because of the project. These potential problems are the preliminary issues that will need to be addressed as part of the project review.

| | | |
|---|---|---|
| Noise | Water drawdown | Recreational loss |
| Air pollution | Habitat loss | Economic loss |
| Water pollution | Aesthetic loss | Other |

e. **Summary of Expected Level of Selected Project Impacts** (check box for high, moderate, or low)
The following table provides project information which will assist in subsequent considerations of potential project impact upon the wetland under review. This table summarizes the evaluator's views based upon existing known information.

| POTENTIAL WETLAND IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Noise Pollution | | | |
| Air Pollution | | | |
| Water Pollution | | | |
| Water Drawdown | | | |
| Habitat Loss | | | |
| Aesthetic Loss | | | |
| Recreational Loss | | | |
| Other | | | |

| POTENTIAL ECONOMIC IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Employment | | | |
| Training | | | |
| Construction Spending | | | |
| Operation Spending | | | |
| Taxes | | | |
| Indirect Spending* | | | |
| Flood Protection | | | |
| Other | | | |

* (e.g. Tourism)

f. **Project Summary** (project description, sources, and a summary of findings that may be useful in future analysis)

A project description and analysis of environmental effects is presented in the "Highway 104 Antigonish Environmental Assessment Report" prepared for Nova Scotia Department of Transportation & Public Works by Jacques Whitford Environment Limited

### 3.1.1.3 Wetland Description

This section describes the affected wetland. It is essential that the wetland be described before proceeding.

a. **Wetland Location**

Province/Territory Nova Scotia
Common Place Name (if any) Antigonish
Nearest Urban Centre Antigonish
Legal Description (if any) None

Land Description: Public
Private
Protected Area
Other _____
If public, name of area/site (if any) _____

If protected, name of agency and status _____

b. **Map**
Show location of wetland and proposed project in relation to region. (Draw or place map here, or attach map and/or project plan to back of this page. Indicate direction of north and ensure that map contains a scale).

(See Figure 5.4).

c. **Wetland Context**
This provides a brief description of the wetland and preliminary relationship to the project.

i. **Wetland Complexity** **Size**

| | | | |
|---|---|---|---|
| Is this a single wetland | Yes | No | _____ ha ( ) acres |
| Is this a wetland complex* | Yes | No | 11.2 ha ( ) acres |

(**i.e.* a series of more than one wetland)

ii. **Wetland Class**

| a) **Single Wetland** (Check one only) | b) **Wetland Complex** (Check all classes present, and write number if it occurs more than once) | c) **Wetland Classification** |
|---|---|---|
| Bog | Bog _____ | Temporary |
| Fen | Fen _____ | Seasonal |
| Swamp | Swamp Four types | Permanent |
| Marsh | Marsh Two types | |
| Shallow Water | Shallow Water | |

iii. **Has this wetland been previously impacted?**
Yes No
If yes, describe A small portion of the wetland was infilled during construction of Highway 104

**Additional Comments Regarding Wetland Description**

See Table I1 for a description of the wetland.

### 3.1.2 Preliminary Screening

This section examines two key considerations prior to the application of the three evaluation stages. These considerations relate to:

1. Potential for project relocations
2. Project redesign
3. Wetland viability

### 3.1.2.1 Potential for Project Relocation

This section examines the possibility of relocating the project away from the wetland, in order to reduce potential direct or indirect effects that may occur. It should be completed in association with the proponent. **(The proponent should be made aware of the subsequent evaluations procedure which may be necessary if relocation is not undertaken or is not possible).**

a. **How important is the wetland site for this project?**
   Essential (go to 3.1.2.2)
   Important (go to 3.1.2.2)
   Desirable (go to 3.1.2.2)
   Unnecessary (go to "b")
   Unknown (go to 3.1.2.2)

b. **Is an alternative location available?**
   Yes Where? (go to "c")
   No (go to 3.1.2.2)

c. **Does an alternative locations create detrimental impacts to other uses?**
   Yes (go to 3.1.2.2)
   No (go to "d")

d. **What is the rationale for relocation of the project, or why must it be located on this wetland site?**

   _____

e. **Project recommended for relocation?**
   Yes (go to "f")
   No (go to 3.1.2.2)

f. **Is proponent prepared to relocate?**
   Yes (if alternative location recommended and proponent accepts evaluation, stop here)
   No (go to 3.1.2.2)

_____ _____

**Evaluator's Signature** **Date**

**CONCLUSION OF ALTERNATIVE PROJECT SITE CONSIDERATION**

### 3.1.2.2 Project Redesign

A proposed project may require a simple or difficult redesign or change in project management practices to minimize wetland effects. This section examines that opportunity. You may need to reconsider this section after the Stage One and Stage Two evaluations.

a. **Is project redesign possible?**
   Very likely (go to b)
   Possibly (go to b)
   Not Possible (go to f)

b. **Will the redesign significantly reduce the impact to the wetland?**
   Yes (go to c)
   No (go to f)

c. **If the project can be redesigned, will a redesign require other conditions?**
   Yes (go to d)
   No (go to f)

d. **What are the conditions for redesign?**
   Rezoning of other land
   Subsidies
   Other (specify) _____

e. **Are these conditions achievable?**
   Very likely (go to j)
   Possibly (go to j)
   Not Possible (go to 3.1.2.3)
   If not possible, why? _____

f. **Are changes in the way the project is managed possible?**
   (e.g. landscaping, cultivation practices, design of infrastructure)
   Very likely (go to g)
   Possibly (go to g)
   Not Possible (go to 3.1.2.3)

g. **Will changes in the way the project is managed significantly reduce impact to the wetland?**
   Yes (go to h)
   No (go to 3.1.2.3)

h. **What are the conditions for a change in the way the project is managed?**
   Subsidies
   Alteration to regulations
   Other (specify) _____

i. **Are these conditions achievable?**
   Very likely (go to j)
   Possibly (go to j)
   Not Possible (go to 3.1.2.3)
   If not possible, why? _____

j. **Interim Recommendations**

The project should be redesigned; or
The way the project is managed should be modified; or
The proponent and approving authority will proceed to modify the project to protect the wetland.
The evaluation should proceed.

The evaluator should consider such redesign or management practices in association with the proponent and/or the approving authority. Once discussions have been held, the evaluator should proceed to complete "k".

k. **Record of Action**

Project satisfactorily redesigned; or
Project management practices satisfactorily modified; or
Proceed to Section 3.1.2.3

**Additional Comments Regarding Project Redesign Considerations**

None

**CONCLUSION OF PROJECT REDESIGN CONSIDERATION**

## 3.1.2.3 Wetland Viability

Wetland viability is the key consideration in the process of wetland and proposed project evaluation. A wetland, which has been severely and detrimentally affected over time and cannot be reasonably rehabilitated, should be considered for detailed analysis in Stage Two, only if it represents one of the last such wetland types in the region. Otherwise, a wetland that has been impacted previously beyond critical thresholds of viability should not be considered further and the project should be recommended for development.

**Preliminary Screening: Cumulative Impact**

This section provides an evaluation of the status of the wetland in a temporal and spatial context. It indicates the degree to which the wetland has been impacted previously by direct or indirect human induced activities and the degree to which the wetland will likely continue to deteriorate with and without the cumulative effects of the proposed project.

a. **Results of Past Effects upon the Wetland**

Has the wetland decreased in size during the past five years?
Yes
No
Don't know (go to 3.1.3.0)
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Is the wetland known to be detrimentally affected by other nearby projects or drainage system changes?
Yes
No
Don't know (go to 3.1.3.0)
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have animal or plant communities been detrimentally impacted by past activity?
Yes
No
Don't know (go to 3.1.3.0)
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have the wetland hydrological characteristics been detrimentally affected by other nearby activities?
Yes
No
Don't know (go to 3.1.3.0)
If yes, by how much: Highly affected
Moderately affected
Minimally affected

b. **Potential Rehabilitation/Restoration**

Can the wetland be rehabilitated/restored?
Likely
Unlikely
Very Unlikely

At what cost?
Very Costly
Costly
Not Very Costly

c. **Wetland Status**

This item relates to the degree to which the cumulative impacts have passed an acceptable threshold level, and the wetland is beyond restorative assistance. Wetlands that are considered "lost" do not warrant further consideration unless they represent one of the last wetlands of their type in the region.

Has the wetland been compromised up to or beyond its viability as a functioning wetland?
Yes (if yes, then complete next question"
No (if no, go to Stage One (see Section 3.1.3.0).

Have most similar wetland types been lost to conversion in the region?
Yes (if yes, go to "d. Recommendation" and consider (1) and (2)
No (if no, go to "d. Recommendation" and consider (3) and (4)

d. **Recommendation**
(1) Protect wetland as a representative or unique example.
(2) Consider restoration/rehabilitation of wetland.
(3) Consider proceeding with development if cumulative impact on wetlands are already high.
(4) Proceed to Section 3.1.3.0, Stage One.

***If recommendation 1, 2, or 3 accepted, stop evaluation here.***

**Evaluator's Signature** **Date**

**CONCLUSION OF CUMULATIVE IMPACT ASSESSMENT**

Name of Wetland Wetland 1 Antigonish, Nova Scotia
*Name* *Area/Town/Province/Territory*

**Complete this evaluation in a sequential manner.**

## 3.1.3 Stage One "General Analysis"

The "General Analysis" is designed to provide land use planners, administrators, developers, and the public with an opportunity to examine the relative value of wetlands, and any proposed projects which may directly or indirectly impact those wetland values. This "General Analysis" sets out a process of easily identifying - from readily available public data - biological, hydrological and biogeochemical, social/cultural, and production wetland functions and the expected new production functions generated by the proposed project. All considerations are at an international, national, or provincial level of significance. A few are also at a regional scale of consideration.

Comparing the importance of the wetland and the project, provides the evaluator with knowledge about the desirability of : (1) protecting the wetland because it has outstanding value; (2) approving the project because it has outstanding value and the wetland has little or no value; and (3) deferring to Stage Two because no conclusion is obvious. The ratings provide guidance only to the recommendations.

**Note: When listing sources, indicate relevant documents, authorities, and agencies.**

Stage One Evaluation undertaken by:
Name Jacques Whitford Environment Limited
Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Stage One values are based upon obvious, easily verified findings. Lack of sufficient information or inconclusive results will trigger the Stage Two applications. Values allocated are:

H = High value (3); M = Moderate Value (2); L = Low Value (1); NA= Not Applicable (X)

**Where information is not available or unknown, check additional sources. If still unavailable or unknown, then automatically proceed to Stage Two Detailed Analysis.**

## 3.1.3.1 Biological Component: Importance to Wildlife/Plant Communities

Potential Source of Data:
- C Territorial/Provincial Wildlife or Natural Resources Agency
- C University/Community College, Botany and Biology Departments
- C Canadian Wildlife Service/Wildlife Habitat Canada office
- C Local Ducks Unlimited Canada office
- C Canada Land Inventory (Agriculture and Agri-Food Canada)

i. **Significance for Waterfowl/Wildlife Species**
This relates to the importance, at a national or provincial scale of significance, of the wetland as a habitat for the production, migration, or other life history events for waterfowl and other animal species at a national or provincial scale of significance. (Select most current classification, and shade numbers in either the Canada Land Inventory box OR the Provincial/Territorial Classification box. Enter shaded numbers on the lines beside each column and their sum on the subtotal line).

| **Canada Land Inventory** | High (Class 1-2) | Moderate (Class 3-4) | Low (Class 5-7) | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | |
| Wildlife | 3 | 2 | 1 | X | |

**Subtotal** (maximum is 6)
(Where "x" occurs, go to "Stage Two Detailed Analysis").

**or**

| **Provincial/Territorial Classification** | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | 1 |
| Wildlife | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6)
(Where "x" occurs, go to "Stage Two Detailed Analysis"). 2

Source Wetland Atlas - Wetland Protection Mapping (Canadian Wildlife Services 1984)
Wetland Survey Conducted in the Wetland (2002)

ii. **Rarity/Scarcity or Uniqueness**

This relates to the degree to which the wildlife and vegetation species and populations inhabiting the wetland are rare, endangered or vulnerable within the region. (shade numbers and total them).

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl/Wildlife | 3 | 2 | 1 | X | 1 |
| Vegetation | 3 | 2 | 1 | X | 2 |

**Subtotal** (maximum is 6)
(Where "x" occurs, go to Stage Two Detailed Analysis). 3

Source Andrew Hebda, Curator of Zoology, Nova Scotia Museum of Natural History
Marian Munroe, Curator of Botany, Nova Scotia Museum of Natural History
Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia (Fuller 1998, internal document)
Atlas of Rare Vascular Plants in Nova Scotia (Pronych and Wilson 1993)
Atlas of Breeding Birds of the Maritime Provinces (Erskine 1992)
The Amphibians and Reptiles of Nova Scotia (Gilhen 1984)
Atlantic Canada Conservation Data Centre data request and general status ranks for vascular plants, birds, mammals, reptiles and amphibians.
Nova Scotia Department of Natural Resources General Status Ranks of Wild Species in Nova Scotia (Vascular plants, birds, mammals, reptiles and amphibians).
Vegetation and wildlife surveys conducted within wetland.

**Total Biological Component Rating:** 5

(Maximum is 12)
(Add "i" + "ii" subtotal, transfer total to equation in "3.1.3.6).

### 3.1.3.2 Hydrological Component: Water Quality/Groundwater/Erosion Control/Flood Control

This relates to the importance of the wetland for valued hydrological functions. It may be a general rating based on interviews with water analysts.

Source of Data: C Territorial/Provincial/Federal Water Resources Agencies
(shade numbers and total them)

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Significance of Contribution to Provincial Regional Water Quality/Groundwater | 3 | 2 | 1 | X | 1 |
| Significance of Contribution to Provincial/Regional Erosion Control/Flood Control | 3 | 2 | 1 | X | 2 |

**Total Hydrological Rating** (maximum is 6) 3
(transfer total to "3.3.3.6")

Source Wetland Survey and consultation with hydrologist (Hans Arisz, Hydrocom Technologies Ltd.).

### 3.1.3.3 Social/Cultural Component: Contribution to Quality of Life

This relates to the existing public commitment to the wetland as exemplified by way of current legislated actions that protect significant wetland resources.

Sources of Data:
- C Territorial/Provincial Lands Branch
- C Territorial/Provincial Planning Branch
- C Territorial/Provincial Environment Branch

(shade numbers and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Existing, Proposed or Potential International/National/Provincial/Regional Heritage Designation or Protected Status (within or adjacent to the protected area). | 3 | 2 | 1 | 1 |

**Total Social/Cultural Rating** (maximum is 3) 1
(transfer total to 3.1.3.6)

Source Atlantic Canada Conservation Data Centre
Beardmore (1985)
Mark Pulsifer, Nova Scotia Department of Natural Resources
Rachel Gautreau, Canadian Wildlife Service

### 3.1.3.4 Production Component: Expected New Project Benefits

This relates to the potential new added value production benefits which may result from implementation of the project, both geographically and within the economic sectors.

Sources of Data:
- C The proponent
- C Territorial/Provincial Economic Development Agency
- C Municipal/Regional Economic Development Office

(shade number and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Significance of Project to the Economic Sector (e.g. agriculture, forestry, or tourism) | 3 | 2 | 1 | 3 |
| Economic Significance to National, Provincial, Regional Development and Employment | 3 | 2 | 1 | 3 |

**Total Production Component Rating** (maximum is 6) 4
(transfer total to 3.1.3.6)

Source Loius Berger (Canada) Ltd. (1996)
Beasy Nicoll Engineering Ltd. (1999)

### 3.1.3.5 Copy of All Relevant Findings and Sources Attached

Yes
No
If no, then list

Information collected during the wetland survey are presented in Tables I1 and I2. A list of sources of existing data used in the evaluation is presented below.


Beasy Nicoll Engineering Limited. 1999. Highway 104 Antigonish Safety Review. Dartmouth, NS

Bond, W.K., K.W. Cox, T. Heberlein, E.W. Manning, D.R. Witty, and D.A. Young. 1992. Wetland Evaluation Guide. North American Wetlands Conservation Council (Canada), Issues Paper, No. 1992-1

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2002. Canadian Species at Risk

Erskine, A.J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing and the Nova Scotia Museum, Halifax, NS

Fuller, S. 1998. Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia. Nova Scotia Museum of Natural History draft internal document, Halifax, N.S.

Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum, Halifax, NS

Louis Berger (Canada) Ltd. 1996. An Assessment of the Economic Impact of Upgrading the Trans Canada Highway 104 To a Four-Lane, Divided, Controlled Access Highway Through Antigonish County. Atlantic Expressway Committee, Antigonish, NS.

NSDNR (Nova Scotia Department of Natural Resources). 2002a. General Status Ranks of Wild Species in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/genstatus/specieslist.asp.

NSDNR (Nova Scotia Department of Natural Resources). 2002b. Species at Risk in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/endngrd/specieslist.htm.

Pronych and Wilson, 1993. Atlas of Rare Vascular Plants in Nova Scotia. Curatorial Report No.78. Nova Scotia Museum of Natural History, Halifax, N.S.

ACCDC (Atlantic Canada Conservation Data Centre). 2002. Species Lists and Rare Species. Internet Publication: http://www.accdc.com/info/lists/.

Scott, F.W. 1994. Provisional Annotated List of Plant and Animal Species Considered to be Rare in Nova Scotia. Nova Scotia Museum of Natural History. Halifax, NS

**Describe other major issues relevant to a decision** As discussed in the Highway 104 Antigonish Environmental Assessment Report (Sections 2.1 and 6.4), the upgrade of the Highway is necessary due to increasing traffic volumes and concerns for public safety. The Five Year (1996 to 2000) blended or combined PDO collision rates for the 12.1 km of highway within the study area are about 40% higher than the comparable five year average for all provincial 100 series highways without access control. A detailed route selection process was undertaken by NSTPW to evaluate a number of options and select one alignment based on consideration of safety, and environmental and socio-economic constraints. The selected alignment is based on this evaluation and proposes to minimize disturbance where possible; however it will impinge upon some wetlands that are unavoidable due to pre-existing development or further environmental constraints.

## 3.1.3.6 Overall Project Impact Rating

An overall project rating occurs when the preceding Sections (3.1.3.1 - 3.1.3.4) are examined to compare the overall significance of the wetland to that of the proposed project. This significance is identified in the rating calculation which follows.

a. **Rating Calculation**
(insert total from previous Sections (3.1.3.1 - 3.1.3.4) in boxes provided, subtract total in Section 3.1.3.4. from total of 3.1.3.4 to 3.1.3.3 and calculate overall ratings)

**Current Wetland Status**

| | | |
|---|---|---|
| 3.1.3.1 Biological Rating | 5 | (a) |
| 3.1.3.2 Hydrological Rating | 3 | (b) |
| 3.1.3.3 Social/Cultural Rating | 1 | (c) |

**Project Status**

| | | |
|---|---|---|
| 3.1.3.4 Projected Production Change Rate | 4 | (d) |
| **Overall Rating= a+b+c minus d = e** | 5 | |

Note: When a value of "U" (unknown) or "NA" (not available) occurs, then proceed to either gather that information or move directly to Stage Two Detailed Analysis to address that requirement.

b. **Overall Rating**

The equation totals the three wetland function component values (a+b+c) and subtracts the new project production benefits value (d). The result is an overall rating (e) which represents the value of the wetland in relation to the benefits of the proposed project.

- Maximum possible value: 19
- Minimum possible value: 1
- Where overall rating is equal to or greater than 13, project rejection (or relocation) should be recommended.
- Where overall rating is equal to or less than 3, project approval should be recommended.
- Where overall rating is between 4 and 12 inclusive, project should be referred to Stage Two Detailed Analysis.

**Recommendations**

(a) reject project
(b) refer to Stage Two Detailed Analysis
(c) approve without conditions
(d) approve with conditions
(List necessary mitigative measures and measures to retain/enhance wetland functions of value to society in (e))
(e) mitigative measures 1) Construct wetland habitat along the edge of Wetland 1 to replace the 0.35 ha of habitat lost at this wetland. 2) Salvage wetland soils from disturbed portion of wetland to aid in rapid re-establishment of native plant communities in reconstructed wetland. 3) Test salvaged wetland soil to ensure that it will not release stored contaminants 4) Ensure that the hydrology of the wetland is maintained through proper culvert placement. 2) Implement erosion and sediment control measures to minimize sedimentation of wetland.

(f) reason for recommendation (note: outline by project benefits and important wetland functions/values lost or reduced do not simply report the number calculated)
The project will provide economic benefits to the local area as a result of construction activity and will improve public safety. The wetland survey and a review of the existing literature indicates that the wetland has relatively little value as wildlife habitat and as habitat for rare or endangered species. Two uncommon plant species, water loosestrife (*Lysimachia thyrsiflora*) and marsh mermaid-weed (*Proserpinaca palustris*), are present in the wetland. The populations of both of these species are considered secure in Nova Scotia. Infilling during road construction may result in the loss of a very small portion of the population of marsh mermaid-weed which is one of the dominant species of the marsh habitat in the wetland. Water loosestrife will not be affected by construction. The wetland has no known social/cultural attributes. The wetland plays a moderate role in surface water flow regulation. The wetland can be expected to augment surface water flow in Brierly Brook during low flow periods. The wetland probably also contributes to amelioration of flood events by slowing the flow of water through the wetland. The surface water flow regulation function is not expected to be significantly altered since only approximately 3.1 % of the total area of wetland habitat will be infilled during construction.

**Evaluator's Signature** **Date**

If referred to Stage Two Detailed analysis, outline particular project impacts or wetland functions/values that may be worthy of special attention.

**CONCLUSION OF STAGE ONE "GENERAL ANALYSIS"**

# 3.2 Wetland 6

## 3.2.1 Process

### 3.2.1.1 Background

Name Jacques Whitford Environment Limited

Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Date December 23, 2002

### 3.2.1.2 Project

This section describes the proposed project. It is essential that the project be described before proceeding with this section.

**Summary of Project** (fill in and check the boxes)

Name of Project Construction of Highway 104 Antigonish

| | | | | |
|---|---|---|---|---|
| a. i. | Is it a public or private project? | | Public | Private |
| ii. | Does it require land use approval? | | Yes | No |
| iii. | Where is it located? | Antigonish, Antigonish County, Nova Scotia | | |
| iv. | Is it proposed in or near a wetland? | | In | Near |
| v. | Will the wetland be fully or partially drained? | | Fully | Partially |
| | fully or partially dredged? | Fully | Partially | |
| | completely or partially filled? | Completely | Partially | |
| | fully or partially dyked? | Fully | Partially (Temporarily) | |
| | fully or partially flooded? | Fully | Partially | |
| | fully or partially enhanced/restored? | Fully | Partially | |
| | Other | | | |

b. **Type of Activity Proposed** (check appropriate boxes; if necessary describe under "other")

| | | |
|---|---|---|
| i. | Industrial | |
| ii. | Commercial | |
| iii. | Residential | |
| iv. | Institutional | |
| v. | Recreational/Tourism | |
| vi. | Agriculture | |
| vii. | Transportation/Utility Corridor | |
| viii. | Habitat Development | |
| ix. | Forestry | |
| x. | Other (describe) | |
| xi. | Statement of Project Purpose | To upgrade the highway near Antigonish to current standards for 100 series highway. |
| xii. | Precise Description of Activity | Construction of 15 km of twinned 100 series highway. |

c. **Status of Project** (land use controls which might affect the project)

i. **Jurisdiction of Approving Authority**
- Federal
- Territorial/Provincial
- Municipal/Regional
- Native

ii. **Type of Mandatory Review**

Mandatory review required?

Yes No

Environmental Impact Assessment required?

Yes No Federal
Yes No Territorial/Provincial
Yes No Municipal
Yes No Native

iii. **Does the project fall under Municipal Development Control?** (If yes continue, if no go to "iv")

Type of Control:

Approved Development Plan
Approved Zoning By-Law
Approved Environmental Impact Assessment (EIA)
Approved Performance Standards
Other (described) _____

iv. **Status of Proposal**

Not Submitted
Under Review
Approved
Denied
Under Appeal
Requires Zoning

v. **Sources of Funding** (check one or more)

Private Financing
Public Financing
Public Subsidy

If public subsidy, please name program _____

_____

vi. **Level of Project Understanding/Refinement** (check one)

At very preliminary stage; little or no economic cost/benefit analysis
Preliminary stage; conceptual drawings, economic cost/benefit analysis, environmental impact considerations
Detailed design; design drawings, cost/benefit analysis (all components), and Environmental Impact Assessment

vii. **Potential for Stewardship**

Stewardship represents landowner commitment to manage the wetland in society's interest. Does that potential exist for this wetland?

Yes
No
Maybe

If yes or maybe, what steps are needed to institute a stewardship program? _____

_____

d. **Project Production Summary**

This section examines the products (i.e. benefits and disbenefits) which the project might generate.

i. **Has an economic analysis been completed for the project?**

Yes (continue to "ii")
No (go to "iv")

If yes, by whom: by proponent in-house
by professional consultant
other (name/agency/organization) Louis Berger (Canada) Ltd. commissioned by the Atlantic Expressway Committee; Beasy Nicoll Engineering Ltd. commissioned by NSTPW

Information about analyst

Name Louis Berger (Canada) Ltd. / Beasy Nicoll Engineering Ltd.
Address Unknown /80 Eileen Stubbs Avenue Dartmouth NS
Telephone No. Unknown / 902-468-4740
Date Analysis Prepared June 1996/ January 1999

ii. **Status of Economic Findings** (evaluator's opinion only)

Detailed, thorough economic findings
Preliminary economic findings
No economic findings (go to "iv")
Information not available (g to "iv")

iii. **Summary of Findings/Project Benefits** (if no estimates, check box; if estimates are available indicate information on line provided)

Permanent jobs (person/years)
Permanent contribution to new area wages per year
Permanent contribution to new area spending (total per year)
Construction jobs (person/years) 167
Construction contribution to new area wages per year $2 million
Construction contribution to area spending (total per year) $74 million
Increased production by type (e.g. agriculture, forestry, tourism)
Other benefits
Amenity Contribution

iv. **Summary of Potential Disbenefits** (check the appropriate boxes)

There are expected problems that may occur because of the project. These potential problems are the preliminary issues that will need to be addressed as part of the project review.

| | | |
|---|---|---|
| Noise | Water drawdown | Recreational loss |
| Air pollution | Habitat loss | Economic loss |
| Water pollution | Aesthetic loss | Other Landowner Displacement |

e. **Summary of Expected Level of Selected Project Impacts** (check box for high, moderate, or low)
The following table provides project information which will assist in subsequent considerations of potential project impact upon the wetland under review. This table summarizes the evaluator's views based upon existing known information.

| POTENTIAL WETLAND IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Noise Pollution | | | |
| Air Pollution | | | |
| Water Pollution | | | |
| Water Drawdown | | | |
| Habitat Loss | | | |
| Aesthetic Loss | | | |
| Recreational Loss | | | |
| Other | | | |

| POTENTIAL ECONOMIC IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Employment | | | |
| Training | | | |
| Construction Spending | | | |
| Operation Spending | | | |
| Taxes | | | |
| Indirect Spending* | | | |
| Flood Protection | | | |
| Other | | | |

* (e.g. Tourism)

f. **Project Summary** (project description, sources, and a summary of findings that may be useful in future analysis)

A project description and analysis of environmental effects is presented in the "Highway 104 Antigonish Environmental Assessment Report" prepared for Nova Scotia Department of Transportation & Public Works by Jacques Whitford Environment Limited

### 3.2.1.3 Wetland Description

This section describes the affected wetland. It is essential that the wetland be described before proceeding.

a. Wetland Location

Province/Territory Nova Scotia
Common Place Name (if any) Antigonish
Nearest Urban Centre Antigonish
Legal Description (if any) None

Land Description:
Public
Private
Protected Area
Other

If public, name of area/site (if any)

If protected, name of agency and status

b. **Map**
Show location of wetland and proposed project in relation to region. (Draw or place map here, or attach map and/or project plan to back of this page. Indicate direction of north and ensure that map contains a scale).

(See Figure 5.4).

c. **Wetland Context**
This provides a brief description of the wetland and preliminary relationship to the project.

i. **Wetland Complexity** **Size**

| | | | | |
|---|---|---|---|---|
| Is this a single wetland | Yes | No | ha ( | ) acres |
| Is this a wetland complex* | Yes | No | 4.27 ha ( | ) acres |

(*i.e. a series of more than one wetland)

ii. **Wetland Class**

| a) **Single Wetland** (Check one only) | b) **Wetland Complex** (Check all classes present, and write number if it occurs more than once) | c) **Wetland Classification** |
|---|---|---|
| Bog | Bog | Temporary |
| Fen | Fen | Seasonal |
| Swamp | Swamp Two types | Permanent |
| Marsh | Marsh Two types | |
| Shallow Water | Shallow Water | |

iii. **Has this wetland been previously impacted?**
Yes No
If yes, describe The wetland has been disturbed at various times in the past. A causway was constructed across a portion of the wetland and some habitat was lost to highway construction. Recently, treed swamp habitat in the wetland was harvested for timber.

**Additional Comments Regarding Wetland Description**

See Table I1 for a description of the wetland.

## 3.2.2 Preliminary Screening

This section examines two key considerations prior to the application of the three evaluation stages. These considerations relate to:

1. Potential for project relocations
2. Project redesign
3. Wetland viability

### 3.2.2.1 Potential for Project Relocation

This section examines the possibility of relocating the project away from the wetland, in order to reduce potential direct or indirect effects that may occur. It should be completed in association with the proponent. **(The proponent should be made aware of the subsequent evaluations procedure which may be necessary if relocation is not undertaken or is not possible).**

a. **How important is the wetland site for this project?**
   Essential (go to 3.2.2.2)
   Important (go to 3.2.2.2)
   Desirable (go to 3.2.2.2)
   Unnecessary (go to" b")
   Unknown (go to 3.2.2.2)

b. **Is an alternative location available?**
   Yes Where? (go to "c")
   No (go to 3.2.2.2)

c. **Does an alternative locations create detrimental impacts to other uses?**
   Yes (go to 3.2.2.2)
   No (go to "d")

d. **What is the rationale for relocation of the project, or why must it be located on this wetland site?**

   _____

e. **Project recommended for relocation?**
   Yes (go to "f")
   No (go to 3.2.2.2)

f. **Is proponent prepared to relocate?**
   Yes (if alternative location recommended and proponent accepts evaluation, stop here)
   No (go to 3.2.2.2)

_____ _____

**Evaluator's Signature** **Date**

**CONCLUSION OF ALTERNATIVE PROJECT SITE CONSIDERATION**

### 3.2.2.2 Project Redesign

A proposed project may require a simple or difficult redesign or change in project management practices to minimize wetland effects. This section examines that opportunity. You may need to reconsider this section after the Stage One and Stage Two evaluations.

a. **Is project redesign possible?**
Very likely (go to "b")
Possibly (go to "b")
Not Possible (go to "f")

b. **Will the redesign significantly reduce the impact to the wetland?**
Yes (go to "c")
No (go to "f")

c. **If the project can be redesigned, will a redesign require other conditions?**
Yes (go to "d")
No (go to "f")

d. **What are the conditions for redesign?**
Rezoning of other land
Subsidies
Other (specify) _____

e. **Are these conditions achievable?**
Very likely (go to "j")
Possibly (go to "j")
Not Possible (go to "3.2.2.3")
If not possible, why? _____

f. **Are changes in the way the project is managed possible?**
(e.g. landscaping, cultivation practices, design of infrastructure)
Very likely (go to "g")
Possibly (go to "g")
Not Possible (go to "3.2.2.3")

g. **Will changes in the way the project is managed significantly reduce impact to the wetland?**
Yes (go to "h")
No (go to "3.2.2.3")

h. **What are the conditions for a change in the way the project is managed?**
Subsidies
Alteration to regulations
Other (specify) _____

i. **Are these conditions achievable?**
Very likely (go to "j")
Possibly (go to "j")
Not Possible (go to "3.2.2.3")
If not possible, why? _____

j. **Interim Recommendations**
The project should be redesigned; or
The way the project is managed should be modified; or
The proponent and approving authority will proceed to modify the project to protect the wetland.
The evaluation should proceed.

The evaluator should consider such redesign or management practices in association with the proponent and/or the approving authority. Once discussions have been held, the evaluator should proceed to complete "k".

k. **Record of Action**

Project satisfactorily redesigned; or
Project management practices satisfactorily modified; or
Proceed to Section 3.2.2.3

**CONCLUSION OF PROJECT REDESIGN CONSIDERATION**

## 3.2.2.3 Wetland Viability

Wetland viability is the key consideration in the process of wetland and proposed project evaluation. A wetland, which has been severely and detrimentally affected over time and cannot be reasonably rehabilitated, should be considered for detailed analysis in Stage Two, only if it represents one of the last such wetland types in the region. Otherwise, a wetland that has been impacted previously beyond critical thresholds of viability should not be considered further and the project should be recommended for development.

**Preliminary Screening: Cumulative Impact**

This section provides an evaluation of the status of the wetland in a temporal and spatial context. It indicates the degree to which the wetland has been impacted previously by direct or indirect human induced activities and the degree to which the wetland will likely continue to deteriorate with and without the cumulative effects of the proposed project.

a. **Results of Past Effects upon the Wetland**

Has the wetland decreased in size during the past five years?
Yes
No
Don't know (go to "3.2.3")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Is the wetland known to be detrimentally affected by other nearby projects or drainage system changes?
Yes
No
Don't know (go to "3.2.3")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have animal or plant communities been detrimentally impacted by past activity?
Yes
No
Don't know (go to "4.0")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have the wetland hydrological characteristics been detrimentally affected by other nearby activities?
Yes
No
Don't know (go to "4.0")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

b. **Potential Rehabilitation/Restoration**

Can the wetland be rehabilitated/restored?
Likely
Unlikely
Very Unlikely

At what cost?
Very Costly
Costly
Not Very Costly

c. **Wetland Status**

This item relates to the degree to which the cumulative impacts have passed an acceptable threshold level, and the wetland is beyond restorative assistance. Wetlands that are considered "lost" do not warrant further consideration unless they represent one of the last wetlands of their type in the region.

Has the wetland been compromised up to or beyond its viability as a functioning wetland?
Yes (if yes, then complete next question"
No (if no, go to Stage One (see Section 3.2.3).

Have most similar wetland types been lost to conversion in the region?
Yes (if yes, go to "d. Recommendation" and consider (1) and (2)
No (if no, go to "d. Recommendation" and consider (3) and (4)

d. **Recommendation**
(1) Protect wetland as a representative or unique example.
(2) Consider restoration/rehabilitation of wetland.
(3) Consider proceeding with development if cumulative impact on wetlands are already high.
(4) Proceed to Section 3.2.3, Stage One.

***If recommendation 1, 2, or 3 accepted, stop evaluation here.***

**Evaluator's Signature** **Date**

**CONCLUSION OF CUMULATIVE IMPACT ASSESSMENT**

Name of Wetland Wetland 6 Antigonish, Nova Scotia
*Name* *Area/Town/Province/Territory*

**Complete this evaluation in a sequential manner.**

### 3.2.3 Stage One "General Analysis"

The "General Analysis" is designed to provide land use planners, administrators, developers, and the public with an opportunity to examine the relative value of wetlands, and any proposed projects which may directly or indirectly impact those wetland values. This "General Analysis" sets out a process of easily identifying - from readily available public data - biological, hydrological and biogeochemical, social/cultural, and production wetland functions and the expected new production functions generated by the proposed project. All considerations are at an international, national, or provincial level of significance. A few are also at a regional scale of consideration.

Comparing the importance of the wetland and the project, provides the evaluator with knowledge about the desirability of : (1) protecting the wetland because it has outstanding value; (2) approving the project because it has outstanding value and the wetland has little or no value; and (3) deferring to Stage Two because no conclusion is obvious. The ratings provide guidance only to the recommendations.

**Note: When listing sources, indicate relevant documents, authorities, and agencies.**

Stage One Evaluation undertaken by:
Name Jacques Whitford Environment Limited
Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Stage One values are based upon obvious, easily verified findings. Lack of sufficient information or inconclusive results will trigger the Stage Two applications. Values allocated are:

H = High value (3); M = Moderate Value (2); L = Low Value (1); NA= Not Applicable (X)

**Where information is not available or unknown, check additional sources. If still unavailable or unknown, then automatically proceed to Stage Two Detailed Analysis.**

### 3.2.3.1 Biological Component: Importance to Wildlife/Plant Communities

Potential Source of Data:
- C Territorial/Provincial Wildlife or Natural Resources Agency
- C University/Community College, Botany and Biology Departments
- C Canadian Wildlife Service/Wildlife Habitat Canada office
- C Local Ducks Unlimited Canada office
- C Canada Land Inventory (Agriculture and Agri-Food Canada)

i. **Significance for Waterfowl/Wildlife Species**
This relates to the importance, at a national or provincial scale of significance, of the wetland as a habitat for the production, migration, or other life history events for waterfowl and other animal species at a national or provincial scale of significance. (Select most current classification, and shade numbers in either the Canada Land Inventory box OR the Provincial/Territorial Classification box. Enter shaded numbers on the lines beside each column and their sum on the subtotal line).

| **Canada Land Inventory** | High (Class 1-2) | Moderate (Class 3-4) | Low (Class 5-7) | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | |
| Wildlife | 3 | 2 | 1 | X | |

**Subtotal** (maximum is 6) (Where "x" occurs, go to "Stage Two Detailed Analysis").

**or**

| **Provincial/Territorial Classification** | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | 1 |
| Wildlife | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6) (Where "x" occurs, go to "Stage Two Detailed Analysis"). 2

Source Wetland Atlas - Wetland Protection Mapping (Canadians Wildlife Services 1984)
Wetland Survey Conducted in the Wetland (2002)

ii. **Rarity/Scarcity or Uniqueness**

This relates to the degree to which the wildlife and vegetation species and populations inhabiting the wetland are rare, endangered or vulnerable within the region. (shade numbers and total them).

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl/Wildlife | 3 | 2 | 1 | X | 1 |
| Vegetation | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6) (Where "x" occurs, go to "Stage Two Detailed Analysis). 2

Source Andrew Hebda, Curator of Zoology, Nova Scotia Museum of Natural History
Marian Munroe Curator of Botany, Nova Scotia Museum of Natural History
Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia (Fuller 1998, internal document)
Atlas of Rare Vascular Plants in Nova Scotia (Pronych and Wilson 1993)
Atlas of Breeding Birds of the Maritime Provinces (Erskine 1992)
The Amphibians and Reptiles of Nova Scotia (Gilhen 1984)
Stefen Gerriets, Data Manager, Atlantic Canada Conservation Data Centre
Vegetation and wildlife surveys conducted within wetland.

**Total Biological Component Rating:** 4

(Maximum is 12)
(Add "i" + "ii" subtotal, transfer total to equation in 3.2.3.6).

### 3.2.3.2 Hydrological Component: Water Quality/Groundwater/Erosion Control/Flood Control

This relates to the importance of the wetland for valued hydrological functions. It may be a general rating based on interviews with water analysts.

Source of Data: C Territorial/Provincial/Federal Water Resources Agencies
(shade numbers and total them)

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Significance of Contribution to Provincial Regional Water Quality/Groundwater | 3 | 2 | 1 | X | 1 |
| Significance of Contribution to Provincial/Regional Erosion Control/Flood Control | 3 | 2 | 1 | X | 2 |

**Total Hydrological Rating** (maximum is 6) 3
(transfer total to "3.3.3.6")

Source Wetland Survey and consultation with hydrologist (Hans Arisz, Hydrocom Technologies Ltd.).

### 3.2.3.3 Social/Cultural Component: Contribution to Quality of Life

This relates to the existing public commitment to the wetland as exemplified by way of current legislated actions that protect significant wetland resources.

Sources of Data:
- C Territorial/Provincial Lands Branch
- C Territorial/Provincial Planning Branch
- C Territorial/Provincial Environment Branch

(shade numbers and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Existing, Proposed or Potential International/National/Provincial/Regional Heritage Designation or Protected Status (within or adjacent to the protected area). | 3 | 2 | 1 | 1 |

**Total Social/Cultural Rating** (maximum is 3) 1
(transfer total to "3.2.3.6")

Source Mark Pulsifer, Department of Natural Resources
Beardmore (1985)
Rachel Gautreau, Canadian Wildlife Service
Stefen Garriets, Data Manager, Atlantic Canada Conservation Data Centre

### 3.2.3.4 Production Component: Expected New Project Benefits

This relates to the potential new added value production benefits which may result from implementation of the project, both geographically and within the economic sectors.

Sources of Data:
- C The proponent
- C Territorial/Provincial Economic Development Agency
- C Municipal/Regional Economic Development Office

(shade number and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Significance of Project to the Economic Sector (e.g. agriculture, forestry, or tourism) | 3 | 2 | 1 | 3 |
| Economic Significance to National, Provincial, Regional Development and Employment | 3 | 2 | 1 | 3 |

**Total Production Component Rating** (maximum is 6) 4
(transfer total to "3.2.3.6")

Source Louis Berger (Canada) Ltd. (1996)
Beasy Nicoll Engineering Ltd. (1999)

### 3.2.3.5 Copy of All Relevant Findings and Sources Attached

Yes
No
If no, then list

Information collected during the wetland survey are presented in Tables I1 and I2. A list of sources of existing data used in the evaluation is presented below.


Beasy Nicoll Engineering Limited. 1999. Highway 104 Antigonish Safety Review. Dartmouth, NS

Bond, W.K., K.W. Cox, T. Heberlein, E.W. Manning, D.R. Witty, and D.A. Young. 1992. Wetland Evaluation Guide. North American Wetlands Conservation Council (Canada), Issues Paper, No. 1992-1

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2002. Canadian Species at Risk,

Erskine, A.J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing and the Nova Scotia Museum, Halifax, N.S.

Fuller, S. 1998. Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia. Nova Scotia Museum of Natural History draft internal document, Halifax, NS.

Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum, Halifax, N.S

Louis Berger (Canada) Ltd. 1996. An Assessment of the Economic Impact of Upgrading the Trans Canada Highway 104 To a Four-Lane, Divided, Controlled Access Highway Through Antigonish County. Atlantic Expressway Committee, Antigonish, NS.

NSDNR (Nova Scotia Department of Natural Resources). 2002a. General Status Ranks of Wild Species in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/genstatus/specieslist.asp.

NSDNR (Nova Scotia Department of Natural Resources). 2002b. Species at Risk in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/endngrd/specieslist.htm.

Pronych and Wilson, 1993. Atlas of Rare Vascular Plants in Nova Scotia. Curatorial Report No.78. Nova Scotia Museum of Natural History, Halifax, NS.

ACCDC (Atlantic Canada Conservation Data Centre). 2002. Species Lists and Rare Species. Internet Publication: http://www.accdc.com/info/lists/.

Scott, F.W. 1994. Provisional Annotated List of Plant and Animal Species Considered to be Rare in Nova Scotia. Nova Scotia Museum of Natural History. Halifax, NS.

**Describe other major issues relevant to a decision** As discussed in the Highway 104 Antigonish Environmental Assessment Report (Sections 2.1 and 6.4), the upgrade of the Highway is necessary due to increasing traffic volumes and concerns for public safety. The Five Year (1996 to 2000) blended or combined PDO collision rates for the 12.1 km of highway within the study area are about 40% higher than the comparable five year average for all provincial 100 series highways without access control. A detailed route selection process was undertaken by NSTPW to evaluate a number of options and select one alignment based on consideration of safety, and environmental and socio-economic constraints. The selected alignment is based on this evaluation and proposes to minimize disturbance where possible; however it will impinge upon some wetlands that are unavoidable due to pre-existing development or further environmental constraints.

## 3.2.3.6 Overall Project Impact Rating

An overall project rating occurs when the preceding Sections (3.2.3.1 -3.2.3.4) are examined to compare the overall significance of the wetland to that of the proposed project. This significance is identified in the rating calculation which follows.

a. **Rating Calculation**
(insert total from previous Sections (3.2.3.1 - 3.2.3.4) in boxes provided, subtract total in Section 3.2.3.4. from total of 3.2.3.1 to 3.2.3.3 and calculate overall ratings)

**Current Wetland Status**

| | | |
|---|---|---|
| 3.2.3.1 Biological Rating | 4 | (a) |
| 3.2.3.2 Hydrological Rating | 3 | (b) |
| 3.2.3.3 Social/Cultural Rating | 1 | (c) |

**Project Status**

| | | |
|---|---|---|
| 3.2.3.4 Projected Production Change Rate | 4 | (d) |

| | |
|---|---|
| **Overall Rating= a+b+c minus d = e** | 4 |

Note: When a value of "U" (unknown) or "NA" (not available) occurs, then proceed to either gather that information or move directly to Stage Two Detailed Analysis to address that requirement.

b. **Overall Rating**

The equation totals the three wetland function component values (a+b+c) and subtracts the new project production benefits value (d). The result is an overall rating (e) which represents the value of the wetland in relation to the benefits of the proposed project.

- Maximum possible value: 19
- Minimum possible value: 1
- Where overall rating is equal to or greater than 13, project rejection (or relocation) should be recommended.
- Where overall rating is equal to or less than 3, project approval should be recommended.
- Where overall rating is between 4 and 12 inclusive, project should be referred to Stage Two Detailed Analysis.

**Recommendations**

(a) reject project
(b) refer to Stage Two Detailed Analysis
(c) approve without conditions
(d) approve with conditions
(List necessary mitigative measures and measures to retain/enhance wetland functions of value to society in (e))
(e) mitigative measures 1) Construct wetland habitat along the edge of Wetland 6 to replace the 0.81 ha of habitat lost at this wetland. 2) Salvage wetland soils from disturbed portion of wetland to aid in rapid re-establishment of native plant communities in reconstructed wetland. 3) Test salvaged wetland soil to ensure that it will not release stored contaminants 4) Ensure that the hydrology of the wetland is maintained through proper culvert placement. 5) Implement erosion and sediment control measures to minimize sedimentation of wetland. 6) Minimize the area of wetland habitat lost or disturbed as a result of highway construction.

(f) reason for recommendation (note: outline by project benefits and important wetland functions/values lost or reduced do not simply report the number calculated)
The project will provide economic benefits to the local area as a result of construction activity and will improve public safety. Construction activity will result in the infilling of approximately 19 % of the total area of wetland habitat resulting in the loss of wildlife habitat. The wetland habitat lost to highway construction is not particularly valuable and does not support any rare or endangered species. Tall shrub dominated basin swamp is the only wetland habitat type lost as a result of highway construction. This is the most abundant wetland habitat type present in the vicinity of Antigonish. The only apparent social or cultural use of the wetland is timber harvesting which was conducted in the recent past. This activity has affected the northern half of the wetland. The timber harvesting operation appears to have had little effect on the wetland substrate and regeneration of the forest plant community is under way. There is also evidence of past hydrological alterations to the wetland which resulted in some tree mortality. The source of this change is not known for certain but may be related to either construction of a causeway across part of the wetland or construction of Highway 104. The wetland appears to have moderate value in regards to surface water flow regulation. It probably augments stream flow during low flow periods and helps to ameliorate flood conditions by slowing and temporarily storing flood waters. This function will not be lost as a result of highway construction since only a small proportion of the wetland will be infilled. The current functions of the wetland will be maintained provided that the hydrology of the wetland is not altered by construction activity. To this end, care must be taken in the design and construction of culverts for the new highway.

**Evaluator's Signature** **Date**

If referred to Stage Two Detailed analysis, outline particular project impacts or wetland functions/values that may be worthy of special attention.

**CONCLUSION OF STAGE ONE "GENERAL ANALYSIS"**

# 3.3 Wetland 11

## 3.3.1 Process

### 3.3.1.1 Background

Name Jacques Whitford Environment Limited

Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Date December 23, 2002

### 3.3.1.2 Project

This section describes the proposed project. It is essential that the project be described before proceeding with this section.

f. **Summary of Project** (fill in and check the boxes)

Name of Project Construction of Highway 104 Antigonish

| | | | | |
|---|---|---|---|---|
| i. | Is it a public or private project? | | Public | Private |
| ii. | Does it require land use approval? | | Yes | No |
| iii. | Where is it located? Antigonish, Antigonish County, Nova Scotia | | | |
| iv. | Is it proposed in or near a wetland? | | In | Near |
| v. | Will the wetland be fully or partially drained? | | Fully | Partially |
| | | fully or partially dredged? | Fully | Partially |
| | | completely or partially filled? | Completely | Partially |
| | | fully or partially dyked? | Fully | Partially (Temporarily) |
| | | fully or partially flooded? | Fully | Partially |
| | | fully or partially enhanced/restored? | Fully | Partially |
| | | Other | | |

g. **Type of Activity Proposed** (check appropriate boxes; if necessary describe under "other")

| | | |
|---|---|---|
| i. | Industrial | |
| ii. | Commercial | |
| iii. | Residential | |
| iv. | Institutional | |
| v. | Recreational/Tourism | |
| vi. | Agriculture | |
| vii. | Transportation/Utility Corridor | |
| viii. | Habitat Development | |
| ix. | Forestry | |
| x. | Other (describe) | |
| xi. | Statement of Project Purpose | To upgrade the highway near Antigonish to current standards for 100 series highway. |
| xii. | Precise Description of Activity | Construction of 15 km of twinned 100 series highway. |

h. **Status of Project** (land use controls which might affect the project)

i. **Jurisdiction of Approving Authority**
- Federal
- Territorial/Provincial
- Municipal/Regional
- Native

ii. **Type of Mandatory Review**

Mandatory review required?

Yes No

Environmental Impact Assessment required?

| | | |
|---|---|---|
| Yes | No | Federal |
| Yes | No | Territorial/Provincial |
| Yes | No | Municipal |
| Yes | No | Native |

iii. **Does the project fall under Municipal Development Control?** (If yes continue, if no go to "iv")

Type of Control:

Approved Development Plan
Approved Zoning By-Law
Approved Environmental Impact Assessment (EIA)
Approved Performance Standards
Other (described) _____

iv. **Status of Proposal**

Not Submitted
Under Review
Approved
Denied
Under Appeal
Requires Zoning

v. **Sources of Funding** (check one or more)

Private Financing
Public Financing
Public Subsidy

If public subsidy, please name program _____

_____

vi. **Level of Project Understanding/Refinement** (check one)

At very preliminary stage; little or no economic cost/benefit analysis
Preliminary stage; conceptual drawings, economic cost/benefit analysis, environmental impact considerations
Detailed design; design drawings, cost/benefit analysis (all components), and Environmental Impact Assessment

vii. **Potential for Stewardship**

Stewardship represents landowner commitment to manage the wetland in society's interest. Does that potential exist for this wetland?

Yes
No
Maybe

If yes or maybe, what steps are needed to institute a stewardship program? _____

_____

d. **Project Production Summary**

This section examines the products (i.e. benefits and disbenefits) which the project might generate.

i. **Has an economic analysis been completed for the project?**

Yes (continue to "ii")
No (go to "iv")

If yes, by whom: by proponent in-house
by professional consultant
other (name/agency/organization) Louis Berger (Canada) Ltd. commissioned by the Atlantic Expressway Committee; Beasy Nicoll Engineering Ltd. commissioned by NSTPW

Information about analyst

Name Louis Berger (Canada) Ltd. / Beasy Nicoll Engineering Ltd.
Address Unknown /80 Eileen Stubbs Avenue Dartmouth NS
Telephone No. Unknown / 902-468-4740
Date Analysis Prepared June 1996/ January 1999

ii. **Status of Economic Findings** (evaluator's opinion only)

Detailed, thorough economic findings
Preliminary economic findings
No economic findings (go to "iv")
Information not available (g to "iv")

iii. **Summary of Findings/Project Benefits** (if no estimates, check box; if estimates are available indicate information on line provided)

Permanent jobs (person/years)
Permanent contribution to new area wages per year
Permanent contribution to new area spending (total per year)
Construction jobs (person/years) 167
Construction contribution to new area wages per year $2 million
Construction contribution to area spending (total per year) $74 million
Increased production by type (e.g. agriculture, forestry, tourism)
Other benefits
Amenity Contribution

iv. **Summary of Potential Disbenefits** (check the appropriate boxes)

There are expected problems that may occur because of the project. These potential problems are the preliminary issues that will need to be addressed as part of the project review.

| | | |
|---|---|---|
| Noise | Water drawdown | Recreational loss |
| Air pollution | Habitat loss | Economic loss |
| Water pollution | Aesthetic loss | Other |

e. **Summary of Expected Level of Selected Project Impacts** (check box for high, moderate, or low)

The following table provides project information which will assist in subsequent considerations of potential project impact upon the wetland under review. This table summarizes the evaluator's views based upon existing known information.

| POTENTIAL WETLAND IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Noise Pollution | | | |
| Air Pollution | | | |
| Water Pollution | | | |
| Water Drawdown | | | |
| Habitat Loss | | | |
| Aesthetic Loss | | | |
| Recreational Loss | | | |
| Other | | | |

| POTENTIAL ECONOMIC IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Employment | | | |
| Training | | | |
| Construction Spending | | | |
| Operation Spending | | | |
| Taxes | | | |
| Indirect Spending* | | | |
| Flood Protection | | | |
| Other | | | |

* (e.g. Tourism)

f. **Project Summary** (project description, sources, and a summary of findings that may be useful in future analysis)

A project description and analysis of environmental effects is presented in the "Highway 104 Antigonish Environmental Assessment Report" prepared for Nova Scotia Department of Transportation & Public Works by Jacques Whitford Environment Limited

### 3.3.1.3 Wetland Description

This section describes the affected wetland. It is essential that the wetland be described before proceeding.

a. **Wetland Location**

Province/Territory Nova Scotia
Common Place Name (if any) Antigonish
Nearest Urban Centre Antigonish
Legal Description (if any) None

Land Description: Public
Private
Protected Area
Other _____
If public, name of area/site (if any) _____

If protected, name of agency and status _____

b. **Map**
Show location of wetland and proposed project in relation to region. (Draw or place map here, or attach map and/or project plan to back of this page. Indicate direction of north and ensure that map contains a scale).

(See Figure 5.4).

c. **Wetland Context**
This provides a brief description of the wetland and preliminary relationship to the project.

i. **Wetland Complexity** **Size**
Is this a single wetland Yes No _____ ha ( ) acres
Is this a wetland complex* Yes No 2.93 ha ( ) acres
(*i.e. a series of more than one wetland)

ii. **Wetland Class**

| a) **Single Wetland** (Check one only) | b) **Wetland Complex** (Check all classes present, and write number if it occurs more than once) | c) **Wetland Classification** |
|---|---|---|
| Bog | Bog _____ | Temporary |
| Fen | Fen _____ | Seasonal |
| Swamp | Swamp Two types | Permanent |
| Marsh | Marsh _____ | |
| Shallow Water | Shallow Water . | |

iii. **Has this wetland been previously impacted?**
Yes No
If yes, describe _____

**Additional Comments Regarding Wetland Description**

See Table I1 for a description of the wetland.

## 3.3.2 Preliminary Screening

This section examines two key considerations prior to the application of the three evaluation stages. These considerations relate to:
1. Potential for project relocations
2. Project redesign
3. Wetland viability

### 3.3.2.1 Potential for Project Relocation

This section examines the possibility of relocating the project away from the wetland, in order to reduce potential direct or indirect effects that may occur. It should be completed in association with the proponent. **(The proponent should be made aware of the subsequent evaluations procedure which may be necessary if relocation is not undertaken or is not possible).**

a. **How important is the wetland site for this project?**
   Essential (go to 3.3.2.2)
   Important (go to 3.3.2.2)
   Desirable (go to 3.3.2.2 )
   Unnecessary (go to "b")
   Unknown (go to 3.3.2.2)

b. **Is an alternative location available?**
   Yes Where? (go to "c")
   No (go to 3.3.2.2)

c. **Does an alternative locations create detrimental impacts to other uses?**
   Yes (go to 3.3.2.2)
   No (go to "d")

d. **What is the rationale for relocation of the project, or why must it be located on this wetland site?**

   _____

e. **Project recommended for relocation?**
   Yes (go to "f")
   No (go to 3.3.2.2)

f. **Is proponent prepared to relocate?**
   Yes (if alternative location recommended and proponent accepts evaluation, stop here)
   No (go to 3.3.2.2)

_____ _____

**Evaluator's Signature** **Date**

**CONCLUSION OF ALTERNATIVE PROJECT SITE CONSIDERATION**

### 3.3.2.2 Project Redesign

A proposed project may require a simple or difficult redesign or change in project management practices to minimize wetland effects. This section examines that opportunity. You may need to reconsider this section after the Stage One and Stage Two evaluations.

a. **Is project redesign possible?**
   Very likely (go to "b")
   Possibly (go to "b")
   Not Possible (go to "f")

b. **Will the redesign significantly reduce the impact to the wetland?**
   Yes (go to "c")
   No (go to "f")

c. **If the project can be redesigned, will a redesign require other conditions?**
   Yes (go to "d")
   No (go to "f")

d. **What are the conditions for redesign?**
   Rezoning of other land
   Subsidies
   Other (specify) _____

e. **Are these conditions achievable?**
   Very likely (go to "j")
   Possibly (go to "j")
   Not Possible (go to "3.3.2.3")
   If not possible, why? _____

f. **Are changes in the way the project is managed possible?**
   (e.g. landscaping, cultivation practices, design of infrastructure)
   Very likely (go to "g")
   Possibly (go to "g")
   Not Possible (go to "3.3.2.3")

g. **Will changes in the way the project is managed significantly reduce impact to the wetland?**
   Yes (go to "h")
   No (go to "3.3.2.3")

h. **What are the conditions for a change in the way the project is managed?**
   Subsidies
   Alteration to regulations
   Other (specify) _____

i. **Are these conditions achievable?**
   Very likely (go to "j")
   Possibly (go to "j")
   Not Possible (go to "3.3.2.3")
   If not possible, why? _____

j. **Interim Recommendations**
   The project should be redesigned; or
   The way the project is managed should be modified; or
   The proponent and approving authority will proceed to modify the project to protect the wetland.
   The evaluation should proceed.

The evaluator should consider such redesign or management practices in association with the proponent and/or the approving authority. Once discussions have been held, the evaluator should proceed to complete "k".

k. **Record of Action**

Project satisfactorily redesigned; or
Project management practices satisfactorily modified; or
Proceed to Section 3.3.2.3

**Additional Comments Regarding Project Redesign Considerations**

None

**CONCLUSION OF PROJECT REDESIGN CONSIDERATION**

## 3.3.2.3 Wetland Viability

Wetland viability is the key consideration in the process of wetland and proposed project evaluation. A wetland, which has been severely and detrimentally affected over time and cannot be reasonably rehabilitated, should be considered for detailed analysis in Stage Two, only if it represents one of the last such wetland types in the region. Otherwise, a wetland that has been impacted previously beyond critical thresholds of viability should not be considered further and the project should be recommended for development.

**Preliminary Screening: Cumulative Impact**

This section provides an evaluation of the status of the wetland in a temporal and spatial context. It indicates the degree to which the wetland has been impacted previously by direct or indirect human induced activities and the degree to which the wetland will likely continue to deteriorate with and without the cumulative effects of the proposed project.

a. **Results of Past Effects upon the Wetland**

Has the wetland decreased in size during the past five years?
Yes
No
Don't know (go to "stage 2 detailed analysis")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Is the wetland known to be detrimentally affected by other nearby projects or drainage system changes?
Yes
No
Don't know (go to "stage 2 detailed analysis")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have animal or plant communities been detrimentally impacted by past activity?
Yes
No
Don't know (go to "stage 2 detailed analysis")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have the wetland hydrological characteristics been detrimentally affected by other nearby activities?
Yes
No
Don't know (go to "stage 2 detailed analysis")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

b. **Potential Rehabilitation/Restoration**

Can the wetland be rehabilitated/restored?
Likely
Unlikely
Very Unlikely

At what cost?
Very Costly
Costly
Not Very Costly

c. **Wetland Status**

This item relates to the degree to which the cumulative impacts have passed an acceptable threshold level, and the wetland is beyond restorative assistance. Wetlands that are considered "lost" do not warrant further consideration unless they represent one of the last wetlands of their type in the region.

Has the wetland been compromised up to or beyond its viability as a functioning wetland?
Yes (if yes, then complete next question"
No (if no, go to Stage One (see Section 3.3.3).

Have most similar wetland types been lost to conversion in the region?
Yes (if yes, go to "d. Recommendation" and consider (1) and (2)
No (if no, go to "d. Recommendation" and consider (3) and (4)

d. **Recommendation**
(1) Protect wetland as a representative or unique example.
(2) Consider restoration/rehabilitation of wetland.
(3) Consider proceeding with development if cumulative impact on wetlands are already high.
(4) Proceed to Section 3.3.3, Stage One.

***If recommendation 1, 2, or 3 accepted, stop evaluation here.***

**Evaluator's Signature** **Date**

**CONCLUSION OF CUMULATIVE IMPACT ASSESSMENT**

Name of Wetland Wetland 11 Antigonish, Nova Scotia
*Name* *Area/Town/Province/Territory*

**Complete this evaluation in a sequential manner.**

### 3.3.3 Stage One "General Analysis"

The "General Analysis" is designed to provide land use planners, administrators, developers, and the public with an opportunity to examine the relative value of wetlands, and any proposed projects which may directly or indirectly impact those wetland values. This "General Analysis" sets out a process of easily identifying - from readily available public data - biological, hydrological and biogeochemical, social/cultural, and production wetland functions and the expected new production functions generated by the proposed project. All considerations are at an international, national, or provincial level of significance. A few are also at a regional scale of consideration.

Comparing the importance of the wetland and the project, provides the evaluator with knowledge about the desirability of : (1) protecting the wetland because it has outstanding value; (2) approving the project because it has outstanding value and the wetland has little or no value; and (3) deferring to Stage Two because no conclusion is obvious. The ratings provide guidance only to the recommendations.

**Note: When listing sources, indicate relevant documents, authorities, and agencies.**

Stage One Evaluation undertaken by:
Name Jacques Whitford Environment Limited
Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Stage One values are based upon obvious, easily verified findings. Lack of sufficient information or inconclusive results will trigger the Stage Two applications. Values allocated are:

H = High value (3); M = Moderate Value (2); L = Low Value (1); NA= Not Applicable (X)

**Where information is not available or unknown, check additional sources. If still unavailable or unknown, then automatically proceed to Stage Two Detailed Analysis.**

### 3.3.3.1 Biological Component: Importance to Wildlife/Plant Communities

Potential Source of Data:
- C Territorial/Provincial Wildlife or Natural Resources Agency
- C University/Community College, Botany and Biology Departments
- C Canadian Wildlife Service/Wildlife Habitat Canada office
- C Local Ducks Unlimited Canada office
- C Canada Land Inventory (Agriculture and Agri-Food Canada)

i. **Significance for Waterfowl/Wildlife Species**
This relates to the importance, at a national or provincial scale of significance, of the wetland as a habitat for the production, migration, or other life history events for waterfowl and other animal species at a national or provincial scale of significance. (Select most current classification, and shade numbers in either the Canada Land Inventory box OR the Provincial/Territorial Classification box. Enter shaded numbers on the lines beside each column and their sum on the subtotal line).

| **Canada Land Inventory** | High (Class 1-2) | Moderate (Class 3-4) | Low (Class 5-7) | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | |
| Wildlife | 3 | 2 | 1 | X | |

**Subtotal** (maximum is 6)
(Where "x" occurs, go to "Stage Two Detailed Analysis").

**or**

| **Provincial/Territorial Classification** | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | 1 |
| Wildlife | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6)
(Where "x" occurs, go to "Stage Two Detailed Analysis"). 2

Source Wetland Atlas - Wetland Protection Mapping (Canadians Wildlife Services 1984)
Wetland Survey Conducted in the Wetland (2002)

ii. **Rarity/Scarcity or Uniqueness**

This relates to the degree to which the wildlife and vegetation species and populations inhabiting the wetland are rare, endangered or vulnerable within the region. (shade numbers and total them).

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl/Wildlife | 3 | 2 | 1 | X | 1 |
| Vegetation | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6)
(Where "x" occurs, go to "Stage Two Detailed Analysis"). 2

Source Andrew Hebda, Curator of Zoology, Nova Scotia Museum of Natural History
Marian Munroe, Curator of Botany, Nova Scotia Museum of Natural History
Stefen Garriets, Data Manager, Atlantic Canada Conservation Data Centre
Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia (Fuller 1998, internal document)
Atlas of Rare Vascular Plants in Nova Scotia (Pronych and Wilson 1993)
Atlas of Breeding Birds of the Maritime Provinces (Erskine 1992)
The Amphibians and Reptiles of Nova Scotia (Gilhen 1984)
Atlantic Canada Conservation Data Centre general status ranks for vascular plants, birds, mammals, reptiles and amphibians.
Nova Scotia Department of Natural Resources General Status Ranks of Wild Species in Nova Scotia (Vascular plants, birds, mammals, reptiles and amphibians).
Vegetation and wildlife surveys conducted within wetland.

**Total Biological Component Rating:** 4

(Maximum is 12)
(Add "i" + "ii" subtotal, transfer total to equation in "3.3.3.6).

### 3.3.3.2 Hydrological Component: Water Quality/Groundwater/Erosion Control/Flood Control

This relates to the importance of the wetland for valued hydrological functions. It may be a general rating based on interviews with water analysts.

Source of Data: C Territorial/Provincial/Federal Water Resources Agencies

(shade numbers and total them)

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Significance of Contribution to Provincial Regional Water Quality/Groundwater | 3 | 2 | 1 | X | 1 |
| Significance of Contribution to Provincial/Regional Erosion Control/Flood Control | 3 | 2 | 1 | X | 2 |

**Total Hydrological Rating** (maximum is 6) 3
(transfer total to "3.3.3.6")

Source Wetland Survey and consultation with hydrologist (Hans Arisz, Hydrocom Technologies Ltd.).

### 3.3.3.3 Social/Cultural Component: Contribution to Quality of Life

This relates to the existing public commitment to the wetland as exemplified by way of current legislated actions that protect significant wetland resources.

Sources of Data:
- C Territorial/Provincial Lands Branch
- C Territorial/Provincial Planning Branch
- C Territorial/Provincial Environment Branch

(shade numbers and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Existing, Proposed or Potential International/National/Provincial/Regional Heritage Designation or Protected Status (within or adjacent to the protected area). | 3 | 2 | 1 | 1 |

**Total Social/Cultural Rating** (maximum is 3) 1
(transfer total to "3.3.3.6")

Source Stefen Garriets, Data Manager, Atlantic Canada Conservation Data Centre
Beardmore (1985)
Mark Pulsifer, Nova Scotia Department of Natural Resources
Rachel Gautreau, Canadian Wildlife Service

### 3.3.3.4 Production Component: Expected New Project Benefits

This relates to the potential new added value production benefits which may result from implementation of the project, both geographically and within the economic sectors.

Sources of Data:
- C The proponent
- C Territorial/Provincial Economic Development Agency
- C Municipal/Regional Economic Development Office

(shade number and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Significance of Project to the Economic Sector (e.g. agriculture, forestry, or tourism) | 3 | 2 | 1 | 2 |
| Economic Significance to National, Provincial, Regional Development and Employment | 3 | 2 | 1 | 2 |

**Total Production Component Rating** (maximum is 6) 4
(transfer total to "3.3.3.6")

Source Louis Berger (Canada) Ltd. (1996)
Beasy Nicoll Engineering Ltd. (1999)

### 3.3.3.5 Copy of All Relevant Findings and Sources Attached

Yes
No
If no, then list

Information collected during the wetland survey are presented in Tables I1 and I2. A list of sources of existing data used in the evaluation is presented below.


Beasy Nicoll Engineering Limited. 1999. Highway 104 Antigonish Safety Review. Dartmouth, NS

Bond, W.K., K.W. Cox, T. Heberlein, E.W. Manning, D.R. Witty, and D.A. Young. 1992. Wetland Evaluation Guide. North American Wetlands Conservation Council (Canada), Issues Paper, No. 1992-1

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2002. Canadian Species at Risk

Erskine, A.J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing and the Nova Scotia Museum, Halifax, N.S.

Fuller, S. 1998. Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia. Nova Scotia Museum of Natural History draft internal document, Halifax, N.S.

Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum, Halifax, N.S

Louis Berger (Canada) Ltd. 1996. An Assessment of the Economic Impact of Upgrading the Trans Canada Highway 104 To a Four-Lane, Divided, Controlled Access Highway Through Antigonish County. Atlantic Expressway Committee, Antigonish, NS.

NSDNR (Nova Scotia Department of Natural Resources). 2002a. General Status Ranks of Wild Species in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/genstatus/specieslist.asp.

NSDNR (Nova Scotia Department of Natural Resources). 2002b. Species at Risk in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/endngrd/specieslist.htm.

Pronych and Wilson, 1993. Atlas of Rare Vascular Plants in Nova Scotia. Curatorial Report No.78. Nova Scotia Museum of Natural History, Halifax, N.S.

ACCDC (Atlantic Canada Conservation Data Centre). 2002. Species Lists and Rare Species. Internet Publication: http://www.accdc.com/info/lists/.

Scott, F.W. 1994. Provisional Annotated List of Plant and Animal Species Considered to be Rare in Nova Scotia. Nova Scotia Museum of Natural History. Halifax, N.S.

Stefen Garriets, Data Manager, Atlantic Canada Conservation Data Centre

**Describe other major issues relevant to a decision** As discussed in the Highway 104 Antigonish Environmental Assessment Report (Sections 2.1 and 6.4), the upgrade of the Highway is necessary due to increasing traffic volumes and concerns for public safety. The Five Year (1996 to 2000) blended or combined PDO collision rates for the 12.1 km of highway within the study area are about 40% higher than the comparable five year average for all provincial 100 series highways without access control. A detailed route selection process was undertaken by NSTPW to evaluate a number of options and select one alignment based on consideration of safety, and environmental and socio-economic constraints. The selected alignment is based on this evaluation and proposes to minimize disturbance where possible; however it will impinge upon some wetlands that are unavoidable due to pre-existing development or further environmental constraints.

## 3.3.3.6 Overall Project Impact Rating

An overall project rating occurs when the preceding Sections (3.3.3.1 - 3.3.3.4) are examined to compare the overall significance of the wetland to that of the proposed project. This significance is identified in the rating calculation which follows.

a. **Rating Calculation**
(insert total from previous Sections (3.3.3.1 -3.3.3.4) in boxes provided, subtract total in Section 3.3.3.4. from total of 3.3.3.1 to 3.3.3.3 and calculate overall ratings)

**Current Wetland Status**

| | | |
|---|---|---|
| 3.3.3.1 Biological Rating | 4 | (a) |
| 3.3.3.2 Hydrological Rating | 3 | (b) |
| 3.3.3.3 Social/Cultural Rating | 1 | (c) |

**Project Status**

| | | |
|---|---|---|
| 3.3.3.4 Projected Production Change Rate | 4 | (d) |

| | |
|---|---|
| **Overall Rating= a+b+c minus d = e** | 4 |

Note: When a value of "U" (unknown) or "NA" (not available) occurs, then proceed to either gather that information or move directly to Stage Two Detailed Analysis to address that requirement.

b. **Overall Rating**

The equation totals the three wetland function component values (a+b+c) and subtracts the new project production benefits value (d). The result is an overall rating (e) which represents the value of the wetland in relation to the benefits of the proposed project.

- Maximum possible value: 19
- Minimum possible value: 1
- Where overall rating is equal to or greater than 13, project rejection (or relocation) should be recommended.
- Where overall rating is equal to or less than 3, project approval should be recommended.
- Where overall rating is between 4 and 12 inclusive, project should be referred to Stage Two Detailed Analysis.

**Recommendations**

(a) reject project
(b) refer to Stage Two Detailed Analysis
(c) approve without conditions
(d) approve with conditions

(List necessary mitigative measures and measures to retain/enhance wetland functions of value to society in (e))

(e) mitigative measures 1) Construct wetland habitat along the edge of Wetland 11 to replace the 0.01 ha of habitat lost at this wetland. 2) Salvage wetland soils from disturbed portion of wetland to aid in rapid re-establishment of native plant communities in reconstructed wetland. 3) Test salvaged wetland soil to ensure that it will not release stored contaminants 4) Ensure that the hydrology of the wetland is maintained through proper culvert placement. 5) Implement erosion and sediment control measures to minimize sedimentation of wetland. 6) Minimize the area of wetland habitat lost or disturbed as a result of highway construction.

(f) reason for recommendation (note: outline by project benefits and important wetland functions/values lost or reduced do not simply report the number calculated)

The project will provide economic benefits to the local area as a result of construction activity and will improve public safety. The wetland survey and a review of the existing literature indicates that the wetland has limited value as wildlife habitat and as habitat for rare or endangered species. The shallow open water of the wetland provides habitat for a variety of amphibian species including Green frog, mink frog and leopard frog as well as fish species such as sticklebacks. Construction of the highway will result in the loss of approximately 0.5 % of the area of the wetland. This loss of wetland habitat is not expected to have a significant adverse effect on this function. The wetland has no known social/cultural attributes. The wetland plays a moderate role in flood control and surface water regulation. During low flow periods the wetland would augment stream flow and during periods of flooding it would slow the flow of flood waters. These hydrologic functions would not be lost since only a small area of the wetland would be infilled during highway construction.

**Evaluator's Signature** **Date**

If referred to Stage Two Detailed analysis, outline particular project impacts or wetland functions/values that may be worthy of special attention.

**CONCLUSION OF STAGE ONE "GENERAL ANALYSIS"**

# 3.4 Wetland 12

## 3.4.1 Process

### 3.4.1.1 Background

Name Jacques Whitford Environment Limited

Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Date December 23, 2002

### 3.4.1.2 Project

This section describes the proposed project. It is essential that the project be described before proceeding with this section.

f. **Summary of Project** (fill in and check the boxes)

Name of Project Construction of Highway 104 Antigonish

| | | | | |
|---|---|---|---|---|
| i. | Is it a public or private project? | | Public | Private |
| ii. | Does it require land use approval? | | Yes | No |
| iii. | Where is it located? Antigonish, Antigonish County, Nova Scotia | | | |
| iv. | Is it proposed in or near a wetland? | | In | Near |
| v. | Will the wetland be fully or partially drained? | | Fully | Partially |
| | | fully or partially dredged? | Fully | Partially |
| | | completely or partially filled? | Completely | Partially |
| | | fully or partially dyked? | Fully | Partially (Temporarily) |
| | | fully or partially flooded? | Fully | Partially |
| | | fully or partially enhanced/restored? | Fully | Partially |
| | | Other | | |

g. **Type of Activity Proposed** (check appropriate boxes; if necessary describe under "other")

| | | |
|---|---|---|
| i. | Industrial | |
| ii. | Commercial | |
| iii. | Residential | |
| iv. | Institutional | |
| v. | Recreational/Tourism | |
| vi. | Agriculture | |
| vii. | Transportation/Utility Corridor | |
| viii. | Habitat Development | |
| ix. | Forestry | |
| x. | Other (describe) | |
| xi. | Statement of Project Purpose | To upgrade the highway near Antigonish to current standards for 100 series highway. |
| xii. | Precise Description of Activity | Construction of 15 km of twinned 100 series highway. |

h. **Status of Project** (land use controls which might affect the project)

i. **Jurisdiction of Approving Authority**
- Federal
- Territorial/Provincial
- Municipal/Regional
- Native

ii. **Type of Mandatory Review**

Mandatory review required?

Yes No

Environmental Impact Assessment required?

| | | |
|---|---|---|
| Yes | No | Federal |
| Yes | No | Territorial/Provincial |
| Yes | No | Municipal |
| Yes | No | Native |

iii. **Does the project fall under Municipal Development Control?** (If yes continue, if no go to "iv")

Type of Control:

Approved Development Plan
Approved Zoning By-Law
Approved Environmental Impact Assessment (EIA)
Approved Performance Standards
Other (described) _____

iv. **Status of Proposal**

Not Submitted
Under Review
Approved
Denied
Under Appeal
Requires Zoning

v. **Sources of Funding** (check one or more)

Private Financing
Public Financing
Public Subsidy

If public subsidy, please name program _____

_____

vi. **Level of Project Understanding/Refinement** (check one)

At very preliminary stage; little or no economic cost/benefit analysis
Preliminary stage; conceptual drawings, economic cost/benefit analysis, environmental impact considerations
Detailed design; design drawings, cost/benefit analysis (all components), and Environmental Impact Assessment

vii. **Potential for Stewardship**

Stewardship represents landowner commitment to manage the wetland in society's interest. Does that potential exist for this wetland?

Yes
No
Maybe

If yes or maybe, what steps are needed to institute a stewardship program? _____

_____

d. **Project Production Summary**

This section examines the products (i.e. benefits and disbenefits) which the project might generate.

i. **Has an economic analysis been completed for the project?**

Yes (continue to "ii")
No (go to "iv")

If yes, by whom: by proponent in-house
by professional consultant
other (name/agency/organization) Louis Berger (Canada) Ltd. commissioned by the Atlantic Expressway Committee; Beasy Nicoll Engineering Ltd. commissioned by NSTPW

Information about analyst

Name Louis Berger (Canada) Ltd. / Beasy Nicoll Engineering Ltd.
Address Unknown /80 Eileen Stubbs Avenue Dartmouth NS
Telephone No. Unknown / 902-468-4740
Date Analysis Prepared June 1996/ January 1999

ii. **Status of Economic Findings** (evaluator's opinion only)

Detailed, thorough economic findings
Preliminary economic findings
No economic findings (go to "iv")
Information not available (g to "iv")

iii. **Summary of Findings/Project Benefits** (if no estimates, check box; if estimates are available indicate information on line provided)

Permanent jobs (person/years)
Permanent contribution to new area wages per year
Permanent contribution to new area spending (total per year)
Construction jobs (person/years) 167
Construction contribution to new area wages per year $2 million
Construction contribution to area spending (total per year) $74 million
Increased production by type (e.g. agriculture, forestry, tourism)
Other benefits
Amenity Contribution

iv. **Summary of Potential Disbenefits** (check the appropriate boxes)

There are expected problems that may occur because of the project. These potential problems are the preliminary issues that will need to be addressed as part of the project review.

| | | |
|---|---|---|
| Noise | Water drawdown | Recreational loss |
| Air pollution | Habitat loss | Economic loss |
| Water pollution | Aesthetic loss | Other |

e. **Summary of Expected Level of Selected Project Impacts** (check box for high, moderate, or low)

The following table provides project information which will assist in subsequent considerations of potential project impact upon the wetland under review. This table summarizes the evaluator's views based upon existing known information.

| POTENTIAL WETLAND IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Noise Pollution | | | |
| Air Pollution | | | |
| Water Pollution | | | |
| Water Drawdown | | | |
| Habitat Loss | | | |
| Aesthetic Loss | | | |
| Recreational Loss | | | |
| Other | | | |

| POTENTIAL ECONOMIC IMPACTS | LEVEL OF EXPECTED IMPACT: HIGH | MODERATE | LOW |
|---|---|---|---|
| Employment | | | |
| Training | | | |
| Construction Spending | | | |
| Operation Spending | | | |
| Taxes | | | |
| Indirect Spending* | | | |
| Flood Protection | | | |
| Other | | | |

* (e.g. Tourism)

f. **Project Summary** (project description, sources, and a summary of findings that may be useful in future analysis)

A project description and analysis of environmental effects is presented in the "Highway 104 Antigonish Environmental Assessment Report" prepared for Nova Scotia Department of Transportation & Public Works by Jacques Whitford Environment Limited

### 3.4.1.3 Wetland Description

This section describes the affected wetland. It is essential that the wetland be described before proceeding.

a. **Wetland Location**

Province/Territory Nova Scotia
Common Place Name (if any) Antigonish
Nearest Urban Centre Antigonish
Legal Description (if any) None

Land Description: Public
Private
Protected Area
Other _____
If public, name of area/site (if any) _____

If protected, name of agency and status _____

b. **Map**
Show location of wetland and proposed project in relation to region. (Draw or place map here, or attach map and/or project plan to back of this page. Indicate direction of north and ensure that map contains a scale).

(See Figure 5.4).

c. **Wetland Context**
This provides a brief description of the wetland and preliminary relationship to the project.

i. **Wetland Complexity** **Size**

| | | | |
|---|---|---|---|
| Is this a single wetland | Yes | No | _____ ha ( ) acres |
| Is this a wetland complex* | Yes | No | 7.22 ha ( ) acres |

(*i.e. a series of more than one wetland)

ii. **Wetland Class**

| a) **Single Wetland** (Check one only) | b) **Wetland Complex** (Check all classes present, and write number if it occurs more than once) | c) **Wetland Classification** |
|---|---|---|
| Bog | Bog _____ | Temporary |
| Fen | Fen _____ | Seasonal |
| Swamp | Swamp Three types | Permanent |
| Marsh | Marsh _____ | |
| Shallow Water | Shallow Water | |

iii. **Has this wetland been previously impacted?**
Yes No
If yes, describe Approximately 30 % of the wetland has been clear-cut (northeastern end of wetland). Recent beaver flooding has resulted in substantial changes to approximately 25 % of the wetland (western end of wetland).

**Additional Comments Regarding Wetland Description**

See Table I1 for a description of the wetland.

## 3.4.2 Preliminary Screening

This section examines two key considerations prior to the application of the three evaluation stages. These considerations relate to:
1. Potential for project relocations
2. Project redesign
3. Wetland viability

### 3.4.2.1 Potential for Project Relocation

This section examines the possibility of relocating the project away from the wetland, in order to reduce potential direct or indirect effects that may occur. It should be completed in association with the proponent. **(The proponent should be made aware of the subsequent evaluations procedure which may be necessary if relocation is not undertaken or is not possible).**

a. **How important is the wetland site for this project?**
   Essential (go to 3.4.2.2)
   Important (go to 3.4.2.2)
   Desirable (go to 3.4.2.2)
   Unnecessary (go to "b")
   Unknown (go to 3.4.2.2)

b. **Is an alternative location available?**
   Yes Where? (go to "c")
   No (go to 3.4.2.2)

c. **Does an alternative locations create detrimental impacts to other uses?**
   Yes (go to 3.4.2.2)
   No (go to "d")

d. **What is the rationale for relocation of the project, or why must it be located on this wetland site?**

   _____

e. **Project recommended for relocation?**
   Yes (go to "f")
   No (go to 3.4.2.2)

f. **Is proponent prepared to relocate?**
   Yes (if alternative location recommended and proponent accepts evaluation, stop here)
   No (go to 3.4.2.2)

_____ _____

**Evaluator's Signature** **Date**

**CONCLUSION OF ALTERNATIVE PROJECT SITE CONSIDERATION**

### 3.4.2.2 Project Redesign

A proposed project may require a simple or difficult redesign or change in project management practices to minimize wetland effects. This section examines that opportunity. You may need to reconsider this section after the Stage One and Stage Two evaluations.

a. **Is project redesign possible?**
   Very likely (go to "b")
   Possibly (go to "b")
   Not Possible (go to "f")

b. **Will the redesign significantly reduce the impact to the wetland?**
   Yes (go to "c")
   No (go to "f")

c. **If the project can be redesigned, will a redesign require other conditions?**
   Yes (go to "d")
   No (go to "f")

d. **What are the conditions for redesign?**
   Rezoning of other land
   Subsidies
   Other (specify) _____

e. **Are these conditions achievable?**
   Very likely (go to "j")
   Possibly (go to "j")
   Not Possible (go to "3.4.2.3")
   If not possible, why? _____

f. **Are changes in the way the project is managed possible?**
   (e.g. landscaping, cultivation practices, design of infrastructure)
   Very likely (go to "g")
   Possibly (go to "g")
   Not Possible (go to "3.4.2.3")

g. **Will changes in the way the project is managed significantly reduce impact to the wetland?**
   Yes (go to "h")
   No (go to "3.4.2.3")

h. **What are the conditions for a change in the way the project is managed?**
   Subsidies
   Alteration to regulations
   Other (specify) _____

i. **Are these conditions achievable?**
   Very likely (go to "j")
   Possibly (go to "j")
   Not Possible (go to "3.4.2.3")
   If not possible, why? _____

j. **Interim Recommendations**
   The project should be redesigned; or
   The way the project is managed should be modified; or
   The proponent and approving authority will proceed to modify the project to protect the wetland.
   The evaluation should proceed.

The evaluator should consider such redesign or management practices in association with the proponent and/or the approving authority. Once discussions have been held, the evaluator should proceed to complete "k".

k. **Record of Action**

Project satisfactorily redesigned; or
Project management practices satisfactorily modified; or
Proceed to Section 3.4.2.3

**Additional Comments Regarding Project Redesign Considerations**

None

**CONCLUSION OF PROJECT REDESIGN CONSIDERATION**

## 3.4.2.3 Wetland Viability

Wetland viability is the key consideration in the process of wetland and proposed project evaluation. A wetland, which has been severely and detrimentally affected over time and cannot be reasonably rehabilitated, should be considered for detailed analysis in Stage Two, only if it represents one of the last such wetland types in the region. Otherwise, a wetland that has been impacted previously beyond critical thresholds of viability should not be considered further and the project should be recommended for development.

**Preliminary Screening: Cumulative Impact**

This section provides an evaluation of the status of the wetland in a temporal and spatial context. It indicates the degree to which the wetland has been impacted previously by direct or indirect human induced activities and the degree to which the wetland will likely continue to deteriorate with and without the cumulative effects of the proposed project.

a. **Results of Past Effects upon the Wetland**

Has the wetland decreased in size during the past five years?
Yes
No
Don't know (go to "3.4.3")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Is the wetland known to be detrimentally affected by other nearby projects or drainage system changes?
Yes
No
Don't know (go to "3.4.3")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have animal or plant communities been detrimentally impacted by past activity?
Yes
No
Don't know (go to "3.4.3")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

Have the wetland hydrological characteristics been detrimentally affected by other nearby activities?
Yes
No
Don't know (go to "3.4.3")
If yes, by how much: Highly affected
Moderately affected
Minimally affected

b. **Potential Rehabilitation/Restoration**

Can the wetland be rehabilitated/restored?
Likely
Unlikely
Very Unlikely

At what cost?
Very Costly
Costly
Not Very Costly

c. **Wetland Status**

This item relates to the degree to which the cumulative impacts have passed an acceptable threshold level, and the wetland is beyond restorative assistance. Wetlands that are considered "lost" do not warrant further consideration unless they represent one of the last wetlands of their type in the region.

Has the wetland been compromised up to or beyond its viability as a functioning wetland?
Yes (if yes, then complete next question"
No (if no, go to Stage One (see Section 3.4.3).

Have most similar wetland types been lost to conversion in the region?
Yes (if yes, go to "d. Recommendation" and consider (1) and (2)
No (if no, go to "d. Recommendation" and consider (3) and (4)

d. **Recommendation**
(1) Protect wetland as a representative or unique example.
(2) Consider restoration/rehabilitation of wetland.
(3) Consider proceeding with development if cumulative impact on wetlands are already high.
(4) Proceed to Section 3.4.3, Stage One.

***If recommendation 1, 2, or 3 accepted, stop evaluation here.***

**Evaluator's Signature** **Date**

**CONCLUSION OF CUMULATIVE IMPACT ASSESSMENT**

Name of Wetland Wetland 12 Antigonish, Nova Scotia
*Name* *Area/Town/Province/Territory*

**Complete this evaluation in a sequential manner.**

### 3.4.3 Stage One "General Analysis"

The "General Analysis" is designed to provide land use planners, administrators, developers, and the public with an opportunity to examine the relative value of wetlands, and any proposed projects which may directly or indirectly impact those wetland values. This "General Analysis" sets out a process of easily identifying - from readily available public data - biological, hydrological and biogeochemical, social/cultural, and production wetland functions and the expected new production functions generated by the proposed project. All considerations are at an international, national, or provincial level of significance. A few are also at a regional scale of consideration.

Comparing the importance of the wetland and the project, provides the evaluator with knowledge about the desirability of : (1) protecting the wetland because it has outstanding value; (2) approving the project because it has outstanding value and the wetland has little or no value; and (3) deferring to Stage Two because no conclusion is obvious. The ratings provide guidance only to the recommendations.

**Note: When listing sources, indicate relevant documents, authorities, and agencies.**

Stage One Evaluation undertaken by:
Name Jacques Whitford Environment Limited
Address 3 Spectacle Lake Drive, Dartmouth, Nova Scotia B3B 1W8

Stage One values are based upon obvious, easily verified findings. Lack of sufficient information or inconclusive results will trigger the Stage Two applications. Values allocated are:

H = High value (3); M = Moderate Value (2); L = Low Value (1); NA= Not Applicable (X)

**Where information is not available or unknown, check additional sources. If still unavailable or unknown, then automatically proceed to Stage Two Detailed Analysis.**

### 3.4.3.1 Biological Component: Importance to Wildlife/Plant Communities

Potential Source of Data:
- C Territorial/Provincial Wildlife or Natural Resources Agency
- C University/Community College, Botany and Biology Departments
- C Canadian Wildlife Service/Wildlife Habitat Canada office
- C Local Ducks Unlimited Canada office
- C Canada Land Inventory (Agriculture and Agri-Food Canada)

i. **Significance for Waterfowl/Wildlife Species**
This relates to the importance, at a national or provincial scale of significance, of the wetland as a habitat for the production, migration, or other life history events for waterfowl and other animal species at a national or provincial scale of significance. (Select most current classification, and shade numbers in either the Canada Land Inventory box OR the Provincial/Territorial Classification box. Enter shaded numbers on the lines beside each column and their sum on the subtotal line).

| **Canada Land Inventory** | High (Class 1-2) | Moderate (Class 3-4) | Low (Class 5-7) | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | |
| Wildlife | 3 | 2 | 1 | X | |

**Subtotal** (maximum is 6) (Where "x" occurs, go to "Stage Two Detailed Analysis").

**or**

| **Provincial/Territorial Classification** | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl | 3 | 2 | 1 | X | 1 |
| Wildlife | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6) (Where "x" occurs, go to "Stage Two Detailed Analysis"). 2

Source Wetland Atlas - Wetland Protection Mapping (Canadians Wildlife Services 1984)
Wetland Survey Conducted in the Wetland (2002)

ii. **Rarity/Scarcity or Uniqueness**

This relates to the degree to which the wildlife and vegetation species and populations inhabiting the wetland are rare, endangered or vulnerable within the region. (shade numbers and total them).

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Waterfowl/Wildlife | 3 | 2 | 1 | X | 1 |
| Vegetation | 3 | 2 | 1 | X | 1 |

**Subtotal** (maximum is 6) (Where "x" occurs, go to "Stage Two Detailed Analysis). 2

Source
Andrew Hebda, Curator of Zoology, Nova Scotia Museum of Natural History
Marian Munroe, Curator of Botany, Nova Scotia Museum of Natural History
Stefen Garriets, Data Manager, Atlantic Canada Conservation Data Centre
Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia (Fuller 1998, internal document)
Atlas of Rare Vascular Plants in Nova Scotia (Pronych and Wilson 1993)
Atlas of Breeding Birds of the Maritime Provinces (Erskine 1992)
The Amphibians and Reptiles of Nova Scotia (Gilhen 1984)
Atlantic Canada Conservation Data Centre data request and general status ranks for vascular plants, birds, mammals, reptiles and amphibians.
Nova Scotia Department of Natural Resources General Status Ranks of Wild Species in Nova Scotia (Vascular plants, birds, mammals, reptiles and amphibians).
Vegetation and wildlife surveys conducted within wetland.

**Total Biological Component Rating:** 4

(Maximum is 12)
(Add "i" + "ii" subtotal, transfer total to equation in "3.4.3.6).

### 3.4.3.2 Hydrological Component: Water Quality/Groundwater/Erosion Control/Flood Control

This relates to the importance of the wetland for valued hydrological functions. It may be a general rating based on interviews with water analysts.

Source of Data: C Territorial/Provincial/Federal Water Resources Agencies
(shade numbers and total them)

| | High | Moderate | Low | Not Available | |
|---|---|---|---|---|---|
| Significance of Contribution to Provincial Regional Water Quality/Groundwater | 3 | 2 | 1 | X | 1 |
| Significance of Contribution to Provincial/Regional Erosion Control/Flood Control | 3 | 2 | 1 | X | 2 |

**Total Hydrological Rating** (maximum is 6) 3
(transfer total to "3.4.3.6")

Source Wetland Survey and consultation with hydrologist (Hans Arisz, Hydrocom Technologies Ltd.).

### 3.4.3.3 Social/Cultural Component: Contribution to Quality of Life

This relates to the existing public commitment to the wetland as exemplified by way of current legislated actions that protect significant wetland resources.

Sources of Data:
- C Territorial/Provincial Lands Branch
- C Territorial/Provincial Planning Branch
- C Territorial/Provincial Environment Branch

(shade numbers and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Existing, Proposed or Potential International/National/Provincial/Regional Heritage Designation or Protected Status (within or adjacent to the protected area). | 3 | 2 | 1 | 1 |

**Total Social/Cultural Rating** (maximum is 3) 1
(transfer total to "3.4.3.6")

Source Atlantic Canada Conservation Data Centre
Beardmore (1985) Mark Pulsifer, Nova Scotia Department of Natural Resources
Rachel Gautreau, Canadian Wildlife Service

### 3.4.3.4 Production Component: Expected New Project Benefits

This relates to the potential new added value production benefits which may result from implementation of the project, both geographically and within the economic sectors.

Sources of Data:
- C The proponent
- C Territorial/Provincial Economic Development Agency
- C Municipal/Regional Economic Development Office

(shade number and total them)

| | High | Moderate | Low | |
|---|---|---|---|---|
| Significance of Project to the Economic Sector (e.g. agriculture, forestry, or tourism) | 3 | 2 | 1 | 2 |
| Economic Significance to National, Provincial, Regional Development and Employment | 3 | 2 | 1 | 2 |

**Total Production Component Rating** (maximum is 6) 4
(transfer total to "3.4.3.6")

Source Louis Berger (Canada) Ltd. (1996)
Beasy Nicoll Engineering Ltd. (1999)

### 3.4.3.5 Copy of All Relevant Findings and Sources Attached

Yes
No
If no, then list

Information collected during the wetland survey are presented in Tables I1 and I2. A list of sources of existing data used in the evaluation is presented below.


Beasy Nicoll Engineering Limited. 1999. Highway 104 Antigonish Safety Review. Dartmouth, NS

Bond, W.K., K.W. Cox, T. Heberlein, E.W. Manning, D.R. Witty, and D.A. Young. 1992. Wetland Evaluation Guide. North American Wetlands Conservation Council (Canada), Issues Paper, No. 1992-1

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2002. Canadian Species at Risk

Erskine, A.J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing and the Nova Scotia Museum, Halifax, N.S.

Fuller, S. 1998. Atlas of Rare, Threatened and Infrequent Fauna of Nova Scotia. Nova Scotia Museum of Natural History draft internal document, Halifax, N.S..

Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum, Halifax, N.S

Louis Berger (Canada) Ltd. 1996. An Assessment of the Economic Impact of Upgrading the Trans Canada Highway 104 To a Four-Lane, Divided, Controlled Access Highway Through Antigonish County. Atlantic Expressway Committee, Antigonish, NS.

NSDNR (Nova Scotia Department of Natural Resources). 2002a. General Status Ranks of Wild Species in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/genstatus/specieslist.asp.

NSDNR (Nova Scotia Department of Natural Resources). 2002b. Species at Risk in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/endngrd/specieslist.htm.

Pronych and Wilson, 1993. Atlas of Rare Vascular Plants in Nova Scotia. Curatorial Report No.78. Nova Scotia Museum of Natural History, Halifax, N.S.

ACCDC (Atlantic Canada Conservation Data Centre). 2002. Species Lists and Rare Species. Internet Publication: http://www.accdc.com/info/lists/.

Scott, F.W. 1994. Provisional Annotated List of Plant and Animal Species Considered to be Rare in Nova Scotia. Nova Scotia Museum of Natural History. Halifax, N.S.

**Describe other major issues relevant to a decision** As discussed in the Highway 104 Antigonish Environmental Assessment Report (Sections 2.1 and 6.4), the upgrade of the Highway is necessary due to increasing traffic volumes and concerns for public safety. The Five Year (1996 to 2000) blended or combined PDO collision rates for the 12.1 km of highway within the study area are about 40% higher than the comparable five year average for all provincial 100 series highways without access control. A detailed route selection process was undertaken by NSTPW to evaluate a number of options and select one alignment based on consideration of safety, and environmental and socio-economic constraints. The selected alignment is based on this evaluation and proposes to minimize disturbance where possible; however it will impinge upon some wetlands that are unavoidable due to pre-existing development or further environmental constraints.

## 3.4.3.6 Overall Project Impact Rating

An overall project rating occurs when the preceding Sections (3.4.3.1 - 3.4.3.4) are examined to compare the overall significance of the wetland to that of the proposed project. This significance is identified in the rating calculation which follows.

a. **Rating Calculation**
(insert total from previous Sections (3.4.3.1 - 3.4.3.4) in boxes provided, subtract total in Section 3.4.3.4. from total of 3.4.3.1 to 3.4.3.3 and calculate overall ratings)

**Current Wetland Status**

| | | |
|---|---|---|
| 3.4.3.1 Biological Rating | 4 | (a) |
| 3.4.3.2 Hydrological Rating | 3 | (b) |
| 3.4.3.3 Social/Cultural Rating | 1 | (c) |

**Project Status**

| | | |
|---|---|---|
| 3.4.3.4 Projected Production Change Rate | 4 | (d) |

| | |
|---|---|
| **Overall Rating= a+b+c minus d = e** | 4 |

Note: When a value of "U" (unknown) or "NA" (not available) occurs, then proceed to either gather that information or move directly to Stage Two Detailed Analysis to address that requirement.

b. **Overall Rating**

The equation totals the three wetland function component values (a+b+c) and subtracts the new project production benefits value (d). The result is an overall rating (e) which represents the value of the wetland in relation to the benefits of the proposed project.

- Maximum possible value: 19
- Minimum possible value: 1
- Where overall rating is equal to or greater than 13, project rejection (or relocation) should be recommended.
- Where overall rating is equal to or less than 3, project approval should be recommended.
- Where overall rating is between 4 and 12 inclusive, project should be referred to Stage Two Detailed Analysis.

**Recommendations**

(a) reject project
(b) refer to Stage Two Detailed Analysis
(c) approve without conditions
(d) approve with conditions
(List necessary mitigative measures and measures to retain/enhance wetland functions of value to society in (e))
(e) mitigative measures 1) Construct wetland habitat along the edge of Wetland 12 to replace the 0.75 ha of habitat lost at this wetland. 2) Salvage wetland soils from disturbed portion of wetland to aid in rapid re-establishment of native plant communities in reconstructed wetland. 3) Test salvaged wetland soil to ensure that it will not release stored contaminants 4) Ensure that the hydrology of the wetland is maintained through proper culvert placement. 5) Implement erosion and sediment control measures to minimize sedimentation of wetland. 6) Minimize the area of wetland habitat lost or disturbed as a result of highway construction.

(f) reason for recommendation (note: outline by project benefits and important wetland functions/values lost or reduced do not simply report the number calculated)
The project will provide economic benefits to the local area as a result of construction activity and will improve public safety. The wetland survey and a review of the existing literature indicates that the wetland has relatively little value as wildlife habitat and as habitat for rare or endangered species. The wetland has no known social/cultural attributes. All merchantable timber in the wetland was harvested in the recent past. The wetland plays a moderate role in regulation of surface water flow. The wetland can be expected to augment stream flow during low flow periods and would help to ameliorate flood conditions by slowing the flow of flood waters. This function is not expected to be significantly altered since only approximately 10.3 % of the total area of wetland habitat will be infilled during construction resulting in the loss of wildlife habitat.

**Evaluator's Signature** **Date**

If referred to Stage Two Detailed analysis, outline particular project impacts or wetland functions/values that may be worthy of special attention.

**CONCLUSION OF STAGE ONE "GENERAL ANALYSIS"**

# 4.0 Nova Scotia Department of the Environment and Labour Ten Step Wetland Evaluations

This report outlines the results of wetland evaluations conducted for 15 wetlands less than 2 ha in size found within the proposed Highway 104 Antigonish By-pass. The wetland field surveys were conducted between August 20 and 23, 2002 with additional information collected during the period from June 18 to 19, 2002.

## 4.1 Wetland 2

| | |
|---|---|
| Wetland Type: | Wetland complex composed of tall shrub basin swamp and basin marsh |
| Size: | 0.42 ha. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Picea glauca* 5% |
| Shrubs: | *Alnus incana* 70% |
| Ground Vegetation: | *Impatiens capensis* 20%, *Osmunda cinnamomea* 15%, *Onoclea sensibilis* 10 %, *Glyceria striata* 7%, *Aster puniceus* 3%. |
| Dominant Vegetation | Basin marsh |
| Trees: | None |
| Shrubs: | *Alnus incana* 5% |
| Ground Vegetation: | *Typha latifolia* 40, *Onoclea sensibilis* 30, *Thelypteris palustris* 15, *Solidago canadensis* 7%, *Cicuta bulbifera* 5%. |
| Vascular plant list: | See Table I2. One uncommon vascular plant species, *Asclepias incarnata* present. *Asclepias incarnata* is listed as S3 by ACCDC. Nova Scotia population considered to be secure by NSDNR. |
| Wildlife: | No rare or sensitive species present. |
| Birds: | Red-breasted Nuthatch, Ovenbird, Swamp Sparrow, and American Goldfinch |
| Mammals: | Racoon and White-tailed Deer |
| Herpetiles: | Northern Spring Peeper |
| Hydrology: | A small wetland located near the headwaters of a small brook. Appears to be a groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | Wetland is surrounded by roads. Dry ephemeral pool present. |

### 4.1.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score (a wetland evaluation system used to determine the value of wetlands as wildlife habitat) is available for the wetland. During the field survey all species of bird, mammal, reptile and amphibian detected within the wetland were recorded. Wildlife species were detected on the basis of visual sightings, vocalizations, tracks, feces, skeletal remains, and distinctive spoor such as characteristic bite marks or dens.

Four species of bird were recorded in or near the wetland including Red-breasted Nuthatch, Ovenbird, Swamp Sparrow and American Goldfinch. It is likely that Swamp Sparrows nest in the wetland while the other three species may forage there. Mammals noted in the wetland included racoon and white-tailed deer. No reptile species were detected during the survey and one amphibian, the northern spring peeper, was found. The ephemeral pool in the wetland probably provides suitable breeding habitat for northern spring peepers and wood frogs. The value of the wetland as wildlife habitat is limited due to the small size of the wetland, its close proximity to houses and the fact that it is located in a small habitat fragment created by the confluence of three roads.

### 4.1.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird or mammal species recorded in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002, NSDNR 2002a, NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 74 species (Table I2) were found in the wetland, none of which are considered to be a rare or endangered species in Canada (COSEWIC 2002) or Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b). One of the species, purple milkweed (*Asclepias incarnata*), is considered to be uncommon in Nova Scotia by the Atlantic Canada Conservation Data Centre (ACCDC)(ACCDC 2002). ACCDC classes purple milkweed as an S3 species which indicates that there are between 21 and 100 records of the species in the province and the species is found within a restricted range. The Nova Scotia Department of Natural Resources (NSDNR) general status list of vascular plants classes purple milkweed as a green species indicating that the population of this species in Nova Scotia is secure (NSDNR 2002a). Purple milkweed is typically found growing in wet or rocky thickets generally near a stream or lakeshore. At this location it was found at the boundary of the tall shrub basin swamp and basin marsh habitats near the edge of an ephemeral pool. Approximately 500 purple milkweed plants were found at this site.

### 4.1.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland appears to be a groundwater discharge site and therefore has little or no groundwater recharge potential.

### 4.1.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

Swamps can contribute to the slowing of flood waters reducing peak flood heights and stretching out the high flow period over a longer period of time. This wetland may also help to regulate surface water flow by slowly releasing stored water during low flow periods thereby augmenting stream flow. Given the small size of the wetland it is not believed that this wetland would play a significant role in local surface flow regulation.

### 4.1.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production and has no potential to be used for agricultural production.

### 4.1.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

The wetland receives surface water drainage from two of the roads which surround it. The wetland may help to settle out particulates washed from the roads and road ditches. It may also absorb contaminants such as metals and hydrocarbons washed from the surfaces of the roads by precipitation. Given the small size of the wetland, this function is not rated as significant.

### 4.1.7 Step 7 Evaluate the Potential for Peat Development

The wetland has developed on mineral soil and contains no peat deposits.

### 4.1.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All issues have been addressed.

### 4.1.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.1.10 Step 10 Summary of Wetland Evaluation

Overall, this wetland is considered to be of moderate value. It is small and has limited value as wildlife habitat due to its small size and proximity to homes and several busy roads. However, it does provide habitat for a relatively large population of a vascular plant species (purple milkweed) which is considered to be uncommon in Nova Scotia. Although there are relatively few records of this species in Nova Scotia its population is considered to be secure. The wetland may play a small role in improving the quality of the road run-off which enters it by filtering out particulates and contaminants such as metals and hydrocarbons. It may also play a small role in surface water flow regulation. The wetland has no potential for agricultural production or peat development.

## 4.2 Wetland 3

| | |
|---|---|
| Wetland Type: | Wetland complex composed of coniferous treed basin swamp and tall shrub basin swamp |
| Size: | 0.95 ha. |
| Dominant Vegetation: | Coniferous treed basin swamp |
| Trees: | *Picea mariana* 15%, *Larix laricina* 7%, *Acer rubrum* 5% |
| Shrubs: | *Rubus hispidus* 15 %, *Spiraea alba* 7 %, *Alnus incana* 5%, *Nemopanthus mucronata* 2%, *Ilex verticillata* 2% |
| Ground Vegetation: | *Sphagnum spp.* 80%, *Carex echinata* 25%, *Eriophorum virginicum* 7 %, *Lysimachia terestris* 5 %, *Triadenum fraseri* 4 %, *Aster umbellatus* 2 % |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Picea mariana* <1 %, *Larix laricina* <1 % |
| Shrubs: | *Alnus incana* 60%, *Ilex verticillata* 20 % |
| Ground Vegetation: | *Sphagnum spp.* 30%, *Calamagrostis canadensis* 25 %, *Lycopus uniflorus* 10 %, *Glyceria canadensis* 10 %, *moss sp.* 10 %, *Osmunda cinnamomea* 5 %, *Smilacina trifolia* 5 %, *Galium sp.* 4 % |
| Vascular plant list: | See Table I2. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Common Grackle, American Goldfinch |
| Mammals: | White-tailed Deer |
| Herpetiles: | None |
| Hydrology: | Basin swamp with no inflow and poorly developed outflow. Headwater of tributary to West River. Probable groundwater discharge site. |
| Anthropogenic uses: | Some timber harvesting has occurred around the margins of the wetland. |
| Comments: | None |

### 4.2.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score (a wetland evaluation system used to determine the value of wetlands as wildlife habitat) is available for the wetland. During the field survey all species of bird, mammal, reptile and amphibian detected within and immediately adjacent to the wetland were recorded. Wildlife species were detected on the basis of visual sightings, vocalizations, tracks, feces, skeletal remains, and distinctive spoor such as characteristic bite marks or dens.

Common Grackle and American Goldfinch were the only bird species observed during the field survey. The wetland undoubtedly supports a larger variety of bird species than encountered during the survey. The wetland supports an open canopied coniferous forest and an alder swamp which would provide habitat for a variety of bird species including White-throated Sparrow, Dark-eyed Junco, Hermit Thrush, American Robin, Alder Flycatcher, Yellow-bellied Flycatcher, Common Yellowthroat, and Blue-headed Vireo. There is no open water present within or near the wetland so it is not expected to provide valuable waterfowl habitat. White-tailed deer was the only mammal species detected in the wetland and no reptiles or amphibians were recorded. Mammal species expected to regularly use the wetland would include coyote, racoon, red squirrel, varying hare, red-back vole, deer mouse, woodland jumping mouse, short-tailed shrew, and common shrew. Reptiles and

amphibians expected to use the wetland would include maritime garter snake, wood frog, American toad, yellow-spotted salamander, and red-back salamander. The results of the field survey suggest that the wetland is unlikely to provide significant wildlife habitat. Coniferous treed swamps and tall shrub swamps are common in the area so this particular wetland does not provide a unique habitat type. In addition, the small size of the wetland limits its value as wildlife habitat.

### 4.2.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or amphibian species recorded in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 49 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.2.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland is characterized by the presence of an outflow stream but no inflow stream. This would suggest that the wetland is a groundwater discharge site rather than a groundwater recharge site.

### 4.2.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland can be expected to contribute to augmentation of stream flow during low flow periods and may help to attenuate flood conditions by storing and slowing the flow of water through the wetland. However, given the small size of the wetland this contribution is not significant. The proposed highway will result in the infilling of approximately 12 % of the wetland. The surface water flow regulation function of the wetland will not be completely lost as a result of construction and operation of the highway.

### 4.2.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production and has no potential to be used for agricultural production.

### 4.2.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

There is currently no development upstream of the wetland. As such the wetland does not provide a water treatment service.

### 4.2.7 Step 7 Evaluate the Potential for Peat Development

The substrate of the wetland is mineral soil rather than peat, consequently, there is no potential for peat harvesting.

### 4.2.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.2.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.2.10 Step 10 Summary of Wetland Evaluation

Overall, this wetland is not considered to be significant. It is small and does not provide unique habitat for plants or animals. This wetland has limited value as wildlife habitat due to its small size and the fact that it is composed of habitat types which are common in the area. No rare or endangered species were encountered in the wetland. The wetland has no potential for agricultural production or peat development and plays no significant role in the hydrology of the area.

## 4.3 Wetland 4

| | |
|---|---|
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.71 ha. |
| Dominant Vegetation: | |
| Trees: | *Acer rubrum* 10%, *Picea glauca* 5% |
| Shrubs: | *Alnus incana* 60 %, *Rubus hispidus* 20 %, *Ilex verticillata* 10 %. |
| Ground Vegetation: | *Sphagnum* spp. 70 %, *Osmunda cinnamomea* 30 %, *Iris versicolor* 8 %, *Osmunda regalis* 5 %, *Carex trisperma* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Black-capped Chickadee, Cedar Waxwing. |
| Mammals: | White-tailed Deer, Racoon, Striped Skunk, Varying Hare. |
| Herpetiles: | None |
| Hydrology: | Basin swamp at the headwater of a small stream. Probable groundwater discharge area. |
| Anthropogenic uses: | Timber harvesting has occurred in the area surrounding the wetland. |
| Comments: | None |

### 4.3.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Wildlife species recorded from the wetland during the field survey included Black-capped Chickadee, Cedar Waxwing, white-tailed deer, racoon, striped skunk, and varying hare. The tall shrub cover in the wetland is similar in structure and species composition to alder thickets and young deciduous forest habitat present in the area surrounding the wetland.

The wetland does not provide significant wildlife habitat. Tall shrub basin swamp is the most abundant wetland type in the area around Antigonish so this wetland does not provide a unique habitat type. Wildlife species present in the wetland are also found in adjacent young deciduous woodlands and alder thickets. In addition, the small size of the wetland also limits its value as wildlife habitat.

### 4.3.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or amphibian species recorded in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 44 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.3.3 Step 3 Evaluate Groundwater Recharge Potential

This wetland forms the headwater of a small stream suggesting that it is a groundwater discharge site.

### 4.3.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland has some potential to regulate surface water flow, however, the significance of this function in relation to other wetlands is low due to the small size of the wetland. Approximately 38 % of the wetland will be infilled as a result of highway construction so this wetland function will be reduced but not lost.

### 4.3.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production and has no potential to be used for agricultural production.

### 4.3.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of up slope sources of contaminated water. Agricultural land is located to the south of the wetland, however, all of the drainage from the fields drains away from the wetland.

### 4.3.7 Step 7 Evaluate the Potential for Peat Development

There is no peat present in this wetland, therefore, there is no potential for peat development.

### 4.3.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.3.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.3.10 Step 10 Summary of Wetland Evaluation

Overall, this wetland is not considered to be significant. It is small and does not provide unique habitat for plants or animals. This wetland has limited value as wildlife habitat due to its small size. No rare or endangered species were encountered in the wetland. The wetland has no potential for agricultural production or peat development nor does it play a significant role in the hydrology of the area.

## 4.4 Wetland 7

| | |
|---|---|
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.09 ha. |
| Dominant Vegetation: | |
| Trees: | None |
| Shrubs: | *Alnus incana* 70 %, *Ilex verticillata* <1 %, *Picea glauca* <1 % |
| Ground Vegetation: | *Rubus pubescens* 17 %, *Sphagnum* spp. 15 %, *Osmunda cinnamomea* 10 %, *Glyceria striata* 10 %, *Onoclea sensibilis* 8 %, *Poa palustris* 7 %, *Calamagrostis canadensis* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, American Goldfinch, Red-eyed Vireo, Black-and-white Warbler, Cedar Waxwing |
| Mammals: | White-tailed Deer |
| Herpetiles: | None encountered. |
| Hydrology: | The wetland receives surface water flow from a hay field to the west. This drainage appears to occur intermittently after precipitation events. Water discharges from the wetland into a small tributary of the West River. No surface water was present at the time of the field surveys (June 18 and August 20). Wetland does not appear to be a groundwater recharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None |

### 4.4.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland does not provide significant wildlife habitat. The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Wildlife species recorded from the wetland during the field survey included Ruffed Grouse, American Goldfinch, Red-eyed Vireo, Black-and-white Warbler, Cedar Waxwing, and white-tailed deer. No reptiles or amphibians were found during the survey. The tall shrub basin swamp habitat present in the wetland is similar in structure to the alder thickets and early successional woodlands found in the area surrounding the wetland. The wildlife species present in the wetland are also typically found in the surrounding upland habitats. In addition, the small size of the wetland also limits its value as wildlife habitat.

### 4.4.2 Step 2 Evaluate for Rare and Endangered Species

None of the wildlife species recorded in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 46 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.4.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland does not appear to be a groundwater recharge site. Water enters the wetland through a surface water inflow channel and exits through an outflow channel. Areas of the wetland up slope of the drainage channel are saturated suggesting that groundwater discharges from the wetland.

### 4.4.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

This wetland is located in a shallow basin on the flank of a low hill. The wetland receives surface water drainage through a small channel which collects surface water flow from a hay field located to the west and up slope of the wetland. Once the channel enters the wetland it becomes diffuse and is not well defined. Water from the wetland eventually discharges into the West River. At the time of the field surveys (June 18 and August 20, 2002) there was no surface water in the wetland. It appears that the wetland receives a combination of groundwater and surface water inputs with surface water inputs limited to heavy precipitation events or spring snow melt. The wetland may play a small role in surface flow regulation by augmenting stream flow between precipitation events. The wetland may also help to regulate surface flow during precipitation events by slowing the flow of water through the wetland. The significance of this function is expected to be low given the small size of the wetland.

### 4.4.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.4.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland may play a role in water treatment. The wetland may serve as a settling pond by slowing the flow of water which enters it. This function would be particularly useful in years when the hay field is plowed and replanted. The wetland would also aid in the immobilization of nutrients. Hay fields are typically fertilized when they are replanted and may have fertilizers such as liquid manure applied to them while they are in production. The wetland could help to reduce nutrient loading to receiving waters by incorporating excess nutrients into biomass. The settling of particulates by the wetland would also help to reduce concentrations of pesticides which often adsorb to soil particles.

Once the highway is constructed, the hay field will no longer exist. As such, inputs of nutrients will cease and once the disturbed portion of the RoW is revegetated, inputs of sediment should be reduced since periodic plowing will cease. The use of pesticides will also be greatly reduced since RoW vegetation management is conducted almost entirely through mowing. Contaminants associated with the operation of the highway would include metals, hydrocarbons and road salt. Wetlands are not very effective at reducing concentrations of hydrocarbons or salt but can be effective in removing metals.

### 4.4.7 Step 7 Evaluate the Potential for Peat Development

There is no peat present in this wetland, therefore, there is no potential for peat development.

### 4.4.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.4.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.4.10 Step 10 Summary of Wetland Evaluation

The wetland is small and does not provide unique habitat for plants or animals. This wetland has limited value as wildlife habitat due to its small size. No rare or endangered species were encountered in the wetland. The wetland is not used for agriculture and has no potential for peat development. Wetland 7 may play a small role in surface water flow regulation and may improve the quality of surface water which enters it by filtering out sediment and incorporating nutrients into plant biomass. Construction of the highway is expected to result in the infilling of approximately 89 % of this wetland with the subsequent loss of these hydrological and water treatment functions. However, construction of the highway will also result in the loss of the hay field which will reduce the requirement to remove sediment, nutrients and pesticides. Operation of the highway will produce a different suite of contaminants including metals, hydrocarbons and road salt. Wetlands typically are not effective at removing either salt or hydrocarbons but can be effective at reducing metal concentrations. Loss of the hay field would therefore not make the loss of the water treatment function of the wetland entirely irrelevant.

## 4.5 Wetland 8

| | |
|---|---|
| Wetland Type: | Wetland complex composed of tall shrub basin swamp and basin marsh. |
| Size: | 0.42 ha. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Larix laricina* 5 %, *Acer rubrum* 3 %, *Picea glauca* 1 %. |
| Shrubs: | *Alnus incana* 40 %, *Spiraea alba* 30 %, *Rubus hispidus* 5 %. |
| Ground Vegetation: | *Sphagnum* spp. 70 %, *Carex echinata* 10 %, *Solidago uliginosa* 5 %, *Dryopteris cristata* 2 %, *Viola cucculata* 1 %. |
| Dominant Vegetation: | Basin Marsh |
| Trees: | None |
| Shrubs: | *Alnus incana* 5 %, *Spiraea alba* 2 %. |
| Ground Vegetation: | *Dulichium arundinacea* 70 %, *Typha latifolia* 15 %, *Iris versicolor* 8 %, *Triadenum fraseri* 7 %, *Juncus canadensis* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Northern Flicker, Black-capped Chickadee, Common Yellowthroat, American Goldfinch. |
| Mammals: | Racoon, Red Squirrel, White-tailed Deer. |
| Herpetiles: | Northern Spring Peeper. |
| Hydrology: | Basin swamp which forms the headwater for a small tributary which drains into the West River. No surface water present at time of survey. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None. |

### 4.5.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. During the field survey five species of bird were recorded in or near the wetland including Northern Flicker, Black-capped Chickadee, Common Yellowthroat, and American Goldfinch. Mammal species recorded in the wetland included racoon, red squirrel and white-tailed deer. Northern spring peeper was the only herpetile recorded during the survey. None of the birds and mammals associated with the wetland are obligate wetland species and are also found in upland habitats adjacent to the wetland. The wetland does not contain any open water and does not provide good waterfowl habitat. The tall shrub basin swamp which comprises most of the wetland is similar in structure to upland shrub thickets and immature forest habitat in the surrounding upland areas. In addition, the small size of the wetland limits its value as wildlife habitat. Overall, the wetland does not provide unique or particularly valuable wildlife habitat.

### 4.5.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird or mammal species recorded in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002, NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 45 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.5.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland is the headwater for a small tributary of the West River suggesting that it is a groundwater discharge site rather than a groundwater recharge site.

### 4.5.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland would play a role in surface water regulation by augmenting stream flow between precipitation events. Wetlands can also regulate surface flow by functioning like a reservoir and slowing the flow of water through a drainage system. Given the small size of the wetland this function is unlikely to be significant. Approximately 50 % of the wetland will be infilled by highway construction. Although this wetland function will not be lost as a result of highway construction, it will be substantially reduced.

### 4.5.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.5.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

There is currently no development in close proximity to the wetland so it does not provide a water treatment service.

### 4.5.7 Step 7 Evaluate the Potential for Peat Development

No peat deposits are present in the wetland.

### 4.5.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.5.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.5.10 Step 10 Summary of Wetland Evaluation

Overall, this wetland is not considered to be significant. It is small and does not provide unique habitat for plants or animals. This wetland has limited value as wildlife habitat due to its small size and the fact that it is composed largely of habitat similar in structure to surrounding upland forest habitats. No rare or endangered species were encountered in the wetland. The wetland has no potential for agricultural production or peat development and plays no significant role in the hydrology of the area.

## 4.6 Wetland 9

| | |
|---|---|
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.31 ha. |
| Dominant Vegetation: | |
| Trees: | *Larix laricina* 5 %, *Picea glauca* 2 % |
| Shrubs: | *Alnus incana* 40 %, *Spiraea alba* 25 %. |
| Ground Vegetation: | *Carex nigra* 20 %, *Carex echinata* 20 %, *Solidago gigantea* 18 %, *Agrostis stolonifera* 15 %, *Carex panicea* 10 %, *Iris versicolor* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | One provincially uncommon species, Boreal Chickadee, recorded. |
| Birds: | Ruby-crowned Kinglet, Boreal Chickadee, Cedar Waxwing, Yellow-rumped Warbler, Magnolia Warbler, Common Yellowthroat, Evening Grosbeak. |
| Mammals: | Red Squirrel, White-tailed Deer |
| Herpetiles: | None noted. |
| Hydrology: | Basin swamp which forms the headwater for a small tributary which drains into the West River. No surface water present at time of survey. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | Wetland is located within the highway RoW but not in the footprint of the road. |

### 4.6.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. There is no open water in the wetland suggesting that it has little value as waterfowl habitat. Seven bird species were recorded in or near the wetland including Ruby-crowned Kinglet, Boreal Chickadee, Cedar Waxwing, Yellow-rumped Warbler, Magnolia Warbler, Common Yellowthroat, and Evening Grosbeak. Red squirrel and white-tailed deer were the only mammal species detected and no reptiles or amphibians were observed. The habitat present within the wetland is similar to that found in the surrounding upland habitats and supports a similar suite of species. As such, it does not provide unique wildlife habitat.

### 4.6.2 Step 2 Evaluate for Rare and Endangered Species

One of the bird species recorded in the wetland, Boreal Chickadee, is classed by ACCDC as an uncommon species in Nova Scotia (ACCDC 2002). NSDNR considers the Boreal Chickadee population of Nova Scotia to be secure (NSDNR 2002a). This species was observed foraging in the wetland during the August 21 field survey but was not recorded in this area during the breeding bird surveys conducted on June 19 and 20. Boreal Chickadees typically nest in moist coniferous forest and occasionally mixedwood forest which are not present in the wetland. It is unlikely that this species would breed in the wetland nor is it likely that the wetland would provide critical habitat for Boreal Chickadee. None of the other bird or mammal species recorded in or near the wetland are considered to be rare in Nova Scotia or Canada as a whole. A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 47 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002, NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.6.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland is the headwater for a small tributary of the West River suggesting that it is a groundwater discharge site rather than a groundwater recharge site.

### 4.6.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland would play a role in surface water regulation by augmenting stream flow between precipitation events; however, given the small size of the wetland this function is unlikely to be significant. Wetlands can also regulate surface flow by functioning like a reservoir and slowing the flow of water through a drainage system. Given the small size of the wetland it is not believed to play a significant role in local surface water flow regulation. This wetland is not located within the footprint of the proposed highway so no infilling is anticipated. As such, this wetland function is not expected to be significantly altered.

### 4.6.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.6.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.6.7 Step 7 Evaluate the Potential for Peat Development

No peat deposits are present in the wetland.

### 4.6.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.6.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.6.10 Step 10 Summary of Wetland Evaluation

Overall, this wetland is not considered to be significant. It is small and does not provide unique habitat for plants or animals. This wetland has limited value as wildlife habitat due to its small size. Boreal Chickadee, an uncommon bird species was observed in the wetland, however, the wetland does not provide suitable breeding habitat or other critical habitat functions for this species. No other species of concern were encountered in the wetland. The wetland has no potential for agricultural production or peat development nor is it expected to play a significant role in the hydrology of the area. The wetland is located within the RoW of the highway but will not be infilled as a result of highway construction since it is located outside of the footprint of the highway.

## 4.7 Wetland 10

| | |
|---|---|
| Wetland Type: | Wetland complex composed of tall shrub basin swamp and basin marsh. |
| Size: | 0.50 ha. |
| Dominant Vegetation: | Tall shrub stream swamp |
| Trees: | None |
| Shrubs: | *Alnus incana* 70 %, *Ilex verticillata* 5 %. |
| Ground Vegetation: | *Sphagnum* spp. 60%, *Onoclea sensibilis* 10 %, *Agrostis stolonifera* 7 %, *Impatiens capensis* 5 %, *Polygonum sagittat*um 2 %, *Polygonum robustius* 2 %. |
| Dominant Vegetation: | Stream marsh |
| Trees: | None |
| Shrubs: | None |
| Ground Vegetation: | *Juncus canadensis, Agrostis stolonifera, Leersia oryzoides, Eleocharis obtusa, Scirpus cyperinus.* (Cover estimates unavailable) |
| Vascular Plant List: | See Table I2. One uncommon species, marsh mermaid-weed (*Proserpinaca palustris*) was found in the wetland. This species is rated S3 by ACCDC and the Nova Scotia population is considered secure by NSDNR. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Rock Dove, Northern Flicker, Black-capped Chickadee, Cedar Waxwing, Common Yellowthroat, American Goldfinch. |
| Mammals: | Racoon, Muskrat, White-tailed Deer |
| Herpetiles: | Green Frog, Northern Leopard Frog, Northern Spring Peeper, probable breeding habitat for Yellow-spotted Salamander and Blue-spotted Salamander. |
| Hydrology: | The wetland has developed on the banks of a small stream which flows into the West River. |
| Anthropogenic uses: | None noted |
| Comments: | Wetland is located within the highway RoW but not in the footprint of the road. |

### 4.7.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Eight species of bird were recorded in or near the wetland during the field surveys including Ruffed Grouse, Rock Dove, Northern Flicker, Black-capped Chickadee, Cedar Waxwing, Common Yellowthroat, and American Goldfinch. Mammal species present in the wetland included muskrat, white-tailed deer and racoon. No reptiles were found in the wetland. Amphibians observed in the wetland included green frog, northern leopard frog and northern spring peeper. The wetland contains open water in the form of a relatively large pool and sluggish stream which provide good amphibian breeding habitat. The wetland is located within the RoW of the highway but is not present within the foot print of the proposed highway. Therefore, the amphibian breeding habitat present in the wetland will not be lost.

### 4.7.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or amphibian species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 57 species (Table I2) were found in the wetland. None of these species is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002), however, one species considered to be uncommon by the ACCDC was recorded in the wetland. This species was marsh mermaid-weed which is listed as S3S4 by ACCDC. This designation indicates that the population status of the species in Nova Scotia is not well known and ranges from uncommon to common. NSDNR (2002a) considers the Nova Scotia population to be secure. This species was found near the northern end of the wetland which is outside of the highway RoW. No construction activity is expected in the wetland so no direct habitat loss is anticipated.

### 4.7.3 Step 3 Evaluate Groundwater Recharge Potential

The geomorphology of the area where the wetland is found suggests that the wetland is a groundwater discharge site rather than a groundwater recharge site. The wetland is found in a valley and there is a small stream which flows through it.

### 4.7.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated midway along the course of a small stream. It is likely that the wetland helps to supplement stream flow during low flow periods and may slow the flow of water in the stream during flood conditions. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. No disturbance of the wetland is anticipated so this wetland function should not be impeded.

### 4.7.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.7.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.7.7 Step 7 Evaluate the Potential for Peat Development

Peat was encountered throughout the wetland and peat depth was estimated to be about one meter. Given the type of wetland in which the peat has developed it is likely that it has a high wood content and is of relatively little value as agricultural peat. The small size of the wetland would preclude development of a peat harvesting operation on the site.

### 4.7.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.7.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.7.10 Step 10 Summary of Wetland Evaluation

The wetland provides breeding habitat for a variety of amphibian species as well as habitat for an uncommon plant species, marsh mermaid-weed. The wetland may also play a minor role in the regulation of surface water flow. The wetland has no potential for agricultural production or peat development. No disturbance of the wetland is anticipated as a result of construction of the highway so these wetland functions should not be adversely affected. Care should be taken in the placement of culverts to prevent ponding in the wetland which could alter the habitat. In addition, the existing roadbed situated at the southern end of the wetland appears to have contributed to the development of the wetland and should be left in place to ensure that wetland hydrology is not altered.

## 4.8 Wetland 13

| | |
|---|---|
| Wetland Type: | Wetland complex composed of mixedwood treed basin swamp and tall shrub basin swamp |
| Size: | 0.94 ha. |
| Dominant Vegetation: | Mixedwood treed basin swamp |
| Trees: | *Acer rubrum* 50%, *Abies balsamea* 20 %, *Betula papyrifera* 5 %, *Fraxinus americana* 5 %. |
| Shrubs: | *Alnus incana* 25 %, *Cornus sericea* 5 %, *Abies balsamea* 2 %, *Ribes hirtellum* <1 %. |
| Ground Vegetation: | *Impatiens capensis* 30 %, *Osmunda cinnamomea* 25 %, *Rubus pubescens* 20 %, *Onoclea sensibilis* 15 %, *Aster puniceus* 5 %. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | None |
| Shrubs: | *Alnus incana* 40 %, *Abies balsamea* 2 %. |
| Ground Vegetation: | *Impatiens capensis* 70 %, *Onoclea sensibilis* 15 %, *Polygonum sagittatum* 10 %, *Aster puniceus* 5 %, *Glyceria striata* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Pileated Woodpecker, American Robin, White-throated Sparrow, American Goldfinch. |
| Mammals: | Deer Mouse, Red Squirrel, White-tailed Deer |
| Herpetiles: | None |
| Hydrology: | Basin swamp located along a small tributary to an unnamed stream which enters Antigonish Harbour. Probable groundwater discharge area. |
| Anthropogenic uses: | Some timber harvesting adjacent to wetland. |
| Comments: | None |

### 4.8.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Bird species observed in or near the wetland included Ruffed Grouse, Pileated Woodpecker, American Robin, White-throated Sparrow, and American Goldfinch. Mammals detected in the wetland included deer mouse, red squirrel and white-tailed deer. No herpetile species were observed during the survey. The mixedwood treed basin swamp and tall shrub basin swamp habitats which comprise the wetland are common wetland types in the area. The wetland is similar in structure and species composition to forest habitats in the surrounding terrestrial habitats. The species detected during the survey are characteristic of terrestrial habitats surrounding the wetland.

### 4.8.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or amphibian species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 77 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.8.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland is located at the edge of an intermittent stream suggesting that it is a groundwater discharge site rather than a groundwater recharge site.

### 4.8.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated along the course of a small stream and it is likely that the wetland helps to supplement stream flow during low flow periods. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. Only 0.1 % of this wetland is expected to be infilled as a result of highway construction; consequently, this wetland function should not be impaired.

### 4.8.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.8.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.8.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat deposits.

### 4.8.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.8.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.8.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat nor does it provide habitat for rare or endangered species. Most of the forested land surrounding the wetland has been harvested. The wetland is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the size and location of the wetland along the drainage course the magnitude of this function is not expected to be great.

## 4.9 Wetland 14

| | |
|---|---|
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.23 ha. |
| Dominant Vegetation: | Undisturbed tall shrub basin swamp |
| Trees: | *Abies balsamea* 3 %, *Picea glauca* 2 %. |
| Shrubs: | *Alnus incana* 60 %, *Ilex verticillata* 2 %, *Abies balsamea* <1 %. |
| Ground Vegetation: | *Onoclea sensibilis* 40 %, *Aster puniceus* 10 %, *Impatiens capensis* 8 %, *Solidago canadensis* 5 %, *Sphagnum* spp. 5 %. |
| Dominant Vegetation: | Heavily disturbed tall shrub basin swamp |
| Trees: | None |
| Shrubs: | *Alnus incana* <1 %, *Rubus idaeus* <1 %. |
| Ground Vegetation: | *Polygonum sagittatum* 40 %, *Carex lurida* 25 %, *Juncus effusus* 20 %, *Glyceria grandis* 15 %, *Scirpus microcarpus* 10 %. |
| Vascular plant list: | See Table I2. No rare species encountered |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Black-capped Chickadee, Red-breasted Nuthatch, Cedar Waxwing, Common Grackle, Common Yellowthroat, White-throated Sparrow, American Goldfinch. |
| Mammals: | Racoon, Varying Hare |
| Herpetiles: | None observed |
| Hydrology: | Basin swamp located along a small tributary of the South River. Probable groundwater discharge site. |
| Anthropogenic uses: | Merchantable timber in the wetland has been harvested. No other uses noted. |
| Comments: | None |

### 4.9.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Eight bird species including Ruffed Grouse, Black-capped Chickadee, Red-breasted Nuthatch, Cedar Waxwing, Common Grackle, Common Yellowthroat, White-throated Sparrow, and American Goldfinch were observed in or near the wetland during the field surveys. Mammals detected in the wetland included varying hare and racoon. No herpetiles were encountered in the wetland during the survey. The habitat present in the wetland is not unique. The tall shrub basin swamp which comprises the wetland is the most common wetland habitat in the area. The wildlife species which inhabit the wetland are characteristic of the woodland habitats which surround the wetland.

### 4.9.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird or mammal species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 66 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.9.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland has developed along the banks of a tributary of South River. It is more likely to be an area of groundwater discharge than an area of groundwater recharge.

### 4.9.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated along the drainage system of a small stream which flows into the South River. It is likely that the wetland helps to supplement stream flow during low flow periods. The wetland may also play a minor role in surface flow regulation during high water periods. Water which overflows the banks of the stream during flood events can be slowed by the vegetation in the wetland thereby helping to reduce the amplitude of the flood event. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. Approximately 61 % of the wetland will be infilled; consequently, this wetland function will be greatly reduced.

### 4.9.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.9.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.9.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat.

### 4.9.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.9.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.9.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat nor does it provide habitat for rare or endangered species. The merchantable timber in the wetland has been harvested and the forested habitats around the wetland have been clear-cut. It is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the size of the wetland the magnitude of this function is not expected to be great.

## 4.10 Wetland 15

| | |
|---|---|
| Wetland Type: | Tall shrub stream swamp |
| Size: | 0.57 ha. |
| Dominant Vegetation: | |
| Trees: | *Acer rubrum* 2 %, *Picea mariana* 1 %. |
| Shrubs: | *Alnus incana* 60 %, *Spiraea alba* <1 %. |
| Ground Vegetation: | *Sphagnum* spp. 35 % *Onoclea sensibilis* 30 %, *Onoclea sensibilis* 30 %, *Aster puniceus* 10 %, *Equisetum sylvaticum* 5 %, *Solidago gigantea* 5 %, *Dryopteris cristata* 3 %. |
| Vascular plant list: | See Table I2. One uncommon species, large purple-fringed orchid (*Platanthera grandiflora*), found in wetland. This species is classed as S3 by the ACCDC and the Nova Scotia population is considered to be secure by NSDNR. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Common Yellowthroat. |
| Mammals: | Red Squirrel, White-tailed Deer, Coyote. |
| Herpetiles: | Wood Frog, Northern Spring Peeper |
| Hydrology: | Stream swamp located along an intermittent stream (not shown on topographic mapping). Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None |

### 4.10.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Only two bird species, Ruffed Grouse and Common Yellowthroat, were noted in or near the wetland at the time of the survey. Mammals detected in the wetland included red squirrel, white-tailed deer and coyote. Northern spring peeper and wood frog were the only herpetiles detected during the survey. The intermittent stream may provide suitable breeding habitat for species such as northern spring peeper, wood frog, yellow-spotted salamander, and blue-spotted salamander which are able to nest in ephemeral water bodies. The habitat present in the wetland is not unique. The tall shrub basin swamp which comprises the wetland is the most common wetland habitat in the area.

### 4.10.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or herpetile species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 50 species (Table I2) were found in the wetland. None of the species are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002), however, one of the species is considered by the ACCDC to be uncommon in Nova Scotia. This species is the large purple-fringed orchid (*Platanthera grandiflora*), a species typically associated with swamps and stream banks. NSDNR (2002a) considers the Nova Scotia population of this species to be secure. Large purple-fringed orchid was found near the center of the wetland outside of the RoW. Only a small area of the wetland (5 %) will be directly disturbed as a result of highway construction. This species could be indirectly affected by highway construction if the hydrology of the wetland is altered.

### 4.10.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland has developed along the banks of an intermittent stream which would suggest that it is a groundwater discharge site.

### 4.10.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated along the drainage system of a small intermittent stream. It is likely that the wetland helps to supplement stream flow during low flow periods and moderates surface water flow during high flow periods by acting as a reservoir and slowing the flow of water through the wetland. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. Only a small portion of the wetland will be infilled during highway construction (5 %) so this wetland function should not be significantly altered.

### 4.10.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.10.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.10.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat.

### 4.10.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.10.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.10.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat. It does provide some amphibian breeding habitat and provides habitat for an uncommon plant species, the large purple-fringed orchid. The wetland is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the size of the wetland this function is not expected to be great. Construction of the highway will result in the infilling of approximately 5 % of the area of the wetland. This habitat loss should not affect the large purple-fringed orchid or significantly reduce the amount of suitable amphibian breeding habitat provided care is taken not to alter the hydrology of the wetland during construction.

## 4.11 Wetland 16

| | |
|---|---|
| Wetland Type: | Coniferous treed basin swamp |
| Size: | 0.80 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 30 %, *Larix laricina* 5 %, *Acer rubrum* 2 %. |
| Shrubs: | *Nemopanthus mucronata* 35 %, *Ilex verticillata* 20 %, *Alnus incana* 10 %, *Viburnum nudum* 10 %, *Gaylussacia baccata* 10 %. |
| Ground Vegetation: | *Sphagnum spp.* 90 %, *Smilacina trifolia* 10 %, *Gaultheria hispidula* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Ruffed Grouse, Red-breasted Nuthatch, Common Yellowthroat. |
| Mammals: | Red Squirrel, Varying Hare, White-tailed Deer. |
| Herpetiles: | Wood Frog, Northern Spring Peeper. |
| Hydrology: | Basin swamp located along a small tributary of the South River. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None |

### 4.11.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for it. Three bird species including Ruffed Grouse, Red-breasted Nuthatch and Common Yellowthroat were observed in or near the wetland during the field surveys. Mammals detected in the wetland included red squirrel, varying hare and white-tailed deer. Wood frog and northern spring peeper were the only herpetile species recorded from the wetland. The habitat present in the wetland is similar in structure and species composition to coniferous forest stands in the area. The wildlife species which inhabit the wetland are characteristic of the woodland habitats which surround the wetland.

### 4.11.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird or mammal species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 40 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.11.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland has developed at the headwaters of a small stream suggesting that it is a groundwater discharge site rather than a groundwater recharge area.

### 4.11.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated at the headwaters of a small stream. It is likely that the wetland helps to supplement stream flow during low flow periods and help to moderate surface water flow during high flow periods. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. Approximately 36 % of the wetland will be infilled resulting in a moderate reduction in this wetland function.

### 4.11.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.11.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.11.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains peat deposits, however, given the small size of the wetland and the lack of other large peat deposits in the vicinity of the wetland, this peat deposit would be uneconomical to develop.

### 4.11.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.11.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.11.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat nor does it provide habitat for rare or endangered species. It is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the small size of the wetland the magnitude of this function is not expected to be great.

## 4.12 Wetland 17

| | |
|---|---|
| Wetland Type: | Tall shrub basin swamp |
| Size: | 0.71 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 1 %, *Betula populifolia* <1 %. |
| Shrubs: | *Ilex verticillata* 40 %, *Nemopanthus mucronata* 15 %, *Alnus incana* 15 %, *Spiraea alba* 15 %, *Viburnum nudum* 5 %. |
| Ground Vegetation: | *Sphagnum* spp. 80 %, *Smilacina trifolia* 10 %, *Osmunda cinnamomea* 2 %, *Dryopteris cristata* 1 %. |
| Vascular plant list: | See Table I2. One uncommon species, large purple-fringed orchid (*Platanthera grandiflora*), found in wetland. This species is classes as S3 by the ACCDC and the Nova Scotia population is considered secure by NSDNR. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Magnolia Warbler, Black-and-white Warbler, Common Yellowthroat, White-throated Sparrow. |
| Mammals: | Varying Hare, Coyote. |
| Herpetiles: | Maritime Garter Snake |
| Hydrology: | Basin swamp located along an intermittent stream. Probable groundwater discharge site. |
| Anthropogenic uses: | None noted. |
| Comments: | None |

### 4.12.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for it. Bird species found in the wetland included Magnolia Warbler, Black-and-white Warbler, Common Yellowthroat, and White-throated Sparrow. Mammals detected in the wetland included varying hare and coyote. Maritime garter snake was the only reptile species encountered and no amphibian species were detected.. The habitat present in the wetland is not unique. The tall shrub basin swamp which comprises the wetland is the most common wetland habitat in the area.

### 4.12.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or herpetile species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 46 species (Table I2) were found in the wetland. None of the species are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002), however, one of the species is considered by the ACCDC to be uncommon in Nova Scotia. This species is the large purple-fringed orchid (*Platanthera grandiflora*), a species typically associated with swamps and stream banks. NSDNR (2002a) considers the Nova Scotia population of this species to be secure. Large purple-fringed orchid was found near the southern end of the wetland. This area is located within the highway RoW and will be infilled as a result of highway construction resulting in the loss of this population (one plant).

### 4.12.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland has developed along an intermittent stream which would suggest that it is a groundwater discharge site.

### 4.12.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated along the drainage system of a small intermittent stream. It is likely that the wetland helps to supplement stream flow during low flow periods and moderates stream flow during high flow periods. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. Approximately 7 % of the wetland will be infilled during highway construction. As such, this wetland function is not expected to be substantially altered.

### 4.12.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.12.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.12.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat.

### 4.12.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.12.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.12.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat. It does provide habitat for an uncommon plant species, the large purple-fringed orchid. The wetland is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the size of the wetland the magnitude of this function is not expected to be great. Construction of the highway will result in the infilling of the portion of the wetland where the large purple-fringed orchid was found. The loss of the one purple-fringed orchid in this wetland will not have a significant adverse effect on the population of this species in Nova Scotia.

## 4.13 Wetland 18

| | |
|---|---|
| Wetland Type: | Mixedwood treed basin swamp (clear-cut) |
| Size: | 1.13 ha. |
| Dominant Vegetation: | |
| Trees: | *Acer rubrum* <1. |
| Shrubs: | *Betula populifolia* 20 %, *Gaylussacia baccata* 20 %, *Picea mariana* 18 %, *Kalmia angustifolia* 15 %, *Nemopanthus mucronata* 12 %, *Ledum groenlandicum* 10%. |
| Ground Vegetation: | *Sphagnum* spp. 90 %, *Osmunda cinnamomea* 10 %, *Smilacina trifolia* 7 %, *Cornus canadensis* 5 %, *Scirpus cyperinus* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Cedar Waxwing, White-throated Sparrow, American Goldfinch. |
| Mammals: | None |
| Herpetiles: | Eastern Smooth Green Snake. |
| Hydrology: | Basin swamp located along a small intermittent stream. Probable groundwater discharge site. |
| Anthropogenic uses: | Merchantable timber in the wetland has been harvested. No other uses noted. |
| Comments: | None |

### 4.13.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. The wetland had been heavily disturbed as a result of recent timber harvesting and little wildlife activity was evident. Three bird species were present including Cedar Waxwing, White-throated Sparrow and American Goldfinch. No evidence of use of the wetland by mammals was found and eastern smooth green snake was the only herpetile species detected. The wetland does not provide unique or valuable wildlife habitat.

### 4.13.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird or mammal species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 55 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.13.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland serves as the headwater for a small tributary to the South River and appears to be an area of groundwater discharge.

### 4.13.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland would play a role in surface water regulation by augmenting stream flow between precipitation events; however, given the small size of the wetland this function is unlikely to be significant. Wetlands can also regulate surface flow by functioning like a reservoir and slowing the flow of water through a drainage system. Given the small size of the wetland, it is not expected to play a significant role in local surface water flow regulation. About 38 % of the wetland will be infilled resulting in a moderate reduction in this wetland function.

### 4.13.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.13.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.13.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat.

### 4.13.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.13.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.13.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat nor does it provide habitat for rare or endangered species. The merchantable timber in the wetland has been harvested and the forested habitats around the wetland have been clear-cut. It is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the small size of the wetland the magnitude of this function is not expected to be great.

## 4.14 Wetland 19

| | |
|---|---|
| Wetland Type: | Wetland complex composed of mixedwood treed basin swamp and tall shrub basin swamp |
| Size: | 0.54 ha. |
| Dominant Vegetation: | Mixedwood treed basin swamp |
| Trees: | *Acer rubrum* 25 %, *Abies balsamea* 15 %, *Picea mariana* 5 %. |
| Shrubs: | *Alnus incana* 15 %, *Abies balsamea* 10 %. |
| Ground Vegetation: | *Glyceria striata* 25 %, *Rubus pubescens* 20 %, *Onoclea sensibilis* 6 %, *Equisetum sylvaticum* 5 %, *Cornus canadensis* 5 %, *Osmunda cinnamomea* 2 %. |
| Dominant Vegetation: | Tall shrub basin swamp |
| Trees: | *Picea glauca* 10 %, *Acer rubrum* 5 %, *Picea mariana* 2 %. |
| Shrubs: | *Alnus incana* 50 %, *Ilex verticillata* 5 %, *Rubus hispidus* 2 %. |
| Ground Vegetation: | *Rubus pubescens* 60 %, *Sphagnum* spp. 40 %, *Osmunda cinnamomea* 15 %, *Onoclea sensibilis* 5 %, *Solidago canadensis* 5 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Black-capped Chickadee, Cedar Waxwing. |
| Mammals: | Red Squirrel, Porcupine, Racoon |
| Herpetiles: | Northern Spring Peeper |
| Hydrology: | Basin swamp located along a small tributary to an unnamed stream. Probable groundwater discharge area. |
| Anthropogenic uses: | Some timber harvesting adjacent to wetland as well as blueberry fields. |
| Comments: | Wetland is located within the highway RoW but not in the footprint of the road. |

### 4.14.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Only two bird species observed in or near the wetland during the survey, Black-capped Chickadee and Cedar Waxwing. Mammals detected in the wetland included porcupine, red squirrel and racoon. Northern spring peeper was the only herpetile species observed during the survey. The mixedwood treed basin swamp and tall shrub basin swamp habitats which comprise the wetland are common wetland types in the area. The wetland is similar in structure and species composition to forest habitats in the surrounding terrestrial habitats. The species detected during the survey are characteristic of terrestrial habitats surrounding the wetland.

### 4.14.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird, mammal or amphibian species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 69 species (Table I2) were found in

the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.14.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland is located at the edge of an intermittent stream suggesting that it is a groundwater discharge site rather than a groundwater recharge site.

### 4.14.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated along the course of a small stream and it is likely that the wetland helps to supplement stream flow during low flow periods and moderates stream flow during high water periods. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation.

### 4.14.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.14.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

The wetland is located on the side of the existing Highway 104. The intermittent stream which enters the wetland runs through the ditch of the highway for approximately 300 m. Sediments scoured from the ditch as well as contaminants such as metals and road salt would enter the wetland by means of the ditch. The wetland could be expected to act as a settling pond to settle out sediments and would provide adsorptive surfaces which would help to remove metals. It is unlikely that the wetland would remove salt from the water since wetlands are typically poor at retaining sodium and chloride ions. Blueberry fields are present on the north side of the wetland. One of the hills on which these fields are situated slopes towards the wetland so some of the surface water and groundwater from the fields may flow into the wetland. Fertilizers and pesticides applied to the fields could enter the wetland in this water. Nutrients are readily taken up by plant growth and microbial activity in the wetland and pesticides can be adsorbed to organic matter and broken down by microbial activity. Pesticides and nutrients such as phosphorus which adsorb to soil particles can be filtered from run-off by the wetland. Although this wetland is located within the RoW it is outside of the footprint of the highway so this wetland function should not be adversely affected.

### 4.14.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat deposits.

### 4.14.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.14.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.14.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat nor does it provide habitat for rare or endangered species. Much of the forested land surrounding the wetland has been harvested and some of this harvested land has been converted into blueberry fields. The wetland is not used for agriculture and has no potential for peat development. The wetland probably helps to regulate surface water flows, however, given the small size of the wetland the magnitude of this function is not expected to be great. The wetland is also expected to play a role in water treatment by removing sediment, nutrients, metals and pesticides from surface water and groundwater which enters the wetland. These functions should not be adversely affected by highway construction since the second lane will be constructed on the south side of the existing Highway 104.

## 4.15 Wetland 20

| | |
|---|---|
| Wetland Type: | Mixedwood treed basin swamp |
| Size: | 0.99 ha. |
| Dominant Vegetation: | |
| Trees: | *Picea mariana* 40 %, *Acer rubrum* 15 %, *Abies balsamea* 10 %, *Betula papyrifera* 5 %. |
| Shrubs: | *Ilex verticillata* 30 %, *Nemopanthus mucronata* 10 %, *Alnus incana* 15 %. |
| Ground Vegetation: | *Osmunda cinnamomea* 60 %, *Sphagnum* spp. 25 %, *Cornus canadensis* 5 %, *Maianthemum canadense* 2 %, *Coptis trifolia* 2 %. |
| Vascular plant list: | See Table I2. No rare species encountered. |
| Wildlife: | No rare or sensitive species encountered. |
| Birds: | Black-capped Chickadee, Blue Jay, American Robin, Cedar Waxwing, Evening Grosbeak, American Goldfinch. |
| Mammals: | Red Squirrel, White-tailed Deer, Striped Skunk, Racoon. |
| Herpetiles: | Green Frog, Wood Frog. |
| Hydrology: | Basin swamp located at headwaters of small intermittent stream. Probable groundwater discharge area. |
| Anthropogenic uses: | Some timber harvesting adjacent to wetland. |
| Comments: | Wetland not delineated on topographic mapping. Field identified and delineated using air photography. |

### 4.15.1 Step 1 Evaluate Wildlife Habitat Potential

The wetland has not been mapped on the Wetlands Atlas for Nova Scotia so no Golet score is available for the wetland. Six bird species including Black-capped Chickadee, Blue Jay, American Robin, Cedar Waxwing, Evening Grosbeak, and American Goldfinch were observed in or near the wetland during the field surveys. Mammals detected in the wetland included red squirrel, white-tailed deer, striped skunk, and racoon. Wood frog and green frog were the only herpetile species recorded from the wetland. The habitat present in the wetland is similar in structure and species composition to mixedwood forest stands in the area. The wildlife species which inhabit the wetland are characteristic of the woodland habitats which surround the wetland. Ephemeral pools in the wetland probably provide breeding habitat for early nesting amphibian species such as wood frog, northern spring peeper, yellow-spotted salamander, and blue-spotted salamander.

### 4.15.2 Step 2 Evaluate for Rare and Endangered Species

None of the bird or mammal species observed in or near the wetland are considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada as a whole (COSEWIC 2002). A vegetation survey was conducted in the wetland to determine if any rare vascular plants were present. A total of 27 species (Table I2) were found in the wetland, none of which is considered to be rare in Nova Scotia (ACCDC 2002; NSDNR 2002a; NSDNR 2002b) or Canada (COSEWIC 2002).

### 4.15.3 Step 3 Evaluate Groundwater Recharge Potential

The wetland has developed at the headwaters of a small stream suggesting that it is a groundwater discharge site rather than a groundwater recharge area.

### 4.15.4 Step 4 Evaluate the Role of the Wetland in Surface Flow Regulation

The wetland is situated at the headwaters of a small stream. It is likely that the wetland helps to supplement stream flow during low flow periods and moderates stream flow during high flow periods. Given the small size of the wetland, it is not expected that this wetland plays a significant role in surface water flow regulation. Almost all of the wetland will infilled as a result of construction of the highway; consequently, this wetland function will be lost.

### 4.15.5 Step 5 Evaluate the Agricultural use of the Wetland

The wetland is not used for agricultural production.

### 4.15.6 Step 6 Evaluate the Potential Role of the Wetland in Water Treatment.

This wetland currently provides no function in water treatment due to lack of nearby development.

### 4.15.7 Step 7 Evaluate the Potential for Peat Development

The wetland contains no peat deposits.

### 4.15.8 Step 8 Have You Addressed all Potential Issues with the Wetland Proposal?

All potential issues have been addressed.

### 4.15.9 Step 9 Address Additional Concerns

There are no additional concerns.

### 4.15.10 Step 10 Summary of Wetland Evaluation

The wetland does not provide important, unique or sensitive wildlife habitat nor does it provide habitat for rare or endangered species. It is not used for agriculture and has no potential for peat development nor does it currently play a role in water treatment. The wetland probably helps to regulate surface water flows, however, given the size and location of the wetland along the drainage course the magnitude of this function is not expected to be great.

# 5.0 References

## 5.1 Literature Cited

ACCDC (Atlantic Canada Conservation Data Centre). 2002. Species Lists and Rare Species. Internet Publication: http://www.accdc.com/info/lists/.

Beardmore, R.M. 1985. Natural Heritage Areas. Parks Canada Atlantic Region. 94pp.

Beasy Nicoll Engineering Limited. 1999. Highway 104 Antigonish Safety Review. Prepared for Nova Scotia Department of Transportation and Public Works.

Bond, W.K., K.W. Cox, T. Heberlein, E.W. Manning, D.R. Witty, and D.A. Young. 1992. Wetland Evaluation Guide. North American Wetlands Conservation Council (Canada), Issues Paper, No. 1992-1

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2002. Canadian Species at Risk. Internet Publication. http//www.sis.ec.gc.ca\mapps\ec_species\htdocs\ec_species_e.phtml.

Erskine, A. J. 1992. Atlas of Breeding Birds of the Maritime Provinces. Nimbus Publishing Ltd. And the Nova Scotia Museum, Halifax, NS, 270 pp.

Fuller, S. 1998. Atlas of Rare, Threatened and Infrequent Fauna in Nova Scotia. Draft internal document. Nova Scotia Museum of Natural History, Halifax, NS.

Gilhen, J. 1984. Amphibians and Reptiles of Nova Scotia. Nova Scotia Museum of Natural History. Halifax, NS. 162 pp.

Louis Berger (Canada) Ltd. 1996. An Assessment of the Economic Impact of Upgrading the Trans Canada Highway 104 To a Four-Lane, Divided, Controlled Access Highway Through Antigonish County. Atlantic Expressway Committee, Antigonish, NS.

National Wetlands Working Group. 1987. The Canadian Wetland Classification System. Lands Conservation Branch, Canadian Wildlife Service, Environment Canada; Ecological Land Classification Series No. 21, 17 pp.

Nova Scotia Department of Natural Resources (NSDNR). 2002a. General Status Ranks of Wild Species in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/genstatus/ranks.asp.

Nova Scotia Department of Natural Resources (NSDNR). 2002b. Species at Risk in Nova Scotia. Internet Publication: http://www.gov.ns.ca/natr/wildlife/endgrd/specieslist.htm.

Pronych, G. And A. Wilson. 1993. Atlas of Rare Vascular Plants in Nova Scotia. Nova Scotia Museum of Natural History, Halifax, NS, Curatorial Report No. 78, 331 pp.

Scott, F.W. 1994. Provisional annotated list of plant and animal species considered to be rare in Nova Scotia. Nova Scotia Museum of Natural History, Halifax, Nova Scotia, 12 pp.

Tufts, R.W. 1986. Birds of Nova Scotia, 3rd Edition. Nimbus Publishing and the Nova Scotia Museum, Halifax, NS, 478 pp.

## 5.2 Personal Communications

Gautreau, Rachel, Environmental Assessment Canadian Wildlife Service, Sackville, New Brunswick, February 1997.

Gerriets, Stefen. Data Manager, Atlantic Canada Conservation Data Centre, Sackville, New Brunswick, October 2002.

Hebda, Andrew, Curator of Zoology, Nova Scotia Museum of Natural History, October 2002.

Munroe, Marion. Curator of Botany, Nova Scotia Museum of Natural History. October 2002.

Pulsifer, Mark, Regional Biologist, Nova Scotia Department of Natural Resources, February 1997 and October 2002.