Rattray Marsh

Class Environmental Assessment

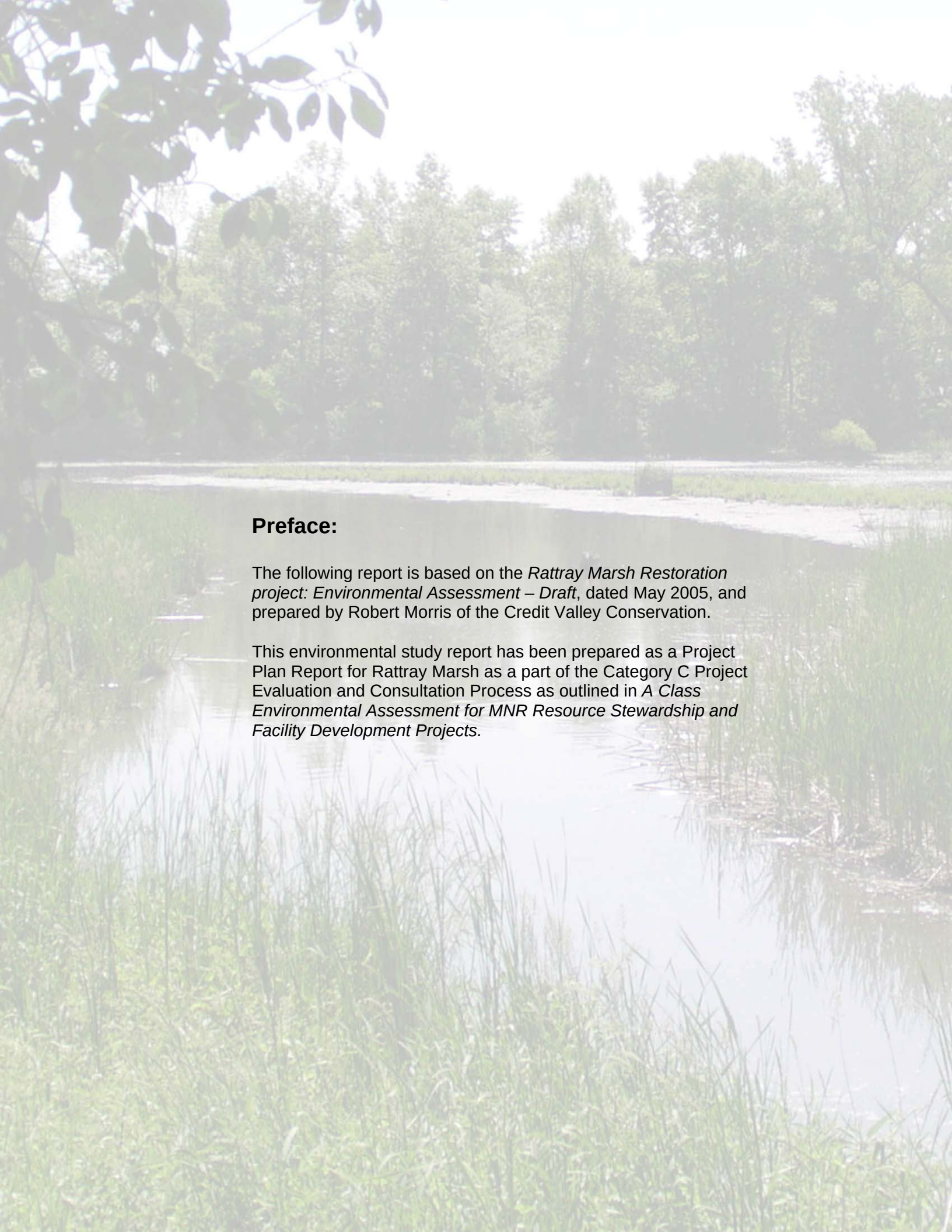
for Credit Valley Conservation

Final Environmental Study Report

August 2009

Prepared Under
A Class Environmental Assessment
for MNR Resource Stewardship and Facility Development Projects

Harrington and Hoyle Ltd.
LANDSCAPE ARCHITECTS



Preface:

The following report is based on the *Rattray Marsh Restoration project: Environmental Assessment – Draft*, dated May 2005, and prepared by Robert Morris of the Credit Valley Conservation.

This environmental study report has been prepared as a Project Plan Report for Rattray Marsh as a part of the Category C Project Evaluation and Consultation Process as outlined in *A Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects.*

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Executive Summary

Located on the Lake Ontario shoreline in the Clarkson Area of Mississauga, Rattray Marsh was opened to the public as the Rattray Marsh Conservation Area in October of 1975. Designated as a *Natural Area*, a *Provincially Significant Wetland,* and an *Area of Natural and Scientific Interest*, Rattray Marsh is one of the last remaining baymouth bar coastal wetlands on the western end of Lake Ontario. The marsh is experiencing ecological degradation as a result of changes in flow, water quality, and soil erosion from Sheridan Creek, as well as exotic species such as carp. The purpose of this study was to review alternatives and develop a coastal wetland restoration plan that reflects the vision, goal, and objectives defined by policy and the Rattray Marsh Steering Committee. The study followed the procedure for a Category C Project as outlined in *A Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects*. Four alternatives were examined and evaluated in accordance with the guidelines in the manual. All procedural requirements are documented in this report.

Incorporating public and agency input, the preferred alternative was selected and refined to reflect the vision, goal, and objectives defined by the Rattray Marsh Steering Committee. The removal of mineral soil will expose the natural organic soil beneath creating conditions more conducive to supporting indigenous marsh vegetation and insect communities. The removal of nuisance species from the marsh will allow for the re-establishment of healthy communities of indigenous marsh plants, insects, amphibians, fish, and birds.

This concept will restore the marsh, however, it will remain vulnerable to excess sediment, pollution, and flashy flows from Sheridan Creek. The restoration of a more natural hydrograph, sediment transport regime, and improved water quality in the watershed is, therefore, critical to the long term success of this marsh restoration concept.

Implementation of the final concept can be done incrementally in phases and would lend itself well to an adaptive management approach linked to the restoration of the watershed. There are many environmentally positive effects associated with this proposal, including enhanced water and soil quality, increased fish and wildlife habitat, and improved aesthetic qualities. Potential negative impacts have been examined and mitigation measures will be employed where they are deemed beneficial.

Introduction

The property upon which Rattray Marsh sits was once owned by James Halliday Rattray. The long struggle for preservation began in 1959 when he died and the property fell into private ownership and was up for development. Lobbyists and concerned citizens were unsuccessful in stopping Phase 1 of the development, but after years of negotiation and lobbying Credit Valley Conservation was able to purchase the land. In October of 1975, the marsh and adjacent land was opened with the City of Mississauga to the public as the Rattray Marsh Conservation Area.

This Environmental Study Report is limited to the issues of the marsh only and is based on the *Rattray Marsh Restoration Project: Environmental Assessment - Draft*, dated May 2005, and prepared by Robert Morris of the Credit Valley Conservation.

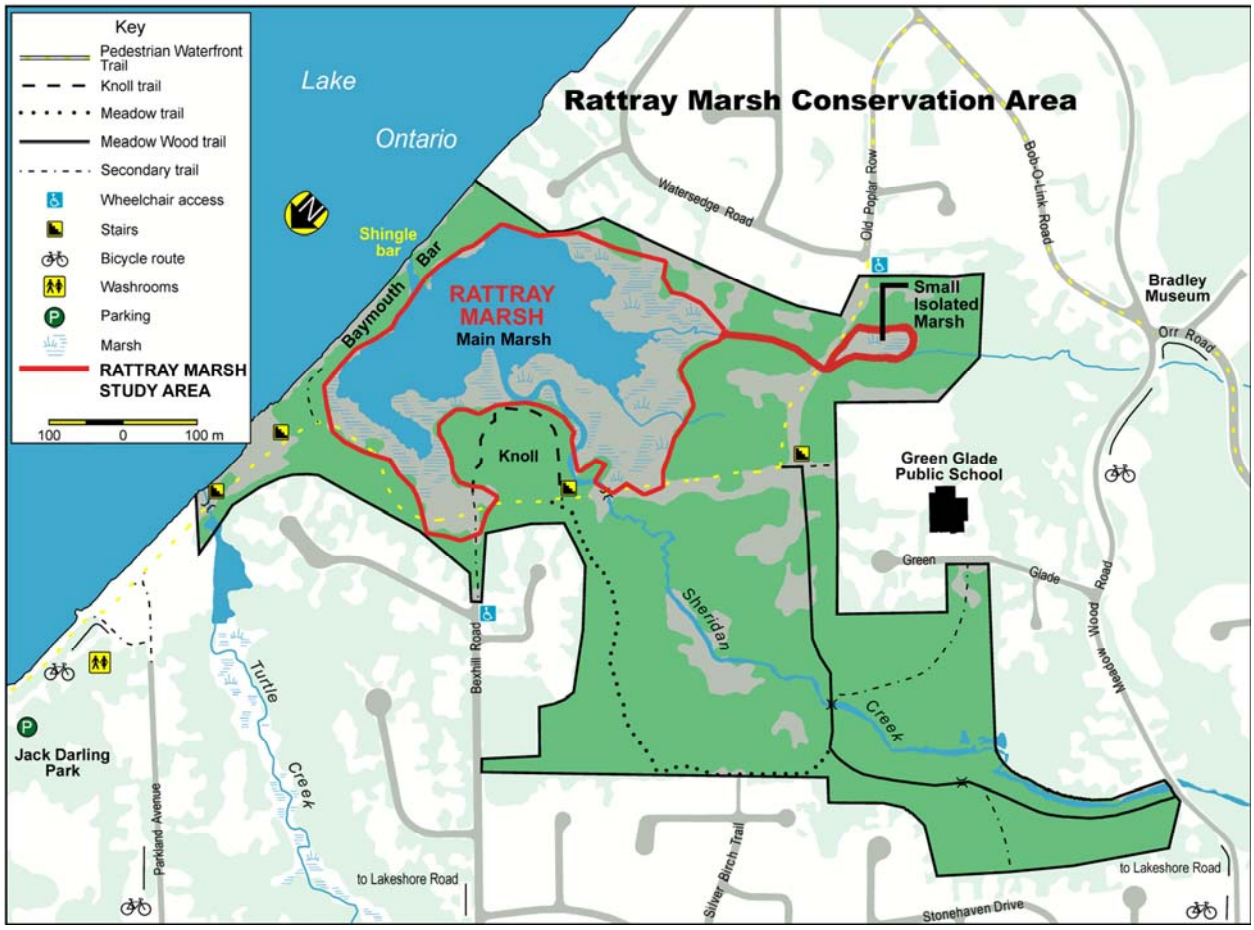


Figure 1. Rattray Marsh Study Area *(Credit Valley Conservation)*

Rattray Marsh is one of the last remaining baymouth bar coastal wetlands on the western end of Lake Ontario and the only such marsh in Mississauga. It has experienced ecological degradation caused initially by a build-up of sediment from Sheridan Creek and exacerbated by exotic species in the marsh such as carp, and poor water quality.

Rattray Marsh formed at the mouth of Sheridan Creek where it enters Lake Ontario. The marsh is separated from the lake by a bar formed as a continuation of the beach/ shoreline referred to as a baymouth bar. Water levels in the marsh are controlled by both flow in the creek and the

lake levels. The barrier changes periodically sometimes from a barrier to flow and at times breaches form allowing surface flow to and from the lake.

The wetland area behind the bar is large and varied. As a result it can support varied plant community and a large and varied population of insects, fish and wildlife. This would include species which live their entire life cycle in the marsh, some which move to the marsh at specific times to breed or feed, and some which use the marsh as a resting feeding area during migration.

The development of the watershed which began with the removal of the original forest cover and most recently with urbanization has dramatically increased soil erosion which has resulted in excessive sediment buildup in the marsh. The buildup of sediment covers the natural organic soils of the marsh and stresses the natural marsh vegetation, insects and wildlife. There are natural flushing mechanisms in the marsh, however, the organic soils remain covered by a persistent layer of sediment.

There are also invasive species which have been introduced to the area which also disturb the marsh and stress the natural vegetation. Carp stir up sediment while feeding which prevents the re-establishment of plants. Canada Geese in large numbers can also clear large areas of young vegetation as it attempts to become established. This instability reduces the number and variety of plants in the marsh and the variety and number of insects and wildlife that depend on them.

Figure 2. Common Carp Found at Rattray Marsh - An Invasive Non-Indigenous Species

Also within the Rattray Marsh Conservation Area there is a smaller isolated marsh on a small tributary southwest of the main marsh. This marsh is at a higher elevation than the main marsh and is connected by a small stream. This marsh is completely vegetated with a community dominated by cattails probably because its elevation has buffered it from the flows and sediment of Sheridan Creek and kept carp from entering the marsh. Its water level is controlled by a culvert at the downstream end over which a trail has been established. There are some invasive plant species in the marsh (phragmites) however it generally appears to be healthy.

Changes in marshes are common, and in most part natural and important to the health of the marsh. In the case of Rattray Marsh the changes have caused ecological degradation. Urban development of the watershed extrinsically affected the marsh by causing a build-up of sediment from Sheridan Creek. This sediment build-up was intrinsically exacerbated by exotic species in the marsh such as carp, which resulted in poor water quality, loss of indigenous species, and created preferable conditions for invasive species.

A *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report - Draft* was prepared in March 2009 by the Credit Valley Conservation. This study provides further information and restoration opportunities which will help resolve the sediment build-up experienced by Rattray Marsh. Therefore, this environmental study will focus on the intrinsic influences on the ecological condition of Rattray Marsh.

The purpose of this project is to review alternatives and develop a coastal wetland restoration plan for Rattray Marsh, located on the Lake Ontario shoreline in the Clarkson area of Mississauga. The study area consists of the main marsh and the small isolated marsh, which, as a whole, are designated as a *Provincially Significant Wetland* and as a *Provincial Area of Natural and Scientific Interest*.

Figure 3. Location Map (*Google Earth Pro, 2007)*

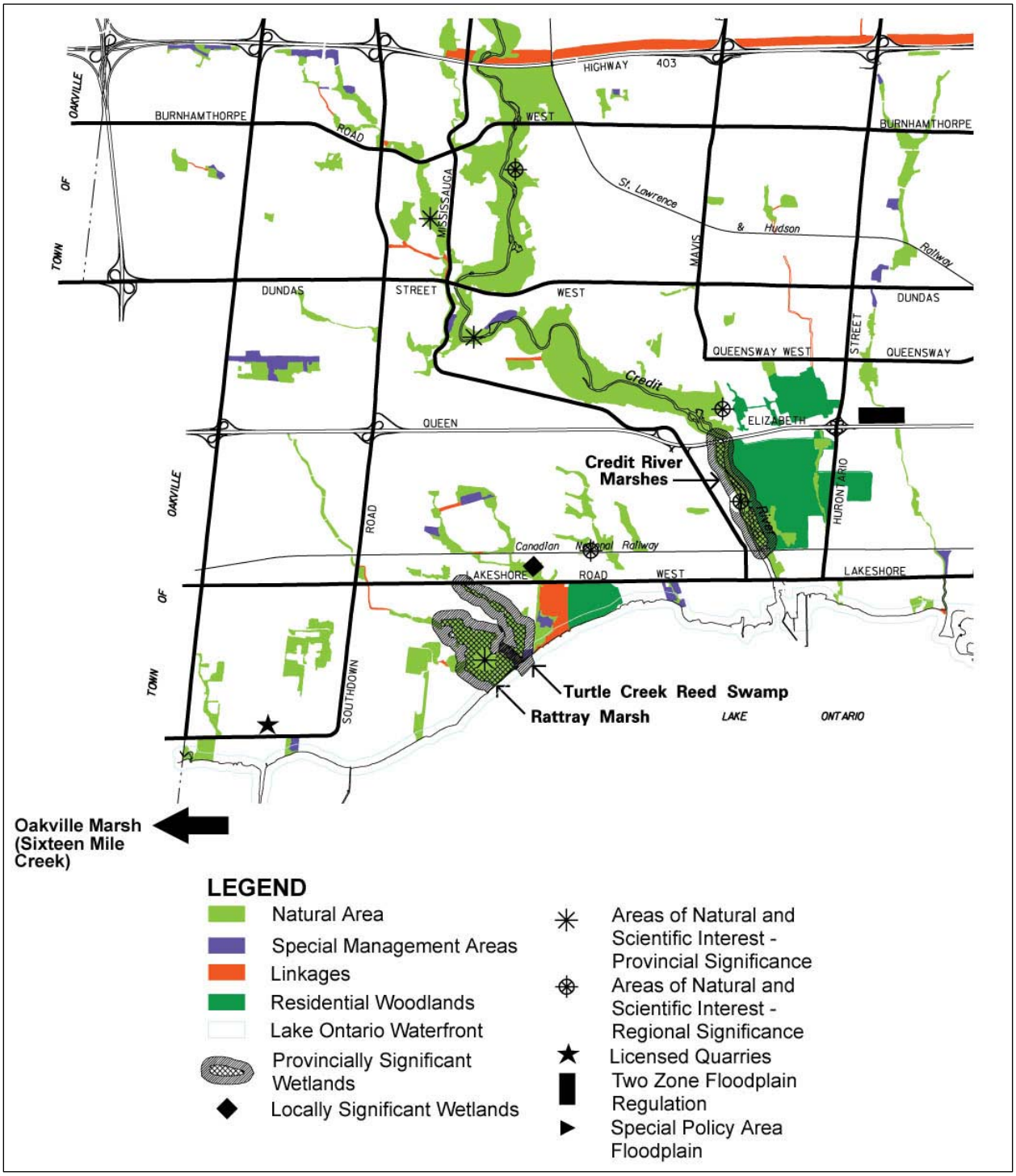


Figure 4. Environmental Areas Map *(City of Mississauga, 2005)*

1.0 General Information

1.1 Definition of Wetlands

"Wetlands: means lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens." (Ministry of Municipal Affairs and Housing, 2005)

According to the *Ontario Wetland Evaluation System: Southern Manual*, "Marshes are wet areas periodically inundated with standing or slowly moving water, and/ or permanently inundated areas characterized by robust emergents, and to a lesser extent, anchored floating plants and submergents. Surface water levels may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mud flats. Water remains within the rooting zone of plants during at least part of the growing season. The substratum usually consists of mineral or organic soils with a high mineral content, but in some marshes there may be as much as 2 m of peat accumulation. Waters are usually circumneutral to slightly alkaline and there is relatively high oxygen saturation. Marshes characteristically show zones or mosaics of vegetation, frequently interspersed with channels or pools of deep or shallow open water. They include open expanses of standing or flowing water which are variously called ponds, shallow lakes, oxbows, reaches or impoundments. Marshes may be bordered by peripheral bands of trees and shrubs but the predominant vegetation consists of a variety of emergent non-woody plants such as rushes, reeds, reed grasses, and sedges. Low shrubs such as sweetgale, red osier, and winterberry may also occur. Where open water areas occur, a variety of submerged or floating plants flourish." (Ministry of Natural Resources, March 1993)

1.2 General Functions of Marshes

According to the *Manual of Implementation Guidelines for the Wetlands Policy Statement* (Ministry of Natural Resources, 1992), ecological functions of a marsh include:

- Controlling and storing surface water and the recharging and discharging of ground water;
- Maintaining and improving water quality;
- Aiding in flood control;
- Protecting shorelines from erosion;
- Assisting in maintaining water quality in adjacent lakes and streams that support fish populations;
- Trapping sediments which would otherwise fill watercourses;
- Supporting and initiating complex food chains which are essential to a broad spectrum of living organisms;
- Immobilizing some contaminants and nutrients;
- Being a source of oxygen;
- Providing habitat for plant and animal species for breeding, spawning, migrating, etc.; and
- Providing corridors for wildlife movement.

The overall purpose of a marsh is that of an ecosystem, where activities are taking place amongst its living and non-living elements

Rattray Marsh does act as a water quality "filter" for Lake Ontario and Peel's drinking water supply for uncontrolled urban pollution sources from an area of 300 ha along Sheridan Creek. The main Waterfront Trail portion is the most traveled nature trail in the watershed. The most valuable asset for Rattray Marsh is an urban backyard oasis and is even accessible by public transit to millions. Access has been given an environmentally sound approach with extensive raised boardwalks, and educational opportunities are to be enhanced soon with a major interpretive signage program. Other socio-economic resources recognized in Rattray are wood products, contribution to a commercial/ recreational fishery including snapping turtles and a variety of furbearers including mink.

1.3 Rattray Marsh Stressors

According to the *Ontario Great Lakes Coastal Wetlands Atlas: A summary of information* (Environment Canada & OMNR, 2003), there are some common stressors leading to the loss of coastal marshes. Some of these stressors that Rattray Marsh is experiencing are:

- Urban Encroachment:
  The Rattray Marsh Conservation Area is surrounded by urban development and paved surfaces. As a result, surface water runs off must faster during a rain storm.

- High Sediment Loads:
  Due to the urban development and paved surfaces within the Sheridan Creek Watershed, runoff is much faster during a rain storm and it carries more soil as it goes. Once Sheridan Creek reaches Rattray Marsh the high speed flow disperses as it calms and the sediment it carries spreads across the marsh over the organic soil.

- Excess Nutrients:
  Due to the urban development and paved surfaces within the Sheridan Creek Watershed, runoff is much faster during a rain storm and it carries, in addition to soil, nutrients as it goes. Excess nutrients cause the eutrophication of wetland communities, reducing the diversity of wetland vegetation.

- Nuisance Species:
  Common Carp are the most common and widespread stress facing coastal marsh restoration efforts. They resuspend sediments, increase turbidity and destroy aquatic macrophytes during their feeding and spawning activities.

- Excess Turbidity:
  Problems are compounded by excess nutrients that encourage the growth of algae and decrease water clarity.

- Water Level Regulation:
  Climate change and unnatural fluctuations of the Sheridan Creek water flow are reducing the occurrence of high and low lake levels. This is resulting in decreases of marsh area and the diversity of plant and wildlife communities. The emergent plant communities decline, the submergent aquatic macrophyte beds increase, and the invasive plants begin to dominate.

1.4 Sheridan Creek Watershed

The drainage area of the Sheridan Creek Watershed is about 1035 hectares. A *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report - Draft* was prepared in March 2009 by the Credit Valley Conservation. For the purpose of this environmental study report, this March 2009 draft watershed study is referenced.

The purpose of the watershed study is to provide recommendations that "will help inform decision makers plan for the future intensification and restoration efforts within the Sheridan Creek Watershed" (Credit Valley Conservation, March 2009).

This study sets forth identified pollution prevention and restoration strategies applicable to different land use and land cover categories in the Sheridan Creek watershed. Restoring the health of the Sheridan Creek Watershed will help resolve the sediment build-up experienced by Rattray Marsh.

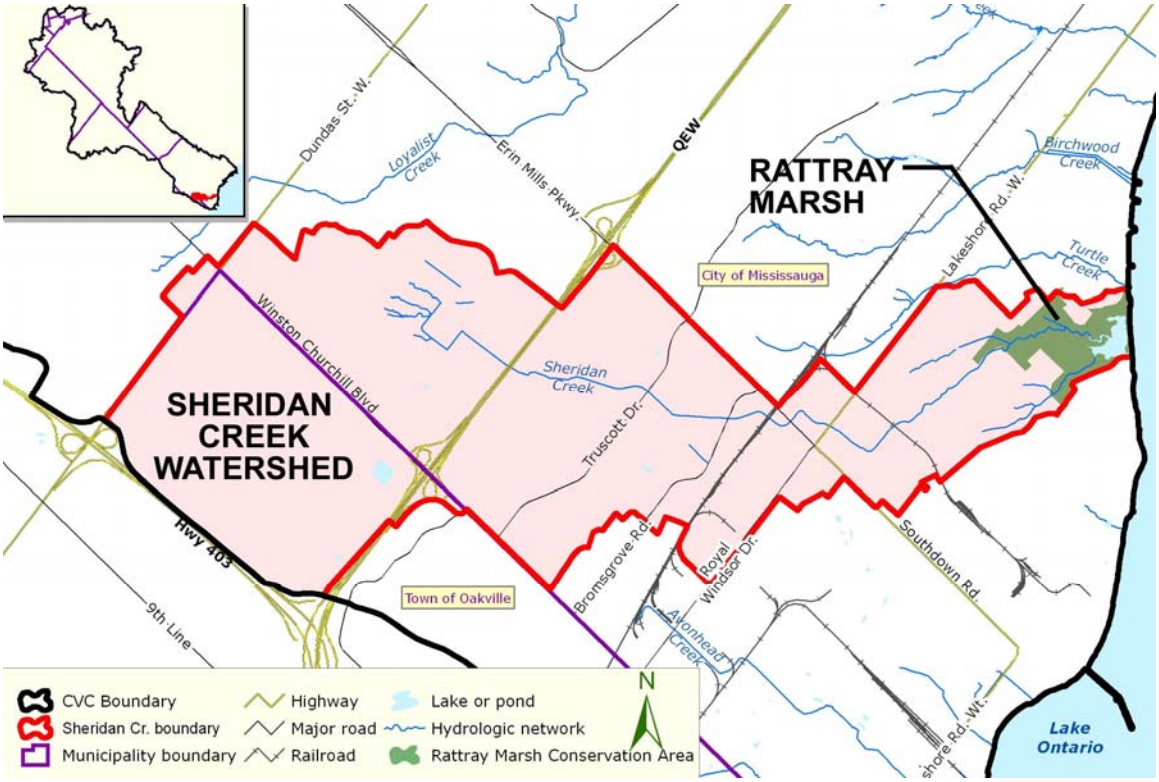


Figure 5. Map of Sheridan Creek Watershed *(OCETA, 2007)*

Step 1 – Project Proposal

2.0 Project Proposal

2.1 The Proposal

To develop a coastal wetland restoration plan to reflect Section 2.1 Natural Heritage of the Ontario Provincial Policy Statement:

2.1 NATURAL HERITAGE

2.1.1 Natural features and areas shall be protected for the long term.

2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.3 Development and site alteration shall not be permitted in:

a) Significant habitat of endangered species and threatened species;
b) Significant wetlands in Ecoregions 5E, 6E and 7E; and
c) Significant coastal wetlands.

2.1.4 Development and site alteration shall not be permitted in:

e) Significant areas of natural and scientific interest

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

2.1.5 Development and site alteration shall not be permitted in fish habitat expect in accordance with provincial and federal requirements.

2.1.6 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

And to reflect the vision, goal, objectives, and targets as outlined by the Rattray Marsh Steering Committee, as follows:

Goal:

To restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species. In a healthy marsh there would be very little area that did not support lush growth of aquatic plants most of the time. Shallow areas would have emergent plants and deeper areas would have submergent plants. The water would be clear and the deeper areas would have lots of young fish, sunfish, minnows, bass, and some larger fish like pike. In the shallows, there would be lots of frogs and turtles, and in the air there would be lots of different kinds of dragonflies and insect-eating birds.

Objectives:

- *To optimize the diversity of indigenous marsh species which occupy or utilize the area.*
- *To reduce/eliminate nuisance species, invasives, and/or exotics.*
- *Where possible, to provide for populations large enough to provide genetic diversity.*
- *To provide specialized habitat for species which move in temporarily from Lake Ontario, Sheridan Creek, or on migration.*
- *To provide appropriate connections to the Sheridan Creek Watershed and the Lake Ontario Shoreline to allow for the movement of desirable plants and animals.*
- *To use the marsh restoration process to foster an understanding and appreciation of the attributes of Great Lakes Coastal Marshes and specifically Rattray Marsh.*

Targets:

- *Restore a minimum of 90% of the unvegetated open water marsh area to support submergent plants.*
- *Water clarity within the marsh should be restored a maximum of 48 hours after a storm event.*
- *Restore 90% of the marsh substrate to predominantly organic soils.*

The recommendations of the project plan are based on the best available information and methods in relation to restoration of coastal wetlands. Should unforeseen significant adverse environmental effects arise, as a result of climate change, watershed hydrology or species management plans, elements of the project plan may be revisited in order to allow for adaptive management. An addendum process would be followed.

2.2 Identification of Study Area

A *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report* - Draft was completed in March 2009 by the Credit Valley Conservation. For the purpose of this environmental study report, this March 2009 draft watershed study is referenced. This study provides further information and restoration opportunities which will help resolve the extrinsic influences on the ecological condition of Rattray Marsh. Therefore, this environmental study will focus on the intrinsic influences.

The study area is composed of the main marsh (~4.3 ha) and the small isolated cattail marsh (~1.0 ha) at the Rattray Marsh Conservation Area owned by Credit Valley Conservation. It represents one of the last remaining baymouth bar coastal wetlands on the western end of Lake Ontario. It is located on the Lake Ontario shoreline in the Clarkson area of Mississauga at the end of Bexhill Rd, south of Lakeshore Ave on the west side of Jack Darling Park.

This study area overlaps with the following administrative areas:

The Ontario Ministry of Natural Resources (OMNR)
Credit Valley Conservation (CVC)
City of Mississauga
Region of Peel
The Federal Department of Fisheries and Oceans (DFO)
The Ontario Ministry of the Environment (MOE)

This study area is designated as a *Provincially Significant Wetland*, a *Provincially Significant Life Science Area of Natural and Scientific Interest*, and locally as an *Environmentally Significant Area* and *Conservation Area*. It is designated as a *Natural Area* by the City of Mississauga and as a *Core Area of the Peel Greenlands System* by the Region of Peel.

2.3 Project Partners

The following agencies and non-government organizations have expressed interest in this project and are a part of the Steering Committee:

- South Peel Naturalists' Club
- Rattray Marsh Protection Association

2.4 Permitting Agencies

The following legislation must be satisfied for approval:

- CVC regulations
- MNR Lakes and Rivers Act
- DFO Federal Fisheries Act
- MNR Ontario Endangered Species Act
- MOE
- City of Mississauga
- Region of Peel

3.0 Project Purpose and Rationale

3.1 Purpose

The purpose of this study project is to review alternatives and develop a coastal wetland restoration plan for Rattray Marsh that is designated as an *Environmentally Significant Area, Provincially Significant Wetland* and *Area of Natural and Scientific Interest*. The goal is to restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species.

3.2 Rationale

Wetlands are the most productive and diverse ecosystems on earth. All healthy natural areas most effectively provide earth's life support system of air, water, and soil. The coastal wetlands of Lake Ontario in the Greater Toronto Region are historically, environmentally, and socially valuable. Such protected natural areas represent about 3% of Mississauga and the GTA. It has been estimated that southern Ontario has already lost about 75% of its original wetlands.

Rattray Marsh represents one of the last remaining baymouth bar coastal wetlands on the western end of Lake Ontario and is experiencing ecological degradation.

Figure 6. Rattray Marsh Air Photo 2006 *(City of Mississauga, 2006)*

4.0 Description of Study Area

Existing Land Use

Rattray Marsh remains a large natural area regardless of the urbanization occurring in its surroundings. It is managed as a part of a public conservation area by Credit Valley Conservation. Rattray Marsh serves as a home for a variety of plants and wildlife, attracting bird watchers, photographers, and nature lovers. The marsh also offers many views that may be admired by the public from the various trails within the conservation area.

Infrastructure
An Environmental Assessment has been completed for the Bexhill Road Forcemain/ Pumping Station. This assessment was initiated by concerns about the location and condition of the existing wastewater collection system and the unknown exact location of an existing 500mm diameter asbestos cement forcemain that crosses the Provincially Significant Rattray Marsh.

The Rattray Marsh EA was initiated based upon regional needs for expansion and a number of relocation options to improve efficiency. Rattray concerns were raised during this process.

Hydrology
The drainage area of the Sheridan Creek Watershed is about 1035 hectares. A *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report - Draft* was completed in March 2009 by the Credit Valley Conservation. The purpose of this study is to provide recommendations that "will help inform decision makers plan for future intensification and restoration efforts within the Sheridan Creek watershed" (Credit Valley Conservation, March 2009).

Like most urbanized watersheds the surface of the Sheridan Creek Watershed is paved and drained to a large extent. This causes surface water to run off much faster during a rain storm and it carries with it more soil and nutrients as it goes. The result is more soil, nutrients, and pollutants flowing into the marsh during storms and less water flowing into the marsh between storms as base flow in the creek or as groundwater discharge.

As mentioned in *Rattray Marsh Restoration Project: Environmental Assessment - Draft*, "most observations report the marsh as having water in it as supplied by Sheridan Creek and partially dammed by a shingle bar where some water makes it down the beach and into Lake Ontario. Some of it assumed to also percolate through the beach bar of coarse materials" (Morris, 2005).

The water levels of the marsh are randomly monitored and recorded by CVC staff using the staff gauge located on the existing concrete wall at the outlet. As discussed in *Rattray Marsh Restoration Project: Environmental Assessment - Draft,* the baymouth bar naturally controls the marsh water level. Wave action from onshore storms, coming in off the lake, and high lake water levels build up the baymouth bar causing the water level of the marsh to increase; and "as the depth of water increases, it begins to exert pressure on the wave deposited barrier. Ultimately, the interior water pressure forces these loose materials into the lake thus opening the outlet. The result is the emptying of the marsh. Breaching may be accelerated by westerly winds which have a tendency to increase pressure on the barrier by moving water towards it" (Morris, 2005).

Sedimentology
A Sedimentological Study of Rattray Marsh was conducted by Geomorphic Solutions in April 2007. Ten core samples were retrieved from the study area. The analysis revealed that the core samples vary generally by their position and proximity to the Sheridan Creek outlet/ delta. Near the outlet to the creek the sediments tend to have coarser sands and some gravel. Over the rest of the marsh there tends to be an underlying peaty organic layer which developed when the marsh was undisturbed. Over these layers there is a 300-500mm (12-18") layer of fine sediment which has little organic matter and appears to be disturbed (i.e. no clear layering). This is generally

assumed to be the result of changes in flow and excess erosion in the watershed which is disturbed in the marsh by exotic species, such as carp.

As discussed in *Rattray Marsh Restoration Project: Environmental Assessment - Draft*, "high turbidity can reduce photosynthesis yet the darker waters can absorb more heat. Turbidity can directly affect the behaviour of many organisms that rely on sight for navigation, feeding and predator avoidance. As particles settle out fish eggs, invertebrates and plants can be smothered" (Morris, 2005).

Water Quality

When the forest cover was removed from the watershed and it became urbanized, a large percentage of the surface became paved. In older developments such as Sheridan Creek, rain water runs off quickly, washing the surfaces clean and flushing everything downstream, resulting in elevated levels of pollutants. Credit Valley Conservation revealed through their Integrated Watershed Monitoring Program that Sheridan Creek contained high nutrient, chloride, metal and *E. coli* levels. Newer subdivisions have stormwater management which slows the flow from the land and cleanses the water.

A *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report - Draft* was completed in March 2009. For the purpose of this environmental study report, this March 2009 draft watershed study is referenced. The purpose of this study is to provide recommendations that "will help inform decision makers plan for the future intensification and restoration efforts within the Sheridan Creek watershed" (Credit Valley Conservation, March 2009). This study analyzes the water quality of seven sites selected across the watershed through a variety of sampling methodologies: instant water quality assessment; Creek Walk water quality assessment; diurnal water quality assessment; impact monitoring; continuous water temperature assessment; long term water quality assessment under Provincial Water Quality Monitoring Network (PWQMN) program; and stream bed sediment quality assessment.

Results and discussion of each water quality sampling method may be found within the "Sheridan Creek Watershed Study and Impact Monitoring: Characterization Report - *Draft*" dated March 2009, and prepared by Credit Valley Conservation. The complete assessment concluded that Sheridan Creek was an alkaline stream with a pH close to 8 and in some areas the pH reached 8.5. The conductivity of the creek was also very high. The assessment also found that the *E. coli* levels were high and "were recorded more than 200 times the provincial objectives during the storm events" (Credit Valley Conservation, March 2009). It is suspected that high levels of *E. coli* are caused by storm water washing in contaminants from pet feces and other sediment borne sources. The chloride levels were also found to be high, which raised concern because the sampling was conducted during a period of the season when it was expected that road salt would not be a source of chlorides, implying that the chlorides are from another source. The phosphorous levels were high in the storm event samples and algae growth was observed at some sections of the creek, signifying that enough nutrients are available for the growth of the algae. "The long term water temperature monitoring indicated good water health for warm fish; however, cold water fish water temperature guidelines were surpassed" (Credit Valley Conservation, March 2009), and high metal concentrations were found, which could be toxic to aquatic life. However, pesticides and PCBs were not found in the Sheridan Creek.

In this watershed, much of what is flushed off of the land flows into Sheridan Creek and ends up in the marsh, creating a nutrient rich environment with excess sediment, high levels of chloride, phosphorous, and metals, and warmer water. The range of plants and animals which can tolerate such conditions is fairly limited and thus there tend to be fewer kinds of plants and animals in the marsh.

Water clouded by sediment and algae blocks out the sunlight, suppressing reestablishment of many aquatic plants, thus keeping the water column and sediment unstable and unnaturally rich.

Invertebrates
The invertebrate sampling from June and August 2006 show that the richness of invertebrates in Rattray Marsh is not very high. For invertebrate sampling refer to Appendix B.

The invertebrates are limited by sedimentation rates experienced from the urbanization of the Sheridan Creek Watershed area. Other factors believed to be affecting invertebrates are high turbidity from carp and waterfowl and shorebirds that feed on invertebrates in shallow water and exposed mudflats.

Birds
Rattray Marsh acts primarily as a migratory staging/ stopover habitat for the vast majority of the recorded bird species. This area attracts many naturalists, such as members of the South Peel Naturalists, because of the variety of birds.

Within the bird records dating from 1975 to 2007 there were 218 bird species sighted for Rattray Marsh. For bird species listing and summary refer to Appendix B. Of these 218 species, 5 are exotic, none are of Global concern, 40 (18.3%) are considered *Provincially Rare*, 47 (21.6%) are considered *Area Sensitive* for habitat requirements, 84 (38.5%) hold P*riority Conservation Status* for the Region of Peel, and 81 (37.3%) are *Species of Conservation Concern* within Credit Valley Conservation. Of these 81 *Species of Conservation Concern* 14 are identified as Confirmed or Probable breeding at Rattray Marsh. There are records dating before 1985 *(indicated ***** on tables)* of 2 Endangered Species, 1 Threatened Species, and 4 Species of Concern. Current listings from 1985 to present, as per COSSARO 2009, 1 Threatened Species and 3 Species of Concern. The current bird listings have identified 62 species not recorded since 1984.

TABLE 1. Rattray Marsh Birds Species of Concern

Scientific Name	Common Name	Status
Gavia immer	Common Loon	Area Sensitive
Gavia stellata	Red-Throated Loon	Provincially Rare, Area Sensitive
Podilymbus podiceps	Pied-Billed Grebe	Priority Conservation Status for Region of Peel
Podiceps grisegena	Red-necked Grebe	Provincially Rare, Area Sensitive
Podiceps grisegena	Horned Grebe	Provincially Rare
Nycticorax nycticorax	Black-Crowned Night-Heron	Provincially Rare, Priority Conservation Status for Region of Peel
Egretta alba	Great Egret	Provincially Rare

TABLE 1. Rattray Marsh Birds Species of Concern (cont'd)

Scientific Name	Common Name	Status
Sensitive Species (NHIC)		Provincially Rare, Threatened Species, Priority Conservation Status for Region of Peel, Area Sensitive
Cathartes aura *	Turkey Vulture	Priority Conservation Status for Region of Peel
	Tundra Swan	Provincially Rare
Anas clypeata	Northern Shoveller	Provincially Rare
Aix sponsa	Wood Duck	Priority Conservation Status for Region of Peel
Anas Americana	American Wigeon	Priority Conservation Status for Region of Peel
Anas discors	Blue-Winged Teal	Priority Conservation Status for Region of Peel
Anas strepara	Gadwall	Priority Conservation Status for Region of Peel
Anus acuta *	Northern Pintail	Priority Conservation Status for Region of Peel
Aytha valisineria *	Canvasback	Provincially Rare, Area Sensitive
Athya Americana *	Redhead	Provincially Rare, Area Sensitive
Aythya marila	Greater Scaup	Provincially Rare
Clangula hymealis *	Long-Tailed Duck	Provincially Rare
Melanitta deglandi *	White-Winged Scoter	Provincially Rare
Bucephala albeola *	Bufflehead	Provincially Rare
Oxyurus jamaicensis *	Ruddy Duck	Provincially Rare
Lophodytes cucullatus	Hooded Merganser	Priority Conservation Status for Region of Peel
Mergus serrator	Red-Breasted Merganser	Area Sensitive
Mergus merganser	Common Merganser	Area Senstiive
Pandion haliaetus	Osprey	Priority Conservation Status for Region of Peel
Cirus cyaneus	Northern Harrier	Area Sensitive
Accipiter copperii	Coopers' Hawk	Priority Conservation Status for Region of Peel, Area Sensitive
Accipiter striatus	Sharp-Shinned Hawk	Priority Conservation Status for Region of Peel, Area Sensitive
Accipiter gentalis *	Northern Goshawk	Priority Conservation Status for Region of Peel, Area Sensitive
Buteo platypterus	Broad-winged Hawk	Priority Conservation Status for Region of Peel, Area Sensitive
Buteo lagopus *	Rough-legged Hawk	Provincially Rare
Falco sparverius *	American Kestrel	Priority Conservation Status for Region of Peel
Falco peregrinus *	Peregrine Falcon	Provincially Rare, Threatened Species

TABLE 1. Rattray Marsh Birds Species of Concern (cont'd)

Scientific Name	Common Name	Status
Bonasa umbellus *	Ruffed Grouse	Priority Conservation Status for Region of Peel, Species of Conservation Concern with CVC
Rallus limicola	Virginia Rail	Priority Conservation Status for Region of Peel
Porzana Carolina	Sora	Priority Conservation Status for Region of Peel
Gallinula chloropus *	Common Moorhen	Priority Conservation Status for Region of Peel
Fulica Americana	American Coot	Priority Conservation Status for Region of Peel, Area Sensitive
Charadrius vociferous	Killdeer	Species of Conservation Concern with CVC
Charadrius semipalmatus	Semipalmated Plover	Provincially Rare
Pluvialis dominica	American Golden Plover	Provincially Rare
Actitus macularia	Spotted Sandpiper	Priority Conservation Status for Region of Peel
Calidris pusilla	Semipalmated Sandpiper	Provincially Rare
Calidris himantopus	Stilt Sandpiper	Provincially Rare
Phalaropus lobatus *	Red-Necked Phalarope	Provincially Rare
Numenius phaeopus *	Whimbrel	Provincially Rare
Limosa *	Hudsonian Godwit	Provincially Rare
Calidris alpina *	Dunlin	Provincially Rare
Limnodromus griseus *	Short-Billed Dowitcher	Provincially Rare, Area Sensitive
Scolopax minor *	American Woodcock	Priority Conservation Status for Region of Peel
Gallinago gallinago	Common Snipe	Priority Conservation Status for Region of Peel
Larus marinus	Great Black-Backed Gull	Priority Conservation Status for Region of Peel
Sterna caspia	Caspian Tern	Provincially Rare
Cihildonias nigra *	Black Tern	Provincially Rare, Species of Special Concern, Priority Conservation Status for Region of Peel, Area Sensitive
Sterna hirundo	Common Tern	Priority Conservation Status for Region of Peel
Coccyzus erthropthalmus	Black-Billed Cuckoo	Priority Conservation Status for Region of Peel
Coccyzus americanus	Yellow-billed Cuckoo	Species of Conservation Concern with CVC
Strix varia *	Barred Owl	Priority Conservation Status for Region of Peel, Area Sensitive
Aseo flammeus *	Short-eared Owl	Provincially Rare, Species of Special Concern, Area Sensitive
Chordeiles minor	Common Nighthawk	Priority Conservation Status for Region of Peel

TABLE 1. Rattray Marsh Birds Species of Concern (cont'd)

Scientific Name	Common Name	Status
Archilochus colubris	Ruby-throated Hummingbird	Priority Conservation Status for Region of Peel
Ceryle alcyon	Belted Kingfisher	Species of Conservation Concern with CVC
Sphyrapicus varius	Yellow-bellied Sapsucker	Priority Conservation Status for Region of Peel, Area Sensitive
Melanerpes erthrocephalus	Red-headed Woodpecker	Provincially Rare, Species of Special Concern, Area Sensitive
Picoides villosus	Hairy Woodpecker	Species of Conservation Concern with CVC, Area Sensitive
Dryocopus pieatus	Pileated Woodpecker	Priority Conservation Status for Region of Peel, Area Sensitive
Sayornis phoebe	Eastern Phoebe	Priority Conservation Status for Region of Peel
Tyrannus tyrannus	Eastern Kingbird	Priority Conservation Status for Region of Peel, Species of Conservation Concern with CVC
Empidonax minimus	Least Flycatcher	Priority Conservation Status for Region of Peel, Area Sensitive
Contopus virens	Eastern Wood-Pewee	Species of Conservation Concern with CVC
Empidonax virescens *	Acadian Flycatcher	Provincially Rare, Endangered Species, Priority Conservation Status for Region of Peel
Vireo solitatius	Blue-headed (Solitary) Vireo	Priority Conservation Status for Region of Peel, Area Sensitive
Lanius ludovicianus *	Loggerhead Shrike	Provincially Rare, Endangered Species, Priority Conservation Status for Region of Peel, Area Sensitive
Lanius exubitor *	Northern Shrike	Provincially Rare, Area Sensitive
Hirundo rustica	Barn Swallow	Priority Conservation Status for Region of Peel, Species of Conservation Concern with CVC
Progne subis	Purple Martin	Priority Conservation Status for Region of Peel
Stelgidopteryx ruficollis *	Rough-Winged Swallow	Priority Conservation Status for Region of Peel
Riparia riparia	Bank Swallow	Priority Conservation Status for Region of Peel
Parus atricapillus	Black-capped Chickadee	Priority Conservation Status for Region of Peel
	Tufted Titmouse	Provincially Rare, Area Sensitive

TABLE 1. Rattray Marsh Birds Species of Concern (cont'd)

Scientific Name	Common Name	Status
Sitta canadensis	Red-breasted Nuthatch	Priority Conservation Status for Region of Peel, Area Sensitive
Sitta carolinensis	White-breasted Nuthatch	Area Sensitive
Certhia americana	Brown Creeper	Priority Conservation Status for Region of Peel, Area Sensitive
Thyothorus ludovicianus	Carolina Wren	Provincially Rare, Species of Conservation Concern with CVC
Trogolodytes troglodytes	Winter Wren	Priority Conservation Status for Region of Peel, Area Sensitive
Cistothorus palustris *	Marsh Wren	Priority Conservation Status for Region of Peel, Species of Conservation Concern with CVC
Regulus satrapa	Golden-crowned Kinglet	Priority Conservation Status for Region of Peel
Regulus calendula	Ruby-crowned Kinglet	Priority Conservation Status for Region of Peel
Polioptila caerulea	Blue-gray Gnatcatcher	Priority Conservation Status for Region of Peel, Area Sensitive
Hylocichla mustelina	Wood Thrush	Species of Conservation Concern with CVC
Catharus furescens	Veery	Priority Conservation Status for Region of Peel, Area Sensitive
Catharus minimus *	Gray-cheeked Thrush	Provincially Rare
Catharus ustulatus	Swainson's Thrush	Priority Conservation Status for Region of Peel
Catharus guttatus	Hermit Thrush	Area Sensitive
Dumetella carolinensis	Gray Catbird	Priority Conservation Status for Region of Peel, Species of Conservation Concern with CVC
Toxostoma rufum	Brown Thrasher	Priority Conservation Status for Region of Peel
Mimus polyglottos	Northern Mockingbird	Priority Conservation Status for Region of Peel
Dendroica magnolia	Magnolia Warbler	Priority Conservation Status for Region of Peel, Area Sensitive
Dendroica caerulescens	Black-throated Blue Warbler	Priority Conservation Status for Region of Peel, Area Sensitive
Vermivora ruficapilla	Nashville Warbler	Priority Conservation Status for Region of Peel
Parula Americana	Northern Parula	Area Sensitive
Dendroica pensylvanica	Chestnut-sided Warbler	Priority Conservation Status for Region of Peel

TABLE 1. Rattray Marsh Birds Species of Concern (cont'd)

Scientific Name	Common Name	Status
Dendroica virens	Black-throated Green Warbler	Priority Conservation Status for Region of Peel, Area Sensitive
Setophage ruticilla	American Redstart	Priority Conservation Status for Region of Peel, Area Sensitive
Seiurus aurocapillus	Ovenbird	Priority Conservation Status for Region of Peel
Seiurus noveboracensis	Northern Waterthrush	Priority Conservation Status for Region of Peel
Seiurus motacilla	Louisiana Waterthrush	Provincially Rare, Species of Special Concern
Wilsonia canadensis	Canada Warbler	Priority Conservation Status for Region of Peel, Area Sensitive
Oporornis philadelphia	Mourning Warbler	Priority Conservation Status for Region of Peel, Species of Conservation Concern with CVC
Miniotilta varia	Black-and-white Warbler	Priority Conservation Status for Region of Peel, Area Sensitive
Icteria virens	Yellow-breasted Chat	Provincially Rare, Species of Special Concern
Vemivora chrysoptera *	Golden-winged Warbler	Priority Conservation Status for Region of Peel, Species of Special Concern
Vermivora pinus *	Blue-winged Warbler	Priority Conservation Status for Region of Peel
Dendroica pinus	Pine Warbler	Priority Conservation Status for Region of Peel, Area Sensitive
Dendroica fusca	Blackburnian Warbler	Priority Conservation Status for Region of Peel
Dendroica coronata	Yellow-rumped Warbler	Priority Conservation Status for Region of Peel
Piranga olivacea *	Scarlet Tanager	Priority Conservation Status for Region of Peel, Area Sensitive
Zonotrichia albicollis	White-throated Sparrow	Priority Conservation Status for Region of Peel
Melospiza Georgiana	Swamp Sparrow	Priority Conservation Status for Region of Peel
Passerculus sandwichensis	Savannah Sparrow	Priority Conservation Status for Region of Peel, Area Sensitive
Spizella pusilla *	Field Sparrow	Priority Conservation Status for Region of Peel
Pipilo erythropthalmus	Eastern Towhee	Priority Conservation Status for Region of Peel
Ouiscalus quiscula	Common Grackle	Species of Conservation Concern with CVC

TABLE 1. Rattray Marsh Birds Species of Concern (cont'd)

Scientific Name	Common Name	Status
Dolichonyx oryzivorus *	Bobolink	Priority Conservation Status for Region of Peel, Area Sensitive
Sturnella magna	Eastern Meadowlark	Priority Conservation Status for Region of Peel, Area Sensitive
Carduelis tristis	American Goldfinch	Priority Conservation Status for Region of Peel

Fish and Wildlife

23 mammal species have been recorded of which 2 are exotic and none are of Global, Provincial or Local concern.

11 native amphibian species have been recorded of which none are of Global, Provincial or Local concern. A frog calling monitoring station was established at Rattray Marsh. In 2003, there were no frog species observed. In 2004, 2005, and 2006 the American Toad was the only frog species to have been observed and in 2009 Credit Valley Conservation confirmed the presence of leopard frogs and green frogs. This is relatively poor in comparison to the number of frog species that have been recorded for Rattray Marsh.

12 native reptile species have been recorded. None of these 12 species are of Global concern; however, according to COSSARO 2009 there is 1 Threatened Species and 1 Species of Concern. *(* indicates historic sighting)*

TABLE 2. Rattray Marsh Reptile Species of Concern

Scientific Name	Common Name	Status
Heterodon platyrhinos *	Eastern Hognose Snake	Threatened
Lampropeltis triangulum triangulum	Eastern Milk Snake	Species of Concern

24 fish species have been recorded of which 3 are exotic. Not all 24 of these species are still seen today at Rattray Marsh. There is 1 native Provincially Threatened Species with a historical listing almost 50 years old that is no longer considered valid given habitat site conditions and species not oriented to the marsh environment. This species is the Red Side Dace. Carp is one of the fish species that are exotic and non-native. The *Rattray Marsh Restoration Project: Environmental Assessment - Draft* describes carp as a fish species that "uproot and destroy most plants and suspend sediments at the same time causing constant high turbidity levels. They create conditions unsuitable for other species and compete in other ways with many species" (Morris, 2005).

For species records refer to Appendix B.

Flora

501 plant species have been recorded within the overall area of Rattray Marsh, including the Upland habitat areas, of which 163 (32.5%) are non-native of the vascular species listing. The Butternut (*Juglans cinerea)* is a Provincially Rare Species having an Endangered Status. It was recorded both historically and in the 2006 Flora investigation by Webber and Kaiser (2007). A detailed flora investigation was undertaken in 2006 by Webber and Kaiser specific to the 'wetland' environment or the main marsh habitat basin area plus 4 smaller surrounding wetland communities. A total of 228 species were identified in the 2006 inventory and historical herbarium specimen records from the wetland habitat area. In addition to the 1 Provincially Significant Species, 26 Regionally (GTA) and 47 Locally (Peel) Significant Species have been identified. Of note, only 14 of the Regionally and Locally Significant species listings were recorded in the 2006 inventory. 13 vegetation communities were identified of which 4 are considered *Locally Uncommon*. In addition, the Shingle Bar Beach Ecosite (BBT1) may also be of Provincial Concern for Rarity Status (S1-S3 vegetation community type), but given lack of Provincial verification for this habitat type, no status designation has yet been determined. For listing of Rattray Marsh plant species refer to Appendix B.

Endangered and Threatened Species are protected by the Ontario Endangered Species Act 2007. An appropriate review will be conducted by the MNR.

5.0 Project Alternatives

In order to properly determine the most appropriate means of rehabilitation, all alternatives must be analyzed. A table was created for a Preliminary Screening of ten alternatives and techniques:

1. **"Do Nothing"**

   No restoration works take place and the marsh continues to experience ecological degradation.

2. **Selective Dredging**

   Mineral soil is removed from the marsh one area at a time to expose the organic soil beneath. This allows for phasing of construction operations.

3. **Complete Dredging**

   Mineral soil is removed from the entire marsh to expose the organic soil beneath in one step.

4. **Weir Construction**

   Installation of an adjustable/ removable weir will allow for adaptation to the climate change lowering the water level of Lake Ontario and to offset unnatural water flow fluctuations of Sheridan Creek. However, this structure may restrict the marsh's dynamism and natural processes, which is not supported by the Ministry of Natural Resources.

   There is a lack of available hydrological and climate change information for a weir to be properly assessed as a restoration alternative. Should unforeseen

significant adverse environmental effects arise, as a result of climate change or watershed hydrology, this alternative shall be revisited in order to allow for adaptive management. An addendum process would be followed.

Other temporary options such as plugging the outlet manually may be considered with MNR approval to provide contingency plans for issues such as fish stranding, sediment control or plant germination/colonization.

5. Dyke System

a) **Brush Bundle Levees**

The levees would be stabilized in such a way to restrict the movement of exotic species, such as carp, from the creek or lake into the marsh. The levees will also allow sediment and flashy flows into the creek to pass directly through to Lake Ontario. The health of the isolated marsh segments would be restored.

b) **By-Pass Channel**

A by-pass channel will function similar to levees. Exotic species, such as carp, from the creek or lake will be restricted from entering the marsh segments. The by-pass channel will also allow sediment and flashy flows into the creek to pass directly through to Lake Ontario, leading to the health of the isolated marsh segments to be restored.

6. Nuisance Species Removal

a) **Exclusion fencing and/ or fish fence/ fishway**

A fencing system will allow for areas to re-vegetate without being damaged by carp. Once these areas are re-vegetated densely enough it may be able to sustain some reinvasion by carp.

7. Habitat Enhancement

A preferred species list for Rattray Marsh is used to create favorable conditions for habitat.

8. Reintroduce Previously Known Indigenous Species to the Site

Reintroducing previously known indigenous species to the marsh will fast track the repopulation process of the marsh. This will guarantee that specific indigenous species will be present at the marsh.

9. Introduce Fill, Import Seed Bank and Planting Plans

By introducing organic fill, importing seeds, and implementing planting plans, specific indigenous flora species may be reintroduced into Rattray Marsh. This will guarantee that specific indigenous species will be present at the marsh.

10. Remove Mineral Soil and Install Silt Traps Upstream

Mineral soil is removed from the marsh exposing the organic soil beneath. To prevent further sedimentation of the marsh from the creek, silt traps will be installed upstream.

The ten alternatives and techniques were evaluated according to their ability to satisfy the Steering Committee's Vision for Rattray Marsh, as well as other comments for consideration:

Elements of the Steering Committee's Vision for Rattray Marsh

- Optimizes Diversity of Indigenous Species
- Reduces/ Eliminates Nuisance Species, Invasives, and/or Exotics
- Provides for Large Populations for Genetic Diversity
- Provides Specialized Habitat for Temporary Species
- Provides Appropriate Connection for Movement of Desirable Species
- Provides an Understanding and Appreciation of Great Lakes Coastal Marshes
- Restores at Least 90% of Unvegetated Open Water Marsh Area for Submergent Plants
- Water Clarity Restored Within 48 Hours After a Storm Event
- Restores 90% of the Marsh Substrate to Organic Soils
- Increases Visitor's Overall Learning Experience

Other Comments for Consideration

- Provides Opportunity for Volunteer Work
- Potential Impacts/ Risks
- Significant Disturbance During Construction
- Can Mitigate Impacts?
- Further Approval May be Needed
- Monitoring Needed
- Maintenance Required During Operation
- Potential to be Cost Prohibitive

Input was received from the Rattray Marsh Steering Committee to complete the preliminary screening. It was found that the individual alternatives and techniques alone would not be able to satisfy the Ontario Provincial Policy Statement and the Steering Committee's vision, goal, and objectives, however, combined with other alternatives and techniques the Steering Committee's vision, goal, and objectives would be achieved. The preliminary screening of alternatives and techniques is summarized in Table 3.

Table 3 was used as a tool in designing the three alternatives presented, labeled Alternative One, Alternative Two, and Alternative Three. As required by *Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects,* the "Do Nothing" alternative was included in this Environmental Study Report as Alternative Four. All alternatives were reviewed by the members of the Rattray Marsh Steering Committee and the Preferred Alternative was refined to be presented to the public at the second open house.

TABLE 3. Preliminary Screening of Alternatives and Techniques

Project Objective: To provide a clear and transparent project planning process where public comments and opinions are welcomed.
Project Goal: To restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species.

Alternatives & Techniques	Elements of the Steering Committee's Vision for Rattray Marsh										Satisfies Vision, Goal, and Objectives?		Other Comments for Consideration						
	Optimizes diversity of indigenous species	Reduces / eliminates nuisance species, invasives, and/or exotics	Provides for large populations for genetic diversity	Provides specialized habitat for temporary species	Provides appropriate connection for movement of desirable species	Provides an understanding and appreciation of Great Lakes Coastal Marshes	Restores at least 90% of unvegetated open water marsh area for submergent plants	Water clarity restored within 48 hours after a storm event	Restores 90% of the marsh substrate to organic soils	Increases visitor's overall learning experience	Alone	With:	Provides opportunity for volunteer work	Potential impacts/ risks	Significant disturbance during construction	Can mitigate impacts ?	Further approval may be needed	Monitoring needed	Maintenance required during operation	Potential to be cost prohibitive
1. "Do nothing"	N	N	N	Y	N	Y	N	N	N	N	N		N	Will continue to degrade	N	Y	N	Y	N	N
2. Selective dredging			N		N	N			Y	Y	N	(4) (6) (7) (8)	N	Impacts on biota		Y	Y			
3. Complete dredging	N		N		N	N				Y	N		N	Impacts on biota	Y	Y	Y			Y
4. Weir construction	N	Y		Y	N	N		Y	N	N	N		N	Risk of blowout		Y	Y	Y	Y	Y
5. Dyke system			Y	N	N	N	N	Y	N	N	N	(6) (7) (8) (9)	N	Major change	N			Y	N	N
a) Brush Bundle Levees				N	N	N	N	Y	N	Y	N		Y	N	N	N/A	N	Y	N	N
b) By-Pass channel				N	N	N	Y	Y	N	N	N		N	Major change		Y	Y	N	N	N
6. Nuisance species removal		Y				Y			N	Y	N		Y	Risk of being incomplete/ inefficient	N	N/A	N	Y		N
a) Exclusion fencing and/ or fish fence/ fishway		Y	N	N	N	Y	Y	Y	N	Y	N		N	May Result in exclusion of large indigenous fish	N	N	N	Y	Y	N
7. Habitat enhancement	Y	N	Y	Y	Y	Y		N		Y	N		Y	Risk of being incomplete/ inefficient			Y	N	N	N
8. Reintroduce previously known indigenous species to the site	Y	N	Y	N	N	Y	N	N	N	Y	N		N	N	N	N/A		Y	N	Y
9. Introduce fill, import seed bank and planting plans	Y	N	N		N	Y		N	Y	Y	N		Y	Risk of being incomplete/ inefficient	Y		Y	N	N	Y
10. Remove mineral soil and install silt traps upstream	N	N	N	Y	Y	N	N	N	Y	Y	N		N	Risk of being incomplete/ inefficient	Y	Y	Y	N	N	Y

N			Y
NO	Unknown	Partially	Yes

5.1 Alternative One

Alternative one is a concept to restore the health of the marsh. It was created by combining restoration techniques 2, 4, 6, 7 and 8 from Table 3. It involves selective removal of the mineral soil and exposing organic soils and/or adding organic soils to the marsh. This concept involves exclosures to protect the revegetated areas, biological removal of nuisance species, and the biological reintroduction of plants, benthic invertebrates, and fish. A structure would be installed at the outlet to exclude carp. This concept leaves the entire marsh open and implementation of the restoration opportunities from the *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report* is critical to its success or sediment will continue to enter and settle in the marsh.

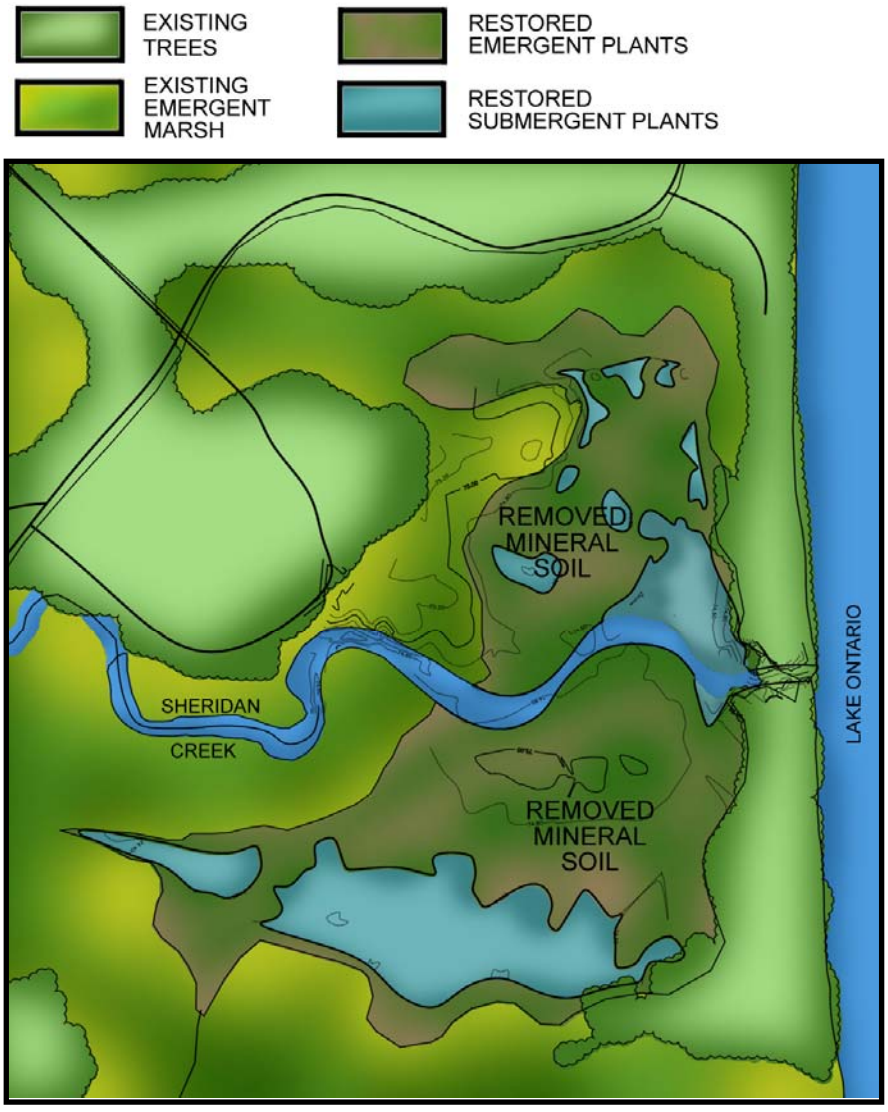


Figure 7. Alternative One

5.2 Alternative Two

Alternative two is a concept to stabilize and enhance the marsh sediment. It was created by combining restoration techniques 5, 6, 7, 8 and 9 from Table 3. The main flow from Sheridan Creek is visible as a deeper channel. Geomorphic Solutions suspects that this is caused by the fixed concrete anchored barrier outlet. The sediment has accumulated beside the creek as it meanders through the marsh, thus isolating the north and south portions from the creek. This concept includes exclosures to protect the revegetated areas, biological removal of nuisance species, and the biological reintroduction of plants, benthic invertebrates, and fish. The dykes or levees would be vegetated and stabilized in such a way as to restrict the movement of carp from the creek or lake into the marsh. The health of the isolated marsh segments would then be restored. This concept would be far less reliant on the implementation of the restoration opportunities from the *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report*, as sediment and flashy flows into the creek would usually pass directly through to the lake.

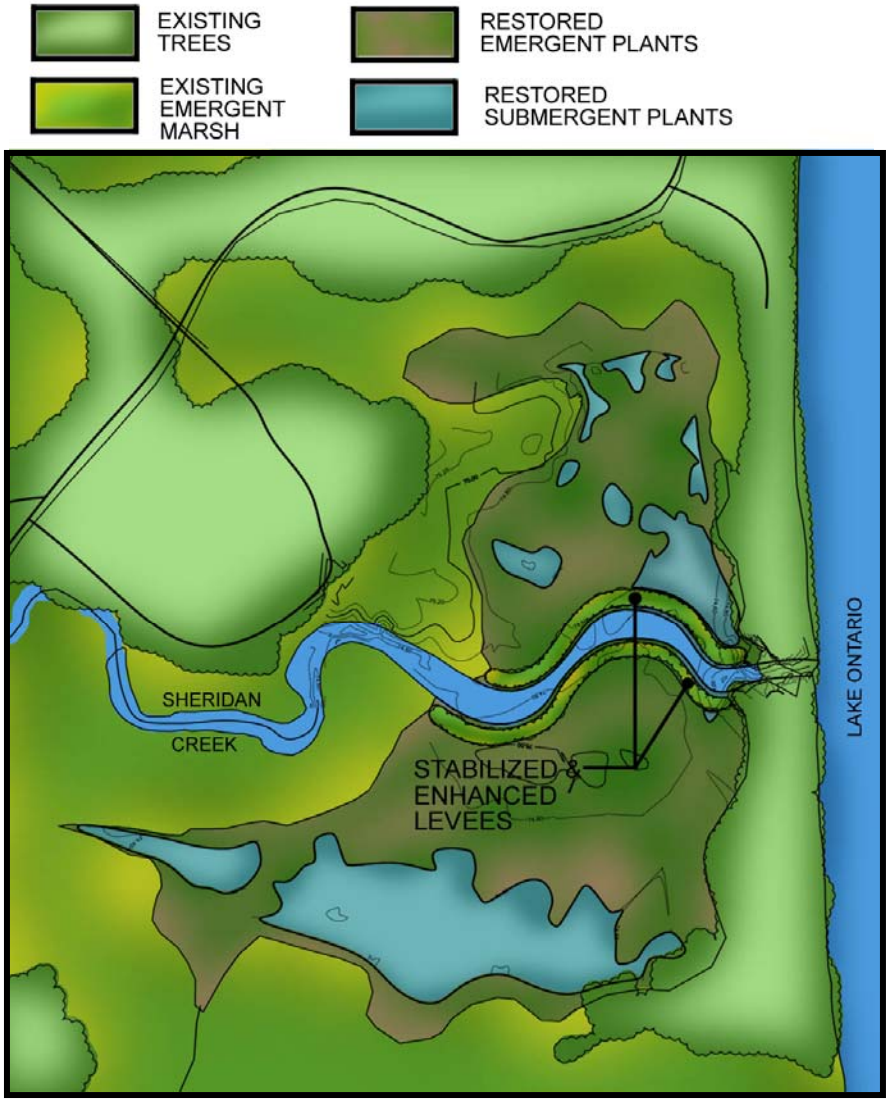


Figure 8. Alternative Two

5.3 Alternative Three

Alternative three was created with input received from a concerned member of the public, who is also a local naturalist. This concept solely involves the removal of mineral soil and the installation of silt traps upstream from the marsh. Nature will be allowed to take its course and indigenous species will be encouraged to return to the marsh once conditions become favorable. Due to the installation of silt traps upstream from the marsh, this alternative is less reliant on the restoration opportunities from the *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report*.

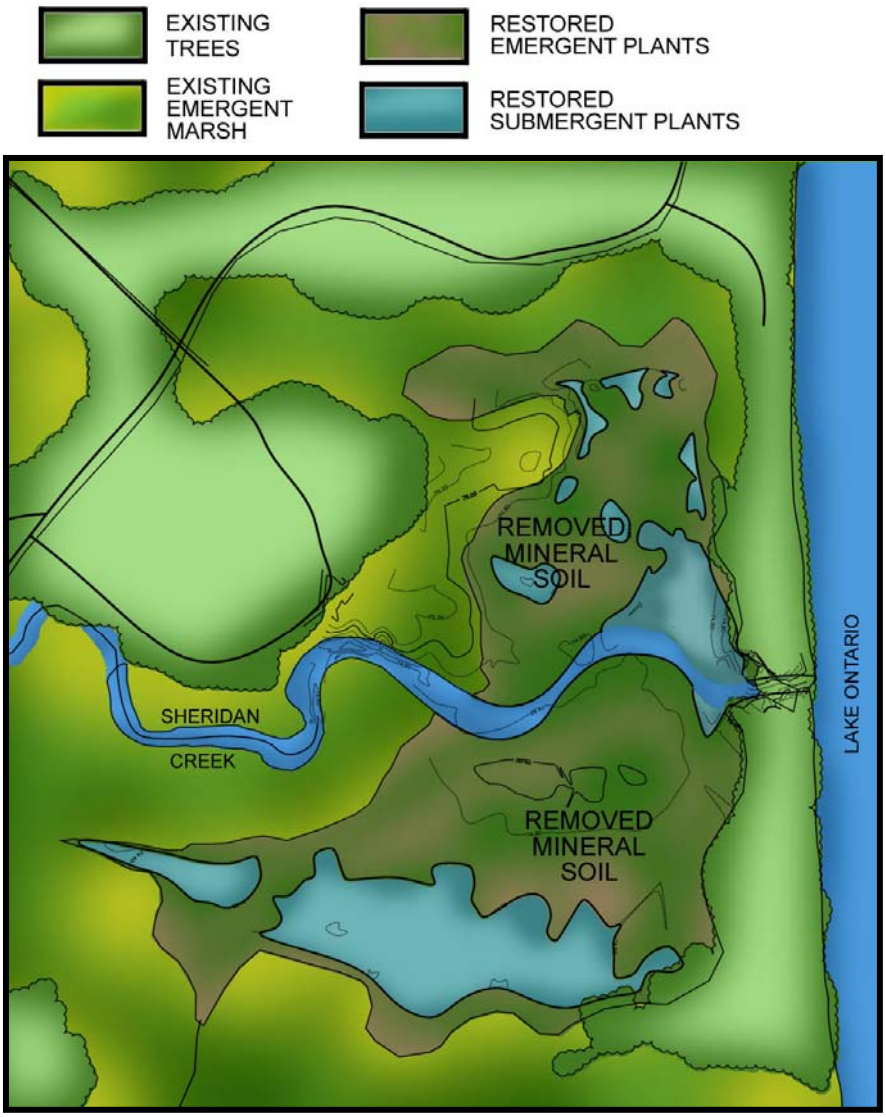


Figure 9. Alternative Three

5.4. Alternative Four

The fourth alternative was to “do nothing”, which is an alternative required to be assessed in all Environmental Studies. It is believed that with this alternative, the marsh will continue to experience ecological degradation. Sediment will continue to build-up in the marsh, invasive cattails will dominate the study area, and it would be expected that the adjacent swamps will encroach upon the marsh. According to the *Ontario Wetland Evaluation System: Southern Manual*, “swamps are wooded wetlands with 25% cover or more of trees or tall shrubs. Occasionally, swamp communities have a strong component of low shrubs. In this case the tall shrub component must be dominant for the community to be considered a swamp” (Ministry of Natural Resources, March 1993).

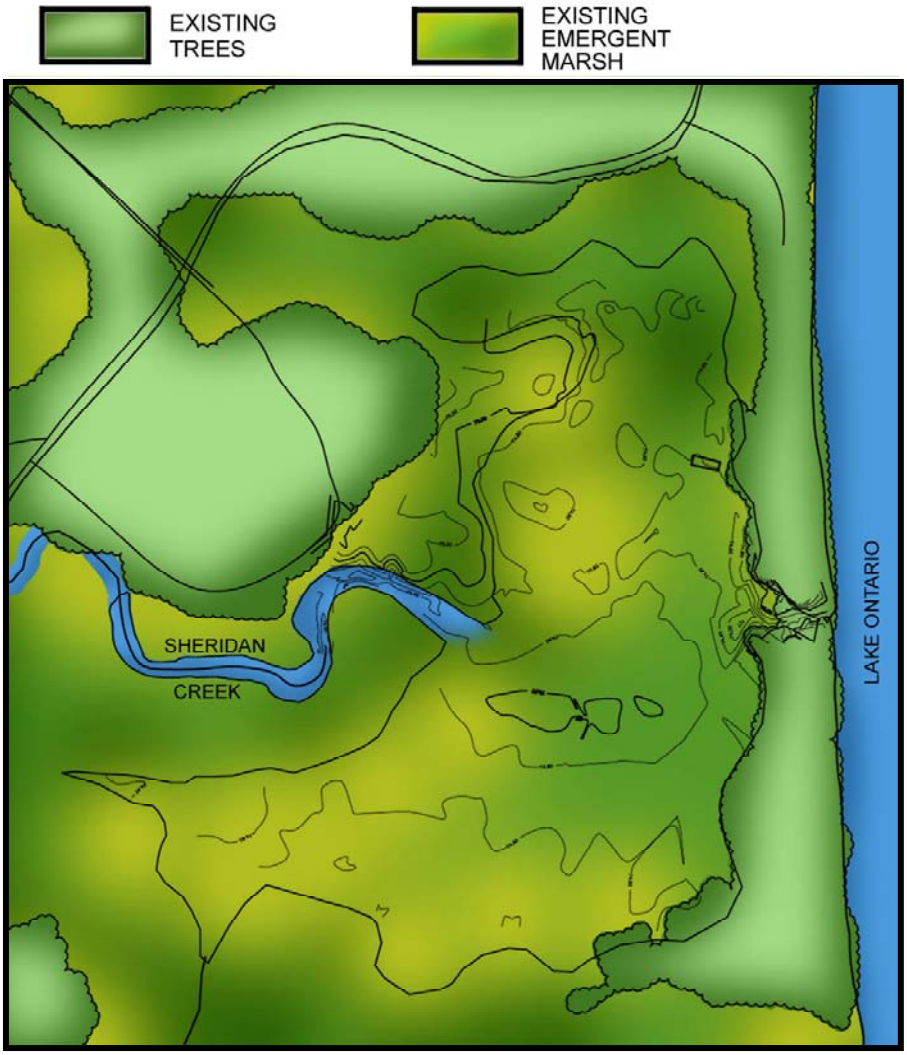


Figure 10. Alternative Four

6.0 Identification of Project Status

In the original screening criteria for this project, aboriginal interests were unknown. As a result, requests for information were sent to the Ministry of Aboriginal Affairs, Chief McNaughton, Bryan LaForme of the Mississaugas of the New Credit First Nation, Don Boswell of the Ontario Research Team Department of Indian and Northern Affairs Canada, Jean-François Tardif of the Financial Issues and Cost Sharing Department of Indian and Northern Affairs Canada, and Ria Tzimas of the Ministry of the Attorney General. It was confirmed by the Ministry of Aboriginal Affairs and Indian and Northern Affairs Canada that there are no First Nation land claims submitted to the Government of Ontario that will have an impact on Rattray Marsh. This project is a **Category C** as defined in section 3.0 of *A Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects* (MNR, 2003).

7.0 First Notice

First notice of the proposal was advertised on two signs located on Lakeshore Road at Silver Birch Trail and on Southdown Road at Truscott Drive from June 14, 2007 to June 28, 2007. On June 13, 2007 notices were mailed to the Ratepayer Groups, Department of Fisheries and Oceans, University of Toronto at Mississauga, Great Lakes Sustainability Fund, Mississauga News, Ducks Unlimited, City of Mississauga with request to distribute to their departments, and the Ministry of Environment. On June 14, 2007 notices were mailed to local schools, Ontario Nature, Ministry of culture and South Peel Naturalists' Club. On June 18, 2007 a notice was mailed to the Regional Chair of the Region of Peel and another notice was mailed on June 19, 2007 to the Region of Peel with request to distribute to relevant departments and council. Notices were hand delivered to landowners whose property abuts Rattray Marsh from June 15, 2007 to June 24, 2007. A first Open House notice was posted in the marsh, noted in a Credit Valley Conservation newsletter and on the Credit Valley Conservation website. Finally, a notice was published on Wednesday, June 20, 2007, in the Mississauga News. A public open house was held on June 27, 2007 at Green Glade Senior Public School hosted by Credit Valley Conservation, in partnership with the Ontario Ministry of Natural Resources (OMNR).

Contact information for possible interested aboriginal groups was received after the scheduled public meeting date of June 27, 2007. Therefore, packages containing a letter of apology for the delay of notification and invitation for any questions, comments or suggestions were distributed to each group. Also included were a copy of the public notice received by other public government agencies and copies of the project steering committee's vision of Rattray Marsh, goals and objectives, an information sheet on "What is Restoration?" and a comment sheet. These packages were mailed on July 9, 2007 to Bryan LaForme of the Mississaugas of the New Credit First Nation and Chief David General and Chief Allen McNaughton of the Six Nations.

8.0 Property Optioning

Credit Valley Conservation currently has title to the property within the study area.

9.0 Determination of Significance of Effects

The significance of the net effects (post-construction) on the various components in the environmental checklist is derived from the input received through consultation with the project steering committee and the public. These effects, as described in *A Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects (OMNR, 2003)* are presented in Tables 4, 5, 6 and 7 and the significance is expressed in relation to the alternatives:

- H

Assigned where the potential negative net effect may reflect a high level of certainty that a significant effect will occur, or a low level of certainty about one or more effects and a need for further evaluation and exploration of mitigation options. One or more "high" negative net effects may result in a decision to seek other ways of resolving a problem or meeting program objectives.

- M

Assigned where the potential negative net effect may be based on reasonable certainty, and may be significant in combination with other medium and high net effects.

- L

Assigned where the potential negative net effect would be assigned where there is a high degree of certainty as to the effect, and where the effect has minimal significance.

Nil

Assigned where a criterion clearly does not apply.

Unk

Assigned where the effects are unknown.

+ L

Assigned where the potential positive net effect would be assigned where there is a high degree of certainty as to the effect, and where the effect has minimal significance.

+ M

Assigned where the potential positive net effect may be based on reasonable certainty, and may be significant in combination with other medium and high net effects.

+ H

Assigned where the potential positive net effect may reflect a high level of certainty that a significant effect will occur.

TABLE 4. ALTERNATIVE ONE - ENVIRONMENTAL SCREENING CRITERIA

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Natural Environment Considerations									
Air Quality				■					Post-construction, the air quality will return to its original state
Water quality or quantity (ground or surface)							■		Sediment will be removed
Species at risk or their habitat						■			Favorable conditions will be restored and/ or created
Significant earth or life science features						■			Reintroduction of plants, benthic invertebrates, and fish will create more favorable conditions
Fish or other aquatic species, communities, or their habitat (including movement of resident or migratory species)							■		Favorable conditions will be restored and/ or created
Land subject to natural or man-made hazards				■					Lands are not subject to natural or man-made hazards
Recovery of a species under a special management program (e.g. elk restoration)				■					No special management program is proposed
Ecological integrity							■		Reintroduction of indigenous species and removal of mineral soil
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)							■		Reintroduction of plants, benthic invertebrates, and fish will create more favorable conditions
Natural vegetation and terrestrial habitat linkages or corridors through fragmentation, alteration and/or critical loss							■		Nuisance species removal and reintroduction of indigenous species will create more favorable conditions
Permafrost				■					No effect on permafrost expected
Soils and sediment quality							■		Sediment will be removed
Drainage or flooding				■					Natural flooding of and drainage through Rattray Marsh expected to be maintained
Sedimentation or erosion							■		Assuming restoration opportunities from Sheridan Creek Watershed Study are implemented

TABLE 4. ALTERNATIVE ONE - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Natural Environment Considerations									
Release of contaminants in soils, sediments					■				Assuming restoration opportunities from Sheridan Creek Watershed Study are implemented
Natural heritage features and areas (e.g. areas of natural and scientific interest, provincially significant wetlands)							■		Improvement into a healthy dynamic ecosystem
Other (specify): Shoreline Processes and Features						■			Improvement into a healthy dynamic ecosystem
Land Use, Resource Management Considerations									
Access to trails or inaccessible areas (land or water)				■					Removal and/ or creation of trails are not proposed
Obstruct navigation				■					No effect on conservation area navigation expected
Other resource management projects								■	Supports the Sheridan Creek Watershed Study
Traffic patterns or traffic infrastructure				■					No effect on traffic patterns or infrastructure expected
Recreational importance – public or private						■			Increased learning experience
Create excessive waste materials				■					Creation of waste material not expected
Commit a significant amount of a non-renewable resource (e.g. aggregates, agricultural land)				■					Non-renewable resources will not be required
Noise levels				■					Post-construction, noise levels will return to its original levels
Views or aesthetics							■		View will be of a healthy dynamic ecosystem
Be a precondition or justification for implementing another project								■	Justifies moving forward with the Sheridan Creek Watershed Study
Adjacent or nearby uses, persons or property							■		Public support for restoring the health of Rattray Marsh
Other (specify)									

TABLE 4. ALTERNATIVE ONE - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Social, cultural, and Economic Considerations									
Cultural heritage resources – including archaeological sites, built heritage, and cultural heritage landscapes									No cultural heritage resources identified on Rattray Marsh
Displace people, businesses, institutions, or public facilities									No displacement is proposed
Community character, enjoyment of property, or local amenities									Rattray Marsh will be restored to a healthy dynamic ecosystem
Increase demands on government services or infrastructure									No increase in demands on government services or infrastructure expected
Public health and/or safety									No effect on public health and/ or safety expected
Local, regional or provincial economics or businesses									No effect on economics or businesses expected
Tourism values (e.g. resource-based tourist lodge)									Rattray Marsh will be restored to a healthy dynamic ecosystem
Other (specify)									
Aboriginal Considerations									
First Nation reserves or communities									No effect on First Nation reserves or communities expected
Spiritual, ceremonial, or cultural sites									No effect on spiritual, ceremonial, or cultural sites expected
Traditional land or resources used for harvesting, activities									No effect on traditional land or resources used for harvesting expected
Aboriginal values									No effect on
Lands subject to land claims									It was confirmed that there are no First Nation land claims submitted to the Government of Ontario that will have impact on Rattray Marsh
Other (specify)									

TABLE 5. ALTERNATIVE TWO - ENVIRONMENTAL SCREENING CRITERIA

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Natural Environment Considerations									
Air Quality				■					Post-construction, the air quality will return to its original state
Water quality or quantity (ground or surface)							■		Sediment not allowed to settle in marsh
Species at risk or their habitat						■			Favorable conditions will be restored and/ or created
Significant earth or life science features						■			Reintroduction of plants, benthic invertebrates, and fish will create more favorable conditions
Fish or other aquatic species, communities, or their habitat (including movement of resident or migratory species)							■		Favorable conditions will be restored and/ or created
Land subject to natural or man-made hazards				■					Lands are not subject to natural or man-made hazards
Recovery of a species under a special management program (e.g. elk restoration)				■					No special management program is proposed
Ecological integrity							■		Removal of nuisance species and reintroduction of indigenous species
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)							■		Reintroduction of plants, benthic invertebrates, and fish will create more favorable conditions
Natural vegetation and terrestrial habitat linkages or corridors through fragmentation, alteration and/or critical loss							■		Nuisance species removal and reintroduction of indigenous species will create more favorable conditions
Permafrost				■					No effect on permafrost expected
Soils and sediment quality							■		Sediment will flow directly to lake
Drainage or flooding		■							Drains directly into lake before settling in marsh
Sedimentation or erosion							■		Sediment will flow straight into Lake Ontario
Release of contaminants in soils, sediments				■					Sediment will flow straight into Lake Ontario

TABLE 5. ALTERNATIVE TWO - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Natural Environment Considerations									
Natural heritage features and areas (e.g. areas of natural and scientific interest, provincially significant wetlands)							■		Improvement into a healthy dynamic ecosystem
Other (specify): Shoreline Processes and Features			■						Marsh dynamism restricted by main flow directed to outlet
Land Use, Resource Management Considerations									
Access to trails or inaccessible areas (land or water)				■					Removal and/ or creation of trails are not proposed
Obstruct navigation				■					No effect on conservation area navigation expected
Other resource management projects				■					None
Traffic patterns or traffic infrastructure				■					No effect on traffic patterns or infrastructure expected
Recreational importance – public or private						■			Increased learning experience
Create excessive waste materials				■					Creation of waste material not expected
Commit a significant amount of a non-renewable resource (e.g. aggregates, agricultural land)				■					Non-renewable resources will not be required
Noise levels				■					Post-construction, noise levels will return to its original levels
Views or aesthetics							■		View will be of a healthy dynamic ecosystem
Be a precondition or justification for implementing another project				■					None
Adjacent or nearby uses, persons or property							■		Public support for restoring the health of Rattray Marsh
Other (specify)									
Social, cultural, and Economic Considerations									
Cultural heritage resources – including archaeological sites, built heritage, and cultural heritage landscapes				■					No cultural heritage resources identified on Rattray Marsh
Displace people, businesses, institutions, or public facilities				■					No displacement is proposed

TABLE 5. ALTERNATIVE TWO - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Social, Cultural, and Economic Considerations									
Community character, enjoyment of property, or local amenities									Rattray Marsh will be restored to a healthy dynamic ecosystem
Increase demands on government services or infrastructure									No increase in demands on government services or infrastructure expected
Public health and/or safety									No effect on public health and/ or safety expected
Local, regional or provincial economics or businesses									No effect on economics or businesses expected
Tourism values (e.g. resource-based tourist lodge)									Rattray Marsh will be restored to a healthy dynamic ecosystem
Other (specify)									
Aboriginal Considerations									
First Nation reserves or communities									No effect on First Nation reserves or communities expected
Spiritual, ceremonial, or cultural sites									No effect on spiritual, ceremonial, or cultural sites expected
Traditional land or resources used for harvesting, activities									No effect on traditional land or resources used for harvesting expected
Aboriginal values									No effect on
Lands subject to land claims									It was confirmed that there are no First Nation land claims submitted to the Government of Ontario that will have impact on Rattray Marsh
Other (specify)									

TABLE 6. ALTERNATIVE THREE - ENVIRONMENTAL SCREENING CRITERIA

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Natural Environment Considerations									
Air Quality				■					Post-construction, air quality will return to its original state
Water quality or quantity (ground or surface)							■		Mineral soil will be removed and silt traps will prevent sediment from traveling down the creek into the marsh
Species at risk or their habitat						■			Sediment removal may create favorable conditions
Significant earth or life science features				■					No effect expected
Fish or other aquatic species, communities, or their habitat (including movement of resident or migratory species)						■			Favorable conditions will be restored and/ or created
Land subject to natural or man-made hazards				■					Lands are not subject to natural or man-made hazards
Recovery of a species under a special management program (e.g. elk restoration)				■					No special management program proposed
Ecological integrity						■			Removal of mineral soil
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)				■					No immediate effect expected, since reintroduction of indigenous species is not proposed
Natural vegetation and terrestrial habitat linkages or corridors through fragmentation, alteration and/or critical loss				■					No immediate effect expected, since reintroduction of indigenous species is not proposed
Permafrost				■					No effect on permafrost expected
Soils and sediment quality							■		Mineral soil removed
Drainage or flooding				■					Flooding of and drainage through marsh expected to be maintained
Sedimentation or erosion							■		Silt traps will prevent further sedimentation
Release of contaminants in soils, sediments						■			Silt traps will not prevent other contaminants from entering the marsh
Natural heritage features and areas (e.g. areas of natural and scientific interest, provincially significant wetlands)							■		Improvement into a healthy dynamic ecosystem
Other (specify): Shoreline Processes and Features						■			Improvement into a healthy dynamic ecosystem

TABLE 6. ALTERNATIVE THREE - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Land Use, Resource Management Considerations									
Access to trails or inaccessible areas (land or water)				■					Removal and/ or creation of trails are not proposed
Obstruct navigation				■					No effect on conservation area navigation expected
Other resource management projects				■					None
Traffic patterns or traffic infrastructure				■					No effect on traffic patterns or infrastructure expected
Recreational importance – public or private				■					No effect on recreational importance expected
Create excessive waste materials				■					Creation of waste material not expected
Commit a significant amount of a non-renewable resource (e.g. aggregates, agricultural land)				■					Non-renewable resources will not be required
Noise levels				■					Post-construction, noise levels will return to its original levels
Views or aesthetics						■			View will be of a healthy marsh
Be a precondition or justification for implementing another project				■					None
Adjacent or nearby uses, persons or property						■			Public support to restore the health of Rattray Marsh
Other (specify)									
Social, cultural, and Economic Considerations									
Cultural heritage resources – including archaeological sites, built heritage, and cultural heritage landscapes				■					No cultural heritage resources identified on Rattray Marsh
Displace people, businesses, institutions, or public facilities				■					No displacement is proposed
Community character, enjoyment of property, or local amenities				■					Rattray Marsh will be restored to a healthy dynamic ecosystem
Increase demands on government services or infrastructure				■					No increase in demands on government services or infrastructure expected
Public health and/or safety				■					No effect on public health and/ or safety expected

TABLE 6. ALTERNATIVE THREE - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Social, Cultural, and Economic Considerations									
Local, regional or provincial economics or businesses									No effect on economics or businesses expected
Tourism values (e.g. resource-based tourist lodge)									Rattray Marsh will be restored to a healthy dynamic ecosystem
Other (specify)									
Aboriginal Considerations									
First Nation reserves or communities									No effect on First Nation reserves or communities expected
Spiritual, ceremonial, or cultural sites									No effect on spiritual, ceremonial, or cultural sites expected
Traditional land or resources used for harvesting, activities									No effect on traditional land or resources used for harvesting expected
Aboriginal values									No effect on
Lands subject to land claims									It was confirmed that there are no First Nation land claims submitted to the Government of Ontario that will have impact on Rattray Marsh
Other (specify)									

TABLE 7. ALTERNATIVE FOUR - ENVIRONMENTAL SCREENING CRITERIA

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Natural Environment Considerations									
Air Quality									Air quality will stay as is
Water quality or quantity (ground or surface)									Sediment infilling will continue
Species at risk or their habitat									Ecological degradation will continue
Significant earth or life science features									Ecological degradation will progress
Fish or other aquatic species, communities, or their habitat (including movement of resident or migratory species)									Ecological degradation will progress
Land subject to natural or man-made hazards									Lands are not subject to natural or man-made hazards
Recovery of a species under a special management program (e.g. elk restoration)									No special management program proposed
Ecological integrity									Marsh will eventually cease to be a dynamic ecosystem
Terrestrial wildlife (including numbers, diversity and movement of resident or migratory species)									Ecological degradation will progress and conditions will become unfavorable
Natural vegetation and terrestrial habitat linkages or corridors through fragmentation, alteration and/or critical loss									Ecological degradation will progress and conditions will become unfavorable
Permafrost									No effect on permafrost expected
Soils and sediment quality									Sediment infilling will continue
Drainage or flooding									
Sedimentation or erosion									Sediment upstream will continue to settle in marsh
Release of contaminants in soils, sediments									Sediment and marsh will continue to enter marsh
Natural heritage features and areas (e.g. areas of natural and scientific interest, provincially significant wetlands)									Flooding of and drainage through marsh expected to be maintained
Other (specify): Shoreline Processes and Features									Ecological degradation will progress

TABLE 7. ALTERNATIVE FOUR - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Land Use, Resource Management Considerations									
Access to trails or inaccessible areas (land or water)				■					Removal and/ or creation of trails are not proposed
Obstruct navigation				■					No effect on conservation area navigation expected
Other resource management projects				■					None
Traffic patterns or traffic infrastructure				■					No effect on traffic patterns or infrastructure expected
Recreational importance – public or private			■						Disappearance of marsh will decrease the aesthetics and view
Create excessive waste materials				■					Creation of waste material not expected
Commit a significant amount of a non-renewable resource (e.g. aggregates, agricultural land)				■					Non-renewable resources will not be required
Noise levels				■					Post-construction, noise levels will return to its original levels
Views or aesthetics			■						Marsh will appear degraded
Be a precondition or justification for implementing another project				■					None
Adjacent or nearby uses, persons or property			■						Marsh will continue to degrade
Other (specify)									
Social, cultural, and Economic Considerations									
Cultural heritage resources – including archaeological sites, built heritage, and cultural heritage landscapes				■					No cultural heritage resources identified on Rattray Marsh
Displace people, businesses, institutions, or public facilities				■					No displacement is proposed
Community character, enjoyment of property, or local amenities				■					Rattray Marsh will be restored to a healthy dynamic ecosystem
Increase demands on government services or infrastructure				■					No increase in demands on government services or infrastructure expected
Public health and/or safety				■					No effect on public health and/ or safety expected

TABLE 7. ALTERNATIVE FOUR - ENVIRONMENTAL SCREENING CRITERIA (cont'd)

	Rating of Potential Net Effect								Comments, Rationale
	- H	- M	- L	Nil	Unk	+ L	+ M	+H	
Social, Cultural, and Economic Considerations									
Local, regional or provincial economics or businesses									No effect on economics or businesses expected
Tourism values (e.g. resource-based tourist lodge)									Rattray Marsh will be restored to a healthy dynamic ecosystem
Other (specify)									
Aboriginal Considerations									
First Nation reserves or communities									No effect on First Nation reserves or communities expected
Spiritual, ceremonial, or cultural sites									No effect on spiritual, ceremonial, or cultural sites expected
Traditional land or resources used for harvesting, activities									No effect on traditional land or resources used for harvesting expected
Aboriginal values									No effect on
Lands subject to land claims									It was confirmed that there are no First Nation land claims submitted to the Government of Ontario that will have impact on Rattray Marsh
Other (specify)									

10.0 Environmental Analysis Summary

An Environmental Analysis Summary is completed for each alternative using Table 3.1 – Environmental Screening Criteria of *A Class Environmental Assessment for MNR Resource Stewardship and Facility Development Projects (OMNR, 2003)*. The following information is included in each summary:

1. An identification of the environmental effects and their estimated significance;
2. An indication of the potential for mitigation of the environmental effects;
3. An estimation of the effectiveness of the alternative to meet its intended purpose;
4. An estimation of the cost and feasibility of carrying out the alternative; and
5. The monitoring requirements of the alternatives.

10.1 Alternative One

Environmental Effects and Significance

This alternative has received eighteen (18) positive scores, one (1) unknown, and twenty-one (21) nil. This alternative supports the Sheridan Creek Watershed Study.

Potential Mitigation of Environmental Effects

This alternative can be modified to include special management programs to recover species and increase diversity, as well as to score higher in the Natural Environment Considerations component. Sediment removal has the potential to have a negative impact on species habitats. Proper study must be conducted and precaution must be taken prior to selecting areas for sediment removal.

Summary of Concerns

The concerns expressed by the Rattray Marsh Steering Committee centered around the natural environment. There was fear that the sediment removal operations will disturb and negatively impact the existing species habitats in the marsh bottom. There was also comment that the weir will not be discreet or natural looking within the landscape. This issue can be addressed again during the design development stage.

Estimated Effectiveness

When considering the alternatives, the effectiveness of the concepts was evaluated based on Section 2.1 Natural Heritage of the Ontario Provincial Policy Statement:

2.1 NATURAL HERITAGE

2.1.7 Natural features and areas shall be protected for the long term.

2.1.8 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among

natural heritage features and areas, surface water features and ground water features.

2.1.9 Development and site alteration shall not be permitted in:

d) Significant habitat of endangered species and threatened species;
e) Significant wetlands in Ecoregions 5E, 6E and 7E; and
f) Significant coastal wetlands.

2.1.10 Development and site alteration shall not be permitted in:

e) Significant areas of natural and scientific interest

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

2.1.11 Development and site alteration shall not be permitted in fish habitat expect in accordance with provincial and federal requirements.

2.1.12 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

And on the Rattray Marsh Steering Committee's vision, goal, and objectives:

Goal:
To restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species. In a healthy marsh there would be very little area that did not support lush growth of aquatic plants most of the time. Shallow areas would have emergent plants and deeper areas would have submergent plants. The water would be clear and the deeper areas would have lots of young fish, sunfish, minnow, bass, and some larger fish like pike. In the shallows, there would be lots of frogs and turtles, and in the air there would be lots of different kinds of dragonflies and insect-eating birds.

Objectives:
- *To optimize the diversity of indigenous marsh species which occupy or utilize the area.*
- *To reduce/eliminate nuisance species, invasives, and/or exotics.*
- *Where possible, to provide for populations large enough to provide genetic diversity.*
- *To provide specialized habitat for species which move in temporarily from Lake Ontario, Sheridan Creek, or on migration.*
- *To provide appropriate connections to the Sheridan Creek Watershed and the Lake Ontario Shoreline to allow for the movement of desirable plants and animals.*

- *To use the marsh restoration process to foster an understanding and appreciation of the attributes of Great Lakes Coastal Marshes and specifically Rattray Marsh.*

Alternative one fulfills the Ontario Provincial Policy Statement and the Rattray Marsh Steering Committee's vision, goal, and objectives, therefore, will be moving further into the study.

Estimated Cost and Feasibility

The cost of sediment removal alone for this alternative was estimated to be approximately $500,000.00.

Monitoring Requirements

Monitoring will be conducted by community groups and agencies at least until the site has become stable and vegetation is established.

10.2 Alternative Two

Environmental Effects and Significance

This alternative has received fifteen (15) positive scores, two (2) negative score, and twenty-three (23) nil. This concept does not require proposed works to take place to the Sheridan Creek Watershed.

Potential Mitigation of Environmental Effects

This alternative can be modified to include special management programs to recover species and increase diversity, as well as to score higher in the Natural Environment Considerations component. The levees will obstruct the natural water movement and re-circulations zones.

Summary of Concerns

The concerns expressed during the Third Steering Committee Meeting centered on the obstruction of natural water flow and movement into the marsh area, which in turn would obstruct the natural dynamism of the creek and marsh.

Estimated Effectiveness

When considering the alternatives, the effectiveness of the concepts was evaluated based on Section 2.1 Natural Heritage of the Ontario Provincial Policy Statement:

2.1 NATURAL HERITAGE

2.1.13 Natural features and areas shall be protected for the long term.

2.1.14 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where

possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.15 Development and site alteration shall not be permitted in:

g) Significant habitat of endangered species and threatened species;
h) Significant wetlands in Ecoregions 5E, 6E and 7E; and
i) Significant coastal wetlands.

2.1.16 Development and site alteration shall not be permitted in:

e) Significant areas of natural and scientific interest

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

2.1.17 Development and site alteration shall not be permitted in fish habitat expect in accordance with provincial and federal requirements.

2.1.18 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

And on the Rattray Marsh Steering Committee's vision, goal, and objectives:

Goal:
To restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species. In a healthy marsh there would be very little area that did not support lush growth of aquatic plants most of the time. Shallow areas would have emergent plants and deeper areas would have submergent plants. The water would be clear and the deeper areas would have lots of young fish, sunfish, minnow, bass, and some larger fish like pike. In the shallows, there would be lots of frogs and turtles, and in the air there would be lots of different kinds of dragonflies and insect-eating birds.

Objectives:
- *To optimize the diversity of indigenous marsh species which occupy or utilize the area.*
- *To reduce/eliminate nuisance species, invasives, and/or exotics*
- *Where possible, to provide for populations large enough to provide genetic diversity.*
- *To provide specialized habitat for species which move in temporarily from Lake Ontario, Sheridan Creek, or on migration.*
- *To provide appropriate connections to the Sheridan Creek Watershed and the Lake Ontario Shoreline to allow for the movement of desirable plants and animals.*

- *To use the marsh restoration process to foster an understanding and appreciation of the attributes of Great Lakes Coastal Marshes and specifically Rattray Marsh.*

This alternative will have a negative impact on the natural features or ecological function of the marsh. Rattray Marsh is a baymouth bar coastal wetland. By vegetating and stabilizing the levees Sheridan Creek will flow through to the lake restricting the natural process of the beach barrier changing periodically from a barrier to flow and at times breach from allowing surface flow to and from the lake. This alternative also was not able to satisfactorily achieve the Rattray Marsh Steering Committee's vision, goal, or objectives.

Estimated Cost and Feasibility

Since the concept was eliminated by the Rattray Marsh Steering Committee, cost was never calculated nor examined.

Monitoring Requirements

No monitoring requirements were analyzed on the basis of elimination from feasible alternatives but it may be assumed that they would resemble those outlined in the section entitled Preferred Alternative.

10.3 Alternative Three

Environmental Effects and Significance

This alternative has received twelve (12) positive scores, and twenty-eight (28) nil. This concept does not require proposed works to take place to the Sheridan Creek Watershed.

Potential Mitigation of Environmental Effects

Sediment removal has the potential to have a negative impact on species habitats. Proper study must be conducted and precaution must be taken prior to selecting areas for sediment removal.

Summary of Concerns

Alternative three is similar to the "Do Nothing" concept. Little restoration work will take place.

Estimated Effectiveness

When considering the alternatives, the effectiveness of the concepts was evaluated based on Section 2.1 Natural Heritage of the Ontario Provincial Policy Statement:

2.1 NATURAL HERITAGE

2.1.19 Natural features and areas shall be protected for the long term.

2.1.20 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.21 Development and site alteration shall not be permitted in:

j) Significant habitat of endangered species and threatened species;
k) Significant wetlands in Ecoregions 5E, 6E and 7E; and
l) Significant coastal wetlands.

2.1.22 Development and site alteration shall not be permitted in:

e) Significant areas of natural and scientific interest

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

2.1.23 Development and site alteration shall not be permitted in fish habitat expect in accordance with provincial and federal requirements.

2.1.24 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

And on the Rattray Marsh Steering Committee's vision, goal, and objectives:

Goal:
To restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species. In a healthy marsh there would be very little area that did not support lush growth of aquatic plants most of the time. Shallow areas would have emergent plants and deeper areas would have submergent plants. The water would be clear and the deeper areas would have lots of young fish, sunfish, minnow, bass, and some larger fish like pike. In the shallows, there would be lots of frogs and turtles, and in the air there would be lots of different kinds of dragonflies and insect-eating birds.

Objectives:
- *To optimize the diversity of indigenous marsh species which occupy or utilize the area.*
- *To reduce/eliminate nuisance species, invasives, and/or exotics.*
- *Where possible, to provide for populations large enough to provide genetic diversity.*
- *To provide specialized habitat for species which move in temporarily from Lake Ontario, Sheridan Creek, or on migration.*

- *To provide appropriate connections to the Sheridan Creek Watershed and the Lake Ontario Shoreline to allow for the movement of desirable plants and animals.*
- *To use the marsh restoration process to foster an understanding and appreciation of the attributes of Great Lakes Coastal Marshes and specifically Rattray Marsh.*

This alternative will not protect the natural features and areas of the marsh for the long term. Installation of silt traps will prevent further sedimentation, however, other toxins in urban runoff will continue to contaminate the marsh. This alternative also was not able to satisfactorily achieve the Rattray Marsh Steering Committee's vision, goal, or objectives.

Estimated Cost and Feasibility

The cost of sediment removal alone for this alternative was estimated to be approximately $500,000.00.

Monitoring Requirements

No monitoring requirements were analyzed on the basis of elimination from feasible alternatives but it may be assumed that they would resemble those outlined in the section entitled Preferred Alternative.

10.4 Alternative Four

Environmental Effects and Significance

This alternative has received zero (0) positive scores, seventeen (17) negative scores, and twenty-three (23) nil. This concept consists of no work to restore the health of Rattray Marsh.

Potential Mitigation of Environmental Effects

N/A

Summary of Concerns

This alternative promotes the continuation of the ecological degradation Rattray Marsh is currently experiencing.

Estimated Effectiveness

When considering the alternatives, the effectiveness of the concepts was evaluated based on Section 2.1 Natural Heritage of the Ontario Provincial Policy Statement:

2.1 NATURAL HERITAGE

2.1.25 Natural features and areas shall be protected for the long term.

2.1.26 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

2.1.27 Development and site alteration shall not be permitted in:

m) Significant habitat of endangered species and threatened species;
n) Significant wetlands in Ecoregions 5E, 6E and 7E; and
o) Significant coastal wetlands.

2.1.28 Development and site alteration shall not be permitted in:

e) Significant areas of natural and scientific interest

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

2.1.29 Development and site alteration shall not be permitted in fish habitat expect in accordance with provincial and federal requirements.

2.1.30 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

And on the Rattray Marsh Steering Committee's vision, goal, and objectives:

Goal:
To restore Rattray Marsh to a healthy, dynamically stable ecosystem of appropriate indigenous species in a healthy marsh there would be very little area that did not support lush growth of aquatic plants most of the time. Shallow areas would have emergent plants and deeper areas would have submergent plants. The water would be clear and the deeper areas would have lots of young fish, sunfish, minnow, bass, and some larger fish like pike. In the shallows, there would lots of frogs and turtles, and in the air there would be lots of different kinds of dragonflies and insect-eating birds.

Objectives:
- *To optimize the diversity of indigenous marsh species which occupy or utilize the area.*
- *To reduce/eliminate nuisance species, invasives, and/or exotics.*
- *Where possible, to provide for populations large enough to provide genetic diversity.*
- *To provide specialized habitat for species which move in temporarily from Lake Ontario, Sheridan Creek, or on migration.*

- *To provide appropriate connections to the Sheridan Creek Watershed and the Lake Ontario Shoreline to allow for the movement of desirable plants and animals.*
- *To use the marsh restoration process to foster an understanding and appreciation of the attributes of Great Lakes Coastal Marshes and specifically Rattray Marsh.*

This alternative is not a solution to restore the health of Rattray Marsh according to the Ontario Provincial Policy Statement and the vision, goal, and objectives of the Rattray Marsh Steering Committee.

Estimated Cost and Feasibility

The estimated cost of the "Do Nothing" alternative would be zero capital expenses and there would be no increase in maintenance costs associated with this alternative.

Monitoring Requirements

There are no anticipated monitoring requirements of the "Do Nothing" alternative.

11.0 Project Evaluation

The potential of achieving the project goal for each alternative was examined in terms of their overall effectiveness, potential environmental effects, estimated preliminary cost, if applicable, and feasibility. The project evaluation is featured in Table 8.

TABLE 8. PROJECT EVALUATION

	Overall Effectiveness Satisfies Policy, Vision, Goals, and Objectives?	**Potential Environmental Effects**	**Estimated Preliminary Cost**	**Feasibility** Continue Further in Study?
Alternative One	YES	Potential negative impact on species habitat during sediment removal. Ongoing management required. Dependent on Watershed Improvement	Sediment Removal ~ $500,000.00	YES
Alternative Two	NO	Natural re-circulation zones will be obstructed by levees. Restricts the natural process of the beach barrier.	N/A	NO
Alternative Three	NO	Potential negative impact on species habitat during sediment removal. Toxins will continue to contaminate marsh. Ongoing management required.	Sediment Removal ~ $500,000.00	NO
Alternative Four	NO	ecological degradation will continue	$0	NO

Step 3 – Evaluation and Project Selection

12.0 Evaluation and Project Selection Process

In consultation with the project proponent (OMNR), the District Manager evaluates and compares the proposed project and its alternatives to and methods. The evaluation is based on desired goals of restoration, potential environmental effects, and finally cost effectiveness. The evaluation also considers comments, input and concerns expressed by members of the public, affected parties and other government agencies. The District manager then determines whether to proceed with the proposed project or one of its alternatives as the Preferred Alternative.

13.0 The "Do Nothing" Alternative

If the null alternative is selected, the proposal will be dropped, deferred or redrafted to consider new alternatives. Should a viable new alternative be identified at this stage, the process will revert to step one so that the new alternative can be given due consideration with those alternatives already brought forth.

14.0 The Preferred Alternative

Four alternatives were prepared by Harrington and Hoyle Ltd. for consideration during the evaluation process. These alternatives were based on comments received from the Rattray Marsh Steering Committee, the local community, interest groups, non-government organization, and other government agencies.

Alternative One was evaluated as the Preferred Alternative with some modifications. The Preferred Alternative involves the removal of mineral soil, the biological removal of nuisance species, and the reintroduction of indigenous plant species, benthic invertebrates, and fish in Rattray Marsh. The success of this Preferred Alternative also depends greatly on proposed restoration works taking place in the Sheridan Creek Watershed. During the evaluation process there was hesitation on whether or not to include a structure at the outlet. Excluding carp from the marsh was considered by CVC to be a valuable function of a structure, however, there were some concerns with installing a weir structure: there was concern that the structure might become clogged and form a temporary dam; that a weir might be used to artificially control the marsh water levels; that a weir structure would provide a clean canvas for graffiti; and that a weir is not a naturally occurring structure in the environment. As a result, it was agreed that a weir structure would not be proposed for initial construction. To support the adaptive management approach, however, the possibility of some form of water level control remains if it is proven that such control is required by monitoring the development of rehabilitated portions of the marsh (adaptive management) or by specific requirements arising from more detailed study of the watershed. No such structure should be considered unless both OMNR and CVC agree that it is required for the overall health of the marsh. An addendum to the ESR may be required if such a structure is contemplated.

Other temporary options such as plugging the outlet manually may be considered with MNR approval to provide contingency plans for issues such as fish stranding, sediment control or plant germination/colonization.

The Preferred Alternative was created to restore Rattray Marsh into a healthy dynamic ecosystem.

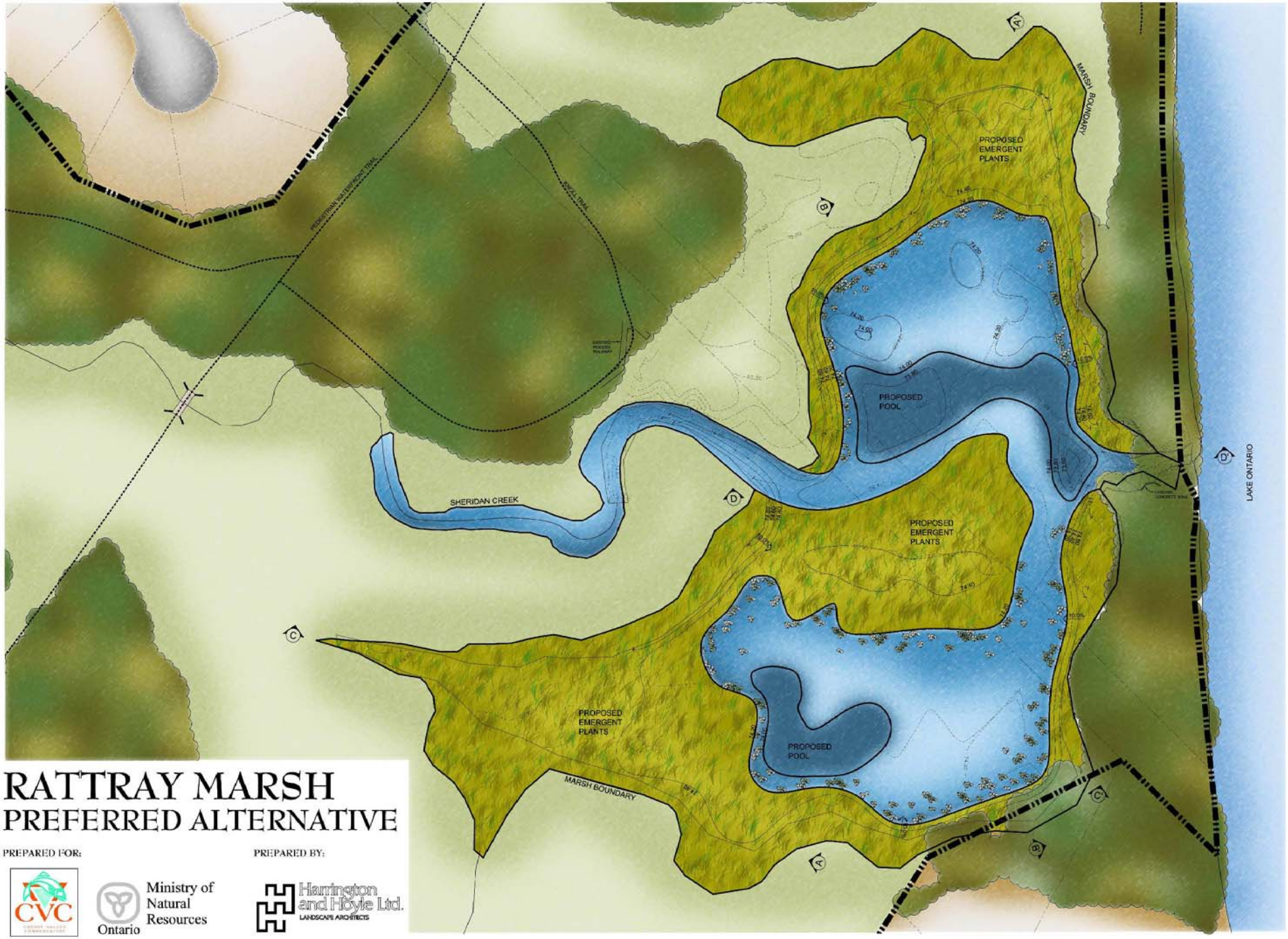


Figure 11. Rattray Marsh Preferred Alternative

Step 4 – Project Plan

15.0 Project Plan

15.1 Project Plan

The Preferred Alternative

The major refinements to the preferred alternative consisted of: the removal of mineral soil, the removal of nuisance species, and the reintroduction of indigenous plant species, benthic invertebrates, and fish in the marsh.

Construction Phasing

The preliminary grading plan, as illustrated in Figure 12, was prepared by Harrington and Hoyle Ltd. This plan was prepared using the data received from the sedimentological study for Rattray Marsh, dated April 5, 2007, and prepared by Geomorphic Solutions. The preliminary grading plan also facilitated the phasing of construction operations for the Preferred Alternative, as illustrated in Figure 13. Each phase of the project engages similar activities in different regions of the site. These activities include de-watering operations, erosion control measures, and dredging and disposal of mineral soil. Areas and quantity of mineral soil to be dredged and disposed of for all six phases are delineated below. Potential construction access points are shown in Figure 15. Detailed plant inventories, planting plans, target species lists, and construction plans will be prepared and implemented as budgets are established. Permits and approvals shall be obtained from the Credit Valley Conservation as per Ontario Regulation 160/06 and from the Department of Fisheries and Oceans Canada.

Phase	Area of Disturbance (m2)	Quantity of Mineral Soil to be Dredged and Disposed of (m3)
I	4,895	1,000
II	5,633	2,500
III	5,008	2,250
IV	6,481	3,750
V	3,621	2,000
VI	2,108	1,500

Operation

The restored marsh must be properly managed and maintained as part of the Rattray Marsh Conservation Area using the following considerations:

1. Protection, repair and restoration of the marsh
   The condition of the marsh must be monitored to ensure no activities or changes occur that could degrade its surroundings.

2. Access Control
   Access to the marsh must be managed to ensure that people do not detrimentally affect the marsh or its surroundings.

3. Public Education
   Nurture appreciation and understanding as to why restrictions and certain maintenance practices are required in the marsh must be understood by the public if the project is to be accepted and successful.

Abandonment

If such a need arises to abandon the restoration plan, a decommissioning procedure will be developed by OMNR in consultation with affected parties.

Environmental Effects

There are some concerns regarding the impacts of continued construction activities while initiating naturalization phases. With any large-scale project, short-term construction noise and reduction in aesthetic value for public visitors is unavoidable. In this case, the concern is amplified specifically because the Rattray Marsh Conservation Area attracts many visitors and is home to a number of residents within close proximity to the work site.

The newly planted vegetation is at risk if controls and/ or removal methods of nuisance species are not put in place to properly manage the potential disturbance and turbidity from the carp. Mitigation measures will address the negative effects listed. This proposal includes many major environmental benefits in the areas of fish and wildlife, cultural and natural integrity and ecological functions. However, the success of this proposal depends greatly on the implementation of restoration strategies recommended within the *Sheridan Creek Watershed Study and Impact Monitoring Characterization Report*.

Environmental Protection Measures

Silt fences are extremely effective as long as structures are maintained on a daily basis; such control measures will prevent construction activities from damaging concurrent naturalization efforts.

1. All activities, including maintenance procedures, will be controlled to prevent entry of petroleum products, debris, rubble, concrete or other deleterious substances into the water. Vehicle refueling and maintenance will be conducted at least 30 metres from the water.

2. Erosion and Sediment Control (ESC) measures will be implemented prior to and maintained during the construction phases to prevent entry of sediment into the water. These erosion and sediment control measures will be removed following construction completion and when disturbed areas have been stabilized and vegetation established.

3. The erosion and sediment control plans will not be static and may need to be upgraded/ amended as the site conditions change to prevent sediment release into the marsh.

4. Silt fences will be installed prior to commencement of construction operations and shall be maintained during all construction phases, to prevent entry of sediment into the water.

5. An extra 100m of silt fence will remain on site at all times for emergencies and modifications.

6. All silt fences shall be inspected daily and kept in good repair.

7. Should de-watering be required during construction operations, water will be discharged onto a stable, turfed or vegetated area a minimum of 30m from the marsh boundary.

8. During construction, the Contractor will monitor the weather forecast daily and will be prepared to leave the site in a stable and secure condition should water levels rise.

9. Should an unexpected storm arise, all unfixed items that would have the potential to cause a spill/pollution (i.e. fuel tanks, porta-potties, machinery) or an obstruction to flow (i.e. equipment) will be removed.

10. Any damage done to the site by flood water shall be repaired as soon as flood waters recede.

11. Dredging work to be performed during OMNR construction window.

12. All disturbed areas are to be stabilized upon completion of the work to restore the construction site.

Monitoring

Credit Valley Conservation has adopted and initiated baseline monitoring using the Coastal Wetlands Monitoring Protocol in partnership with Environment Canada.

Caveat

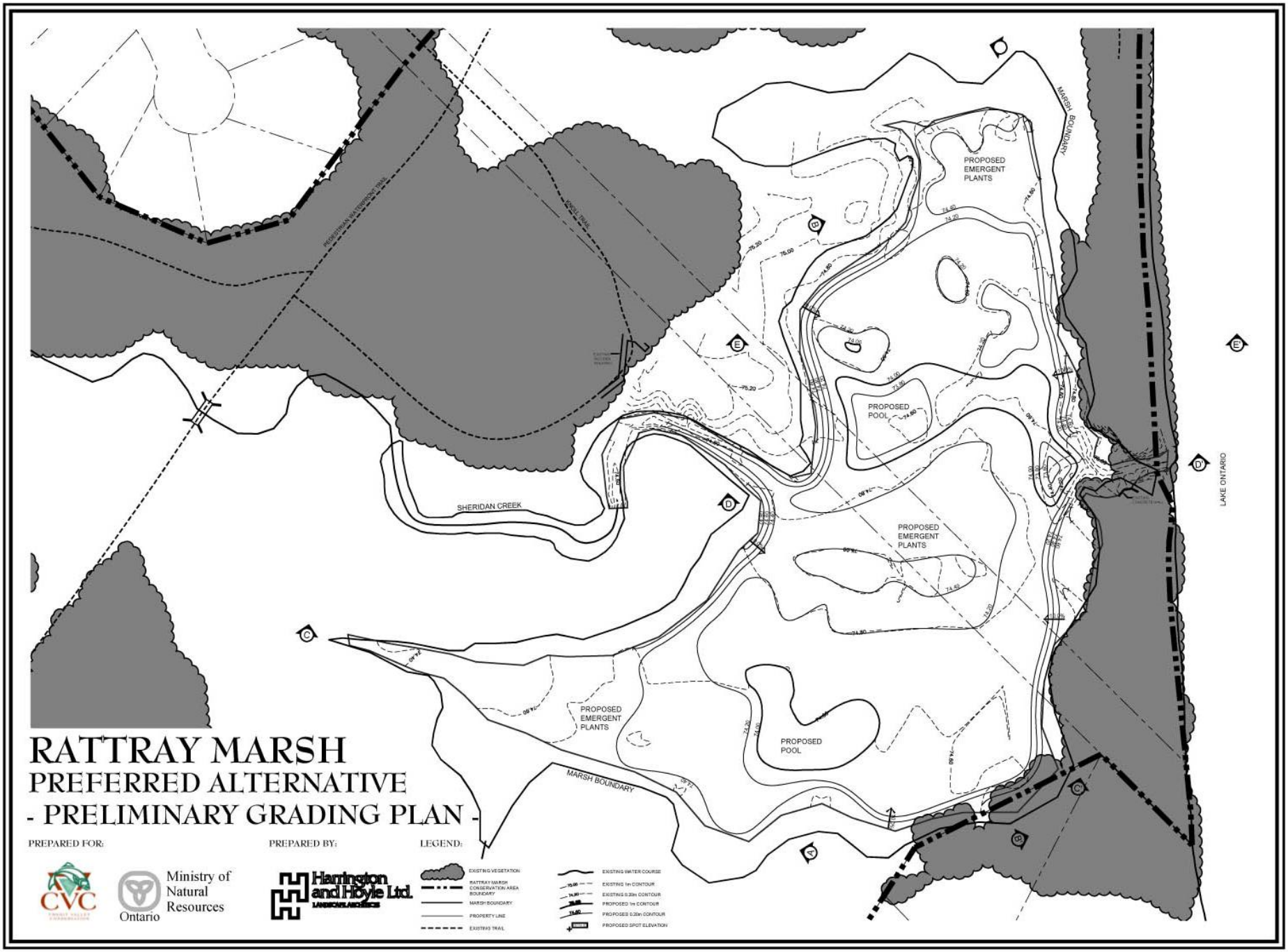
The need to address "emergency" issues such as fish stranding or contingency sediment controls and short term objectives such as manipulating water levels to control or encourage plant species colonization were not discussed. Options such as plugging the outlet manually may be considered with MNR approval to provide contingency plans for these issues.

The recommendations of the project plan are based on the best available information and methods in relation to restoration of coastal wetlands. Should unforeseen significant adverse environmental effects arise, as a result of climate change, watershed hydrology or species management plans, elements of the project plan may be revisited in order to allow for adaptive management. An addendum process would be followed.

Maintenance

Maintenance will continue until a stable vegetative cover of healthy, indigenous plants is established.

Figure 12. Rattray Marsh Preferred Alternative – Preliminary Grading Plan



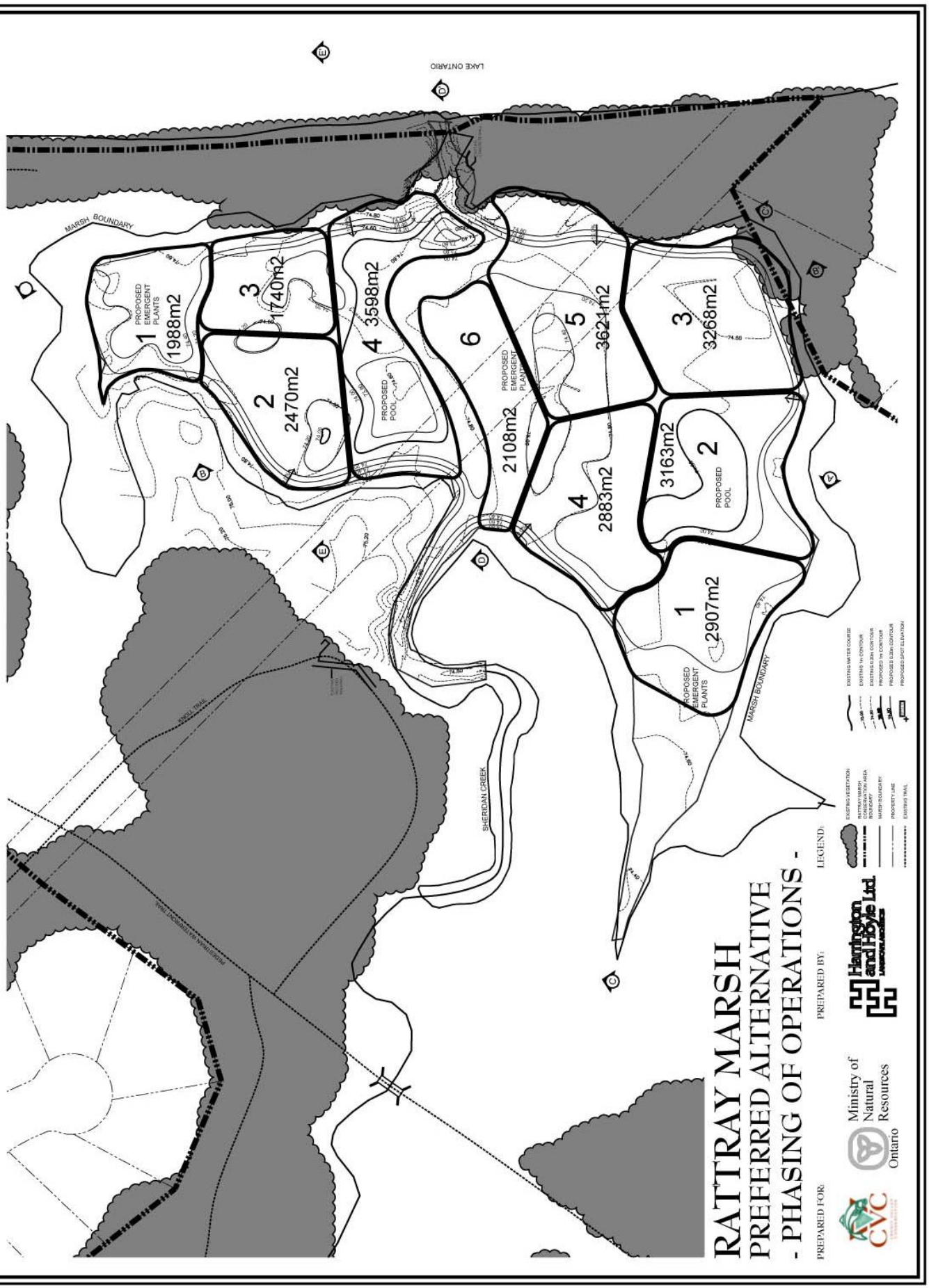
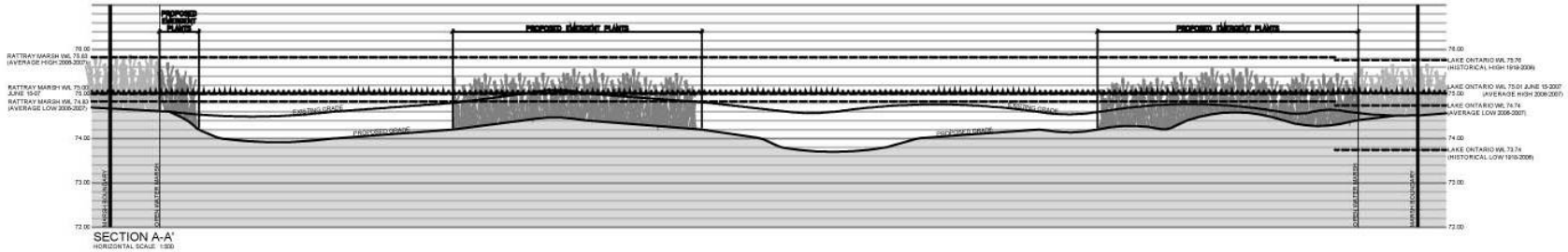
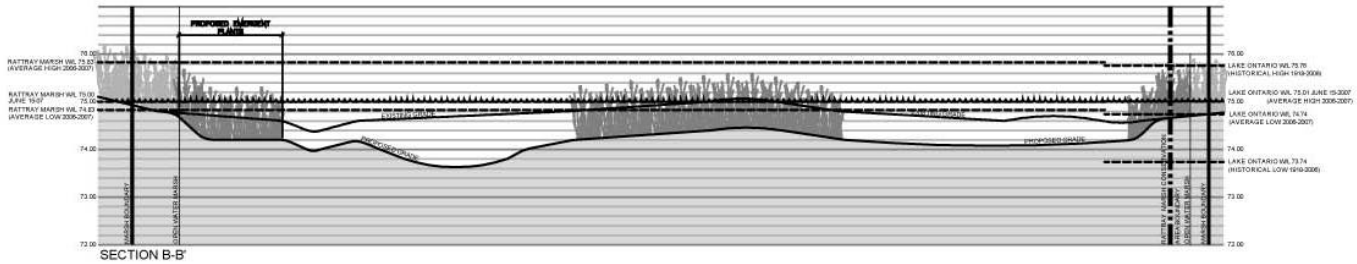
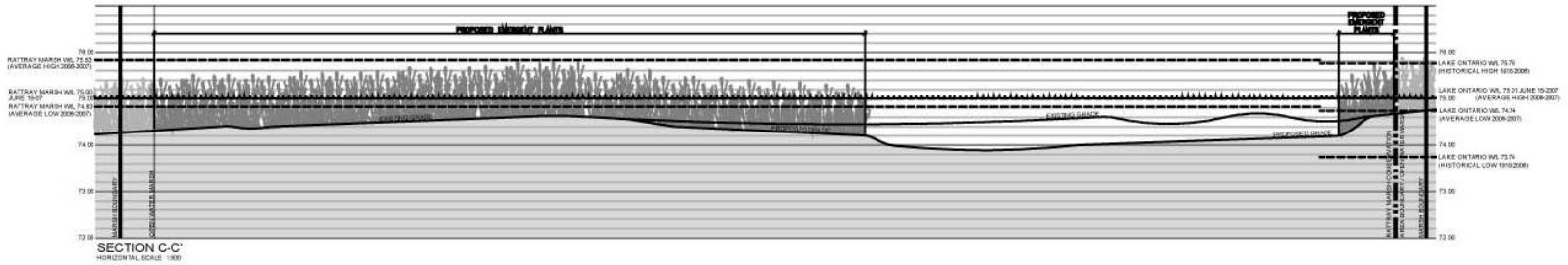


Figure 13. Rattray Marsh Preferred Alternative – Phasing of Operations

Figure 14. Rattray Marsh Preferred Alternative – Sections







RATTRAY MARSH
PREFERRED ALTERNATIVE
- SECTIONS -

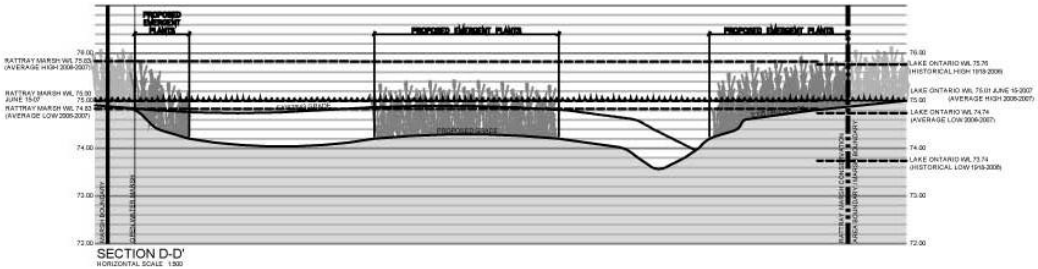
PREPARED FOR:

CVC

Ministry of Natural Resources
Ontario

PREPARED BY:

Harrington and Hoyle Ltd.
LANDSCAPE ARCHITECTS



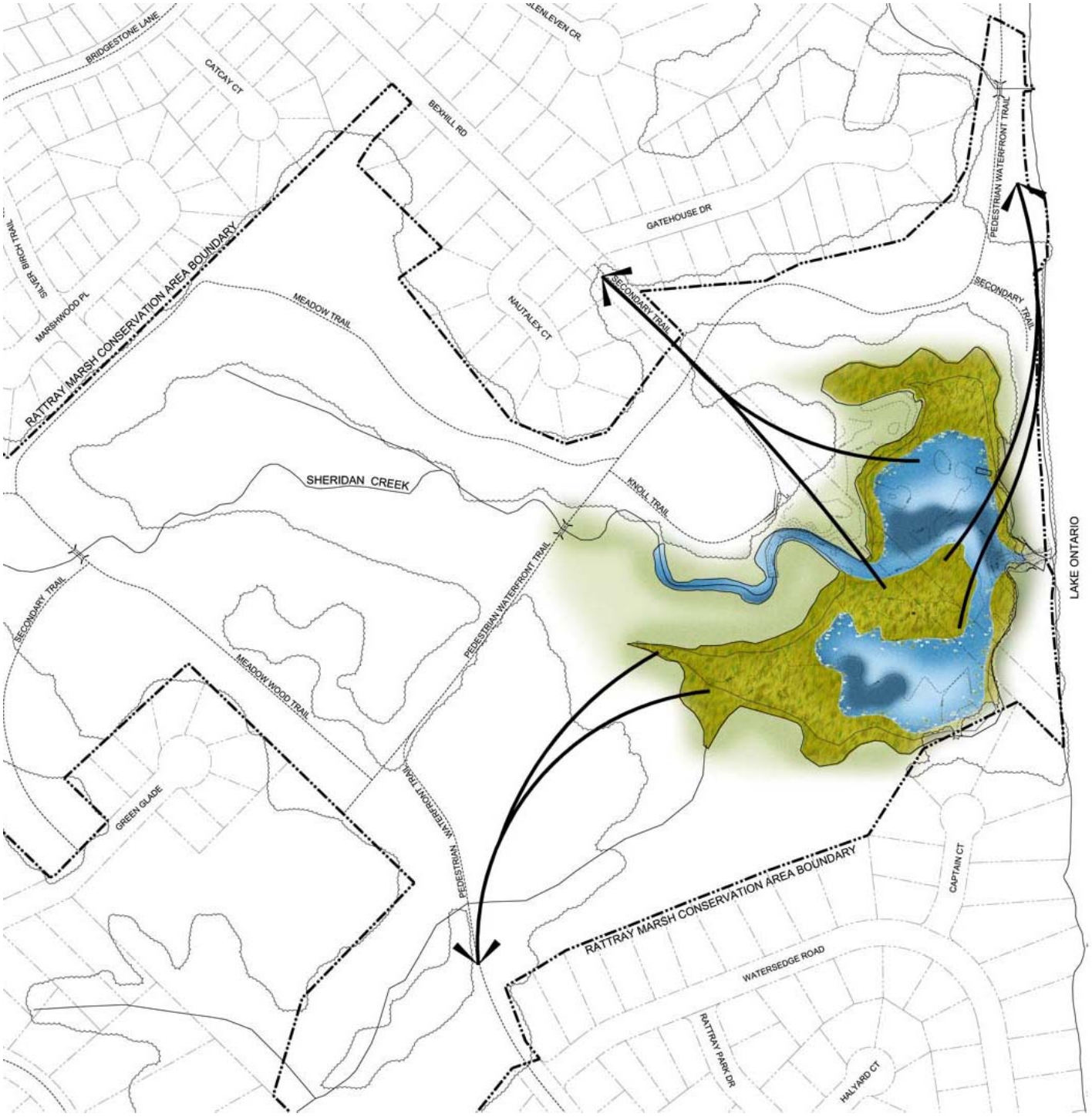


Figure 15. Rattray Marsh Preferred Alternative – Potential Construction Access Points

TABLE 9. CLASS EA PROCESS

Date	Project Component	Comments
May 25, 2007	First Steering Committee Meeting	
June 13, 2007	First Public Notice mailed to government agencies	Distributed to Ratepayers Groups, DFO, University of Toronto at Mississauga, Great Lakes sustainability Fund, Mississauga News, Ducks Unlimited, City of Mississauga with request to distribute to all departments, and the Ministry of Environment.
June 14, 2007	First Public Notice mailed to government agencies	Distributed to local school, Ontario Nature, Ministry of Culture and South Peel Naturalists' Club.
June 14, 2007 – June 28, 2007	First Public Notice advertised through signage	One Sign located on Lakeshore Road at Silver Birch Trail and another sign on Southdown Road at Truscott Drive.
June 15, 2007 – June 24, 2007	Hand delivery of First Public Notice	Distributed to landowners whose property abuts Rattray Marsh
June 18, 2007	First Public Notice mailed to government agencies	Distributed to Regional Chair of the Region of Peel.
June 19, 2007	First Public Notice mailed to government agencies	Distributed to the Region of Peel with request to distribute to relevant departments and council.
June 20, 2007	Second Steering Committee Meeting	Formation and approval of Rattray Marsh Restoration vision, goals, and objectives.
June 20, 2007	First Public Notice issued by CVC, in partnership with OMNR	Published in the Mississauga News
June 27, 2007	First Public Meeting/ Open House	Green Glade Senior Public School
July 9, 2007	First Public Notice mailed to First Nations as recommended by MAA	Distributed to Bryan LaForme of the Mississaugas of the New Credit First Nation, and Chief David General and Chief Allen McNaughton of the Six Nations.
September 10, 2007	Supplementary Steering Committee Meeting	Allowed members of the steering committee who are unable to attend daytime meetings to express their comments and input.
September 20, 2007	Third Steering Committee Meeting	Concepts discussed. Preferred Alternative decided upon.
October 29, 2007	Fourth Steering Committee Meeting	Review of the Preferred Alternative and Draft ESR.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed or emailed	Distributed to members of the public who requested notification at/ after the First Public Meeting.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed or emailed	Distributed to members of the public who attended and filled out

		the Sign-In Sheets at the First Public Meeting.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed to government agencies	Distributed to Ratepayers Groups, DFO, University of Toronto at Mississauga, Great Lakes sustainability Fund, Mississauga News, Ducks Unlimited, City of Mississauga with request to distribute to all departments, and the Ministry of Environment.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed to First Nations	Distributed to Bryan LaForme of the Mississaugas of the New Credit First Nation, and Chief David General and Chief Allen McNaughton of the Six Nations.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed	Distributed to local schools, Ontario Nature, Ministry of Culture and South Peel Naturalists' Club.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed to government agencies	Distributed to Regional Chair of the Region of Peel.
November 7, 2007	Notice to Inspect Draft ESR/ Public Meeting mailed to government agencies	Distributed to the Region of Peel with request to distribute to relevant departments and council.
November 8 – 14, 2007	Notice to Inspect Draft ESR/ Public Meeting issued by CVC, in partnership with OMNR	Published in the Mississauga News
November 15 – 21, 2007	Notice to Inspect Draft ESr/ Public Meeting advertised through signage	Sign located at the northwest corner of Southdown Road and Truscott
November 19 – 21, 2007	Notice to Inspect Draft ESR/ Public Meeting advertised through signage	Sign located on the south side of Lakeshore Road, west of Silverbirch
November 21, 2007	Second Public Meeting/ Open House	Green Glade Senior Public School

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Figure References

Figure 1. Rattray Marsh Study Area
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Figure 2. Common Carp Found at Rattray Marsh – Invasive Non-Indigenous Species
Photograph Taken By Harrington & Hoyle Ltd. June 15, 2007.

Figure 3. Location Map
Google Earth Pro. *Rattray Marsh* [map]. (2007). Scale undetermined; generated by First Base Solutions, Europa Technologies, & Navteq. Using Google Earth. (October 7, 2008)

Figure 4. Environmental Areas Map
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Figure 5. Map of the Sheridan Creek Watershed
Ontario Centre for Environmental Technology Advancement (OCETA). (2007). *Sheridan Creek Keymap.* http://www.oceta.on.ca/workshops/oceta_cvc/images/Sheridan_Creek_with_keymap.jpg

Figure 6. Rattray Marsh Air Photo
City of Mississauga. (2006). *Aerial Photography*. http://www6.mississauga.ca/eMaps/(vqdtone3z2rxzw45yox3um2t)/

Figure 7. Alternative One
Created by Harrington & Hoyle Ltd. August 2007

Figure 8. Alternative Two
Created by Harrington & Hoyle Ltd. August 2007

Figure 9. Alternative Three
Created by Harrington & Hoyle Ltd. September 2007

Figure 10. Alternative Four
Created by Harrington & Hoyle Ltd. September 2007

Figure 11. Rattray Marsh Preferred Alternative
Created by Harrington & Hoyle Ltd. October 2007

Figure 12. Rattray Marsh Preferred Alternative - Preliminary Grading Plan
Created by Harrington & Hoyle Ltd. June 2009

Figure 13. Rattray Marsh Preferred Alternative - Phasing of Operations
Created by Harrington & Hoyle Ltd. June 2009

Figure 14. Rattray Marsh Preferred Alternative - Sections
Created by Harrington & Hoyle Ltd. June 2009

Figure 15. Rattray Marsh Preferred Alternative - Potential Construction Access Points
Created by Harrington & Hoyle Ltd. November 2007

APPENDICES

APPENDIX A
Designation

APPENDIX B
Biological Data

APPENDIX C
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APPENDIX D
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APPENDIX F
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APPENDIX H
Newspaper Clippings

APPENDIX I
Public Open House Materials and Proceedings, June 2007

APPENDIX J
Public Correspondence

APPENDIX K
Agency Correspondence Concerning Aboriginal Affairs

APPENDIX L
Concept Development

APPENDIX M
Public Open House to Inspect Draft ESR, November 2007