MASTER PLAN UPDATE 2005

Westminster Ponds / Pond Mills Environmentally Significant Area

ACKNOWLEDGEMENTS

The Westminster Ponds / Pond Mills Environmentally Significant Area Master Plan update was developed by dedicated individuals who have contributed many hours to establish guidelines for preserving this environmental area for future generations. These people continue an 80-year legacy of people working to preserve and enjoy this Environmentally Significant Area (ESA) located in the heart of London.

A special thanks to the specific individuals and organizations represented on the Local Advisory Committee:

Karen Auzins - Rotary Club of London West
Bonnie Bergsma - City of London
Hugh Casbourn - McIlwraith Field Naturalists
Ron Challis - Labour Council
Will Cook - Millbank Villas
Steve Couture - Western Ontario Fish and Game Protective Association (Alternate)
David Crockett - London Health Sciences Centre
Brenda Gallagher - Upper Thames River Conservation Authority
Stan Gibbs - Western Ontario Fish and Game Protective Association
Gary Kay - Global Action Plan
Catherine Kurucz - Thames Valley District School Board
Jack Lorimer - McIlwraith Field Naturalists
Andrew Macpherson - City of London
Jim Mahon - Neighbour
Cheryl Miller - City of London Ward 5 Councillor
Bob McLeod - Neighbour
Steve Sauder - Upper Thames River Conservation Authority
Alex Shivas - Upper Thames River Conservation Authority
Tara Tchir - Upper Thames River Conservation Authority
Dave Wake - McIlwraith Field Naturalists
Barbara Wyatt-Chiodo - Westminster / Pond Mills Environmental Education Centres

A special thanks also to Dr. W. Judd and Elisabeth Fritz for the historical perspectives, continuing support and dedication to the Westminster Ponds / Pond Mills Environmentally Significant Area (ESA).

Thank you to the ESA Team for sharing their experience and knowledge of the Westminster Ponds / Pond Mills ESA. The ESA Team is comprised of UTRCA staff who work in cooperation with the City of London to manage the six publically-owned (City and UTRCA owned) ESAs including Sifton Bog, Kilally, Warbler Woods, Westminster Ponds / Pond Mills, Medway and Meadowlily. The main responsibilities of the ESA Team are education, risk management, encroachment and enforcement. This team is responsible for implementing many of the management recommendations that develop from the Westminster Ponds / Pond Mills Master Plan.

Thank you to the staff of the Upper Thames River Conservation Authority who shared their expertise in developing and editing this Master Plan update. A special thanks to Phil Simm who developed the numerous maps for the Master Plan update.

Finally, thank you to the City of London for the financial assistance and staff support for this project.

EXECUTIVE SUMMARY

Significance

Westminster Ponds / Pond Mills Environmentally Significant Area (ESA) is the largest natural area in the City of London, covering approximately 250 hectares (618 acres). The ESA contains the Westminster Ponds area (including Saunders Pond, Spettigue Pond and Tumbleson Pond) in the west, the Pond Mills area (including North Pond and South Pond) in the east, and the Dayus Creek Valley (including Thompson Pond) in the centre (Map 1). The ESA is significant for its size, rich variety of natural habitats, rolling topography and unique "kettle" ponds, all within an urban setting.

Most of the Westminster Ponds / Pond Mills ESA is owned by the City of London (Map 2). Smaller portions are owned by the London Health Sciences Centre (LHSC), the Upper Thames River Conservation Authority (UTRCA), the Western Ontario Fish and Game Protective Association, and other private landowners. The publicly owned property is managed by the UTRCA.

The ESA's land formations were created during the glacial retreat of the Huron and Erie ice sheets more than 12,000 years ago. The kettle ponds were created when large blocks of ice were left behind by the glaciers, creating permanent depressions that filled with water. The ESA's five major ponds and numerous smaller ponds are the best examples of kettle ponds remaining in the London area. The deep, cool ponds are fed by surface runoff.

The varied topography and drainage of the ESA support an exceptionally rich flora. The dry ridges between the kettle ponds have a typical Sugar Maple hardwood forest, with a mixture of several other tree species including ashes, oaks, hickories, Basswood, Hop-hornbeam, American Beech and Black Cherry. The low wet areas between the ridges support an entirely different type of forest with Red Maple, Yellow Birch, Silver Maple and White Elm. The ESA includes a marsh, swamp, and bog complex that is a Provincially Significant Wetland (PSW).

The shrub thickets and herbaceous plants are even more varied than the forests. The cool, wet, shady Red Maple swamps are home to several plants that are more common in northern locations, such as Gold Thread, Bluebead Lily, and various ferns and mosses. Southern species such as dogwoods and hickories can often be found growing close by.

In addition to its unusual and representative vegetation communities, the Westminster Ponds / Pond Mills ESA is also recognized as valuable habitat for wildlife; including fish, insects and migrating waterfowl. The area attracts a large number of wildlife species because of the diverse vegetation and the presence of the ponds.

Process

The Westminster Ponds / Pond Mills ESA Master Plan update has been completed collaboratively by the City of London, the UTRCA, and interested community organizations and individuals. At a community meeting in May 2003, 65 people gave input into issues, concerns and opportunities for Westminster Ponds / Pond Mills ESA. From this meeting a Local Advisory Committee (LAC) was formed.

The strength of the planning process was the 21- member LAC. This committee helped develop the mission, guiding principles, goals & objectives, criteria for decision-making, and recommendations for the update of the Master Plan. The LAC members, representing 13 different organizations, worked together from September 2003 to August 2004. The UTRCA provided technical information, including past reports and newly completed studies.

The Westminster Ponds / Pond Mills Environmentally Significant Area Master Plan Update was presented to and approved by the City of London Planning Committee on June 20, 2005. Planning Committee sent the following report to Municipal Council:

> That, on the recommendation of the General Manager of Planning and Development, the Westminster Ponds / Pond Mills Environmentally Significant Area Master Plan Update BE APPROVED; it being noted the Planning Committee heard a presentation from S. Sauder and T. Tchir from the Upper Thames River Conservation Authority;
>
> it being pointed out that at the public participation meeting associated with this matter, [two] individuals [representing the London Coalition Against Pesticides] made an oral submission … noting that while they generally support the Plan, there should be revisions to ensure that alternatives to the use of pesticides or herbicides are explored and built into the final recommendations [and] … requesting further information with respect to the proposed use of herbicides in the Ponds area and requesting that there be a provision for the ongoing monitoring of any test areas or that interested City residents be utilized to assist with the manual removal of unwanted vegetation.

Municipal Council adopted the Planning Committee's report on June 27, 2005, with the following amendment added to the end of the first paragraph:

> it being further noted that the Upper Thames River Conservation Authority is encouraged to work with volunteers for the purpose of manually removing unwanted vegetation in the subject area to avoid, wherever possible, the use of herbicides.

Results

More than 30 reports were reviewed and incorporated into the Master Plan update. An inventory of vegetation communities was also completed for the entire ESA. Studies of the ESA have found:

- more than 200 vegetation communities
- 757 species of vascular plants, including 30 that are nationally and/or provincially rare, and 60 % of the plant species found in Middlesex County
- over 200 species of birds
- 19 species of fish
- 14 species of amphibians
- nine species of reptiles
- numerous insect species

Seventeen maps have been created to support the background information and guide decision-making for the future including: the study area, vegetation communities, water well locations, ESA boundaries, property ownership, Carolinian Canada zone, naturalization recommendations and trail recommendations.

Over 85 recommendations have been developed to guide decision-making and the budget for Westminster Ponds / Pond Mills ESA over the next ten years. All recommendations have been written in collaboration with the LAC based upon the best technical information available. Implementation of the recommendations will go a long way toward fulfilling the new mission statement:

The City of London, the UTRCA, and community partners will preserve the ecological integrity of Westminster Ponds / Pond Mills Environmentally Significant Area while providing compatible educational and recreational opportunities.

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1.0 THE WESTMINSTER PONDS/POND MILLS ESA MASTER PLAN UPDATE

1.1 Study Area

The Westminster Ponds / Pond Mills Ecologically Significant Area (ESA) is located near the centre of the City of London, Ontario near the southern boundary of the Upper Thames River watershed (see the red outline on the location map insert of Map 1). The ESA is situated between 42-46' 37" N and 42- 47' 43" N latitude and between 81- 10' 04" W and 81-7' 47" W longitude. The ESA is an irregularly shaped parcel and is approximately 4 km wide east to west and 2 km long north to south. It extends from Wellington Road on the west to just east of Highbury Avenue, and from Commissioners Road East on the north to just south of Southdale Road East and Bradley Avenue (Map 1). For the purpose of the Master Plan update and to place the natural area in a wider context, the study area will include all lands within the four roads bounding the natural area as well as all lands within 1 km of the roads.

The six main ponds found in the ESA are:
1. Spettigue Pond
2. Saunders Pond: also known as Griffiths Pond, Walkers Pond, Kidney Pond
3. Tumbleson Pond: also known as Western Ontario Fish and Game Pond, Nixons Bog Pond, Lucans Pond, South Walkers Pond, Fishermans Pond, South Pond
4. Thompson Pond
5. North Pond
6. South Pond

According to the current City of London Official Plan mapping, the Westminster Ponds / Pond Mills ESA area is approximately 2.5 km2 , of which 1.8 km2 is currently owned by the City of London and UTRCA (Map 2). The remaining 0.6 km2 is owned by other public and private landowners. The Westminster Ponds / Pond Mills ESA is one of the largest natural areas in the City of London.

1.2 Study Team

The Upper Thames River Conservation Authority (UTRCA) was retained in October 2002 as the primary consultants responsible for coordinating the Master Plan update. The UTRCA worked with a Local Advisory Committee (LAC) consisting of representatives from the following organizations:
- The City of London
- Global Action Plan
- Labour Council
- London Health Sciences Centre
- McIlwraith Field Naturalists
- Millbank Villas
- Neighbours
- Rotary Club of London West
- Thames Valley District School Board
- Westminster Ponds / Pond Mills Environmental Education Centres
- Western Ontario Fish and Game Protective Association

The LAC played a major role throughout the Master Plan update process. Members of the LAC represented organizations and individuals with interest in developing a long term plan for Westminster Ponds / Pond Mills ESA. The specific role of the LAC was to:

- provide feedback on technical information,
- help the UTRCA with communications, and
- help the UTRCA develop the mission statement, principles, goals and objectives, criteria for decision-making and recommendations.

Tara Tchir (UTRCA Ecologist) and Brenda Gallagher (UTRCA Vegetation Specialist) were responsible for describing the natural heritage components (aquatic and terrestrial plants and animals) of the ESA. Steve Sauder (UTRCA Communications and Marketing Specialist) was responsible for facilitation and community consultation. Philip Simm (UTRCA GIS Specialist) was responsible for producing the various maps. Alex Shivas (UTRCA Coordinator of Operations, Recreation Services and Properties) provided expertise on property and operation issues. Dan Jones, Chris White and the rest of the UTRCA ESA team shared their knowledge of management issues specific to the ESA.

1.3 Purpose of Master Plan Update

In the City of London, the Westminster Ponds / Pond Mills ESA is designated as an Environmentally Significant Area (ESA) within the hierarchy of the municipal parks system (City of London 1998). ESAs contain natural features and perform ecological functions that warrant their retention in a natural state. Such areas cannot withstand unlimited human use and must be managed following a consistent approach that preserves the features and functions of the ESA, and yet provides reasonable access and appropriate recreational opportunities to these public lands.

The original Master Plan for the area was completed by the UTRCA in 1989. With recent property acquisitions, evolving recreational demands and potential changes to habitats and species, an update was desirable. The purpose of the Master Plan update is to provide new direction for the preservation of this significant natural area while accommodating appropriate recreational activities and existing management strategies.

1.4 Planning Process

Public participation was an important component of the work undertaken on this project. A community consultation process was implemented from October 2002 to September 2004 to solicit community input.

Step 1 (October 2002): Launch Master Plan Update

- Media launch with Rotary Club of London West for the boardwalk project
- Media interviews and answering neighbour questions relating to the update
- Develop a fact sheet (Appendix A) and multi-media presentation

Step 2 (November 2002): Data Collection

- Gather resource information
- Develop a stakeholder and neighbourhood contact list

Step 3 (January 2003): Opportunity Finding

- Test draft community involvement strategy with stakeholder groups to identify possible issues and opportunities. Presentations made to and issues collected from: Environmental and Ecological Planning Advisory Committee (EEPAC), London Advisory Committee for Heritage (LACH), McIlwraith Field Naturalists,Western Ontario Fish and Game Protective Association, Westminster Ponds Advisory Committee, Rotary Club of London West, London and Middlesex Historical Society, Urban League of London, London Health Science Centre (LHSC) and St. Joseph's Health Care London (SJHC).
- Neighbour / stakeholder interviews
- Host community meeting/event on May 27, 2003 (65 people attended)
- Develop selection criteria for LAC members
- Establish LAC in September 2003 (see comments below)
- Prioritize issues and opportunities from interviews, stakeholder meetings and the community meeting

Step 4 (September 2003): Idea Finding

- Develop the mission and goals with LAC
- Host the "Doors Open London" public event at Westminster Ponds / Pond Mills ESA to communicate update process with residents of London (350 people attended)

Step 5 (November 2003): Solution Finding & Planning for Action

- Identify criteria for decision-making with LAC
- Develop objectives and recommendations with LAC

Step 6 (May 2005): Master Plan Update Finalized

- LAC review

Step 7 (June 2005): Master Plan Update Acceptance

- Presentation to Planning Committee, City of London
- Community review
- Development of collaborative funding proposals

2.0
VISION FOR THE WESTMINSTER PONDS/POND MILLS ESA

2.1 Mission Statement

The LAC and UTRCA developed the following mission statement:

The City of London, Upper Thames River Conservation Authority, and community partners will preserve the ecological integrity of Westminster Ponds / Pond Mills Environmentally Significant Area while providing compatible educational and recreational opportunities.

2.2 Guiding Principles

Six Guiding Principles were developed by the UTRCA and LAC as a tool for planning and decision-making:

- Preserve ecological integrity
- Preserve cultural integrity
- Utilize a community-based approach for planning and implementing
- Use the area wisely
- Always create opportunities for awareness and education
- Consider long term sustainability

As a further tool for planning, a list of six criteria for decision-making was developed by LAC to provide guidance in making clear, logical choices for the management of the Westminster Ponds / Pond Mills ESA

- Does the recommendation meet the Official Plan ESA criteria of the City of London?
- Does the recommendation minimize negative impacts to the most sensitive areas?
- Does the recommendation complement the goals of the Master Plan update?
- Does the recommendation provide worthwhile benefits to visitors?
- Does the recommendation have a reasonable environmental cost?
- Does the recommendation have a reasonable financial cost?

The LAC and community also developed a list of issues and challenges (Appendix B) that were considered in the Master Plan update.

2.3 Goals and Objectives

The team developed six goals and twenty-three objectives to provide more specific direction for the future management of the ESA. Goals were developed that would consider the ecological integrity in all management decisions. Objectives were developed that complement the mission, guiding principles and criteria for decision-making. Measures of success would include a reduction of negative environmental impact to the ESA while continuing to provide compatible education and recreational opportunities. Six goals and corresponding objectives were developed:

Goal 1. Maintain and Enhance Ecological Integrity

Boundary Objectives:
1. update biological information
2. update ESA boundaries
3. develop recommendations for property acquisition
4. recommend areas for increasing, maintaining, or restoring habitat through naturalization or buffers
5. develop recommendations for wildlife corridors outside of the ESA

Aquatic Objectives:
6. develop program for monitoring water quantity and quality

Invasive / Nuisance Species Objectives:
7. develop recommendations for minimizing the impact of invasive species
8. develop recommendations for minimizing negative impacts of nuisance wildlife
9. develop recommendations for West Nile Virus (WNv)

Property Objectives
10. develop recommendations for ecological succession of the closed landfill site
11. develop recommendations for the LHSC fence
12. develop recommendations for minimizing encroachment

Goal 2. Determine Compatible Uses

Objectives:
1. develop recommendations for compatible recreation within the ESA and on hospital property immediately adjacent to the ESA
2. develop recommendations for access and trail signs
3. develop recommendations for trail design
4. develop recommendations to limit the impact of domestic pets

Goal 3. Preserve and Promote Cultural Heritage

Objectives:
1. identify historical cultural features
2. develop recommendations for veterans' buildings and their relationship to the ESA

Goal 4. Engage Community Partners

Objectives:
1. create recommendations for communicating with related agencies, organizations, and neighbours
2. develop recommendations for engaging organizations and volunteers

Goal 5. Encourage Awareness and Environmental Education

Objectives:
1. develop recommendations for interpretation and education for casual users
2. develop recommendations for environmental education with school boards

Goal 6. Implement Recommendations

Objectives:
1. create an implementation plan and develop a reporting program

3.0 ECOLOGICAL DESCRIPTION OF THE ESA

Most of the ecological description is based on past scientific research by the University of Western Ontario (UWO), the UTRCA, development consultants and engineers. Inventories by naturalist groups, such as the McIlwraith Field Naturalists, are also incorporated. In 2002 / 2003, an inventory of the top four species in each vegetation layer (canopy, sub-canopy, shrub and herbaceous) was conducted by the UTRCA to verify the information. Voucher specimens were not collected in the 2002 / 2003 inventory.

3.1 Physiography and Quaternary Geology

During the Wisconsin glaciation, the whole of southwestern Ontario was covered by ice sheets. The Westminster Ponds / Pond Mills ESA was created during the glacial retreat of the Huron and Erie ice sheets starting 14,000 years ago. The Erie Lobe created the moraines of the Mount Elgin Ridges. As the glaciers melted and the ice retreated, an east-west ridge (moraine) of stony soil (till) was deposited along the retreating edge of the glacier when it ceased to move for a period of time.

The Westminster Ponds / Pond Mills ESA occurs in an area known as the Lake Simcoe - Rideau Site Region (Hills 1960). The ESA lies within the Mount Elgin Ridges (Map 3). The Mount Elgin Ridges is an area of moraine features with ridges and depressions of heavier calcareous clay soils that lies between the Thames River Valley and the Norfolk Sand Plain, covering an area of approximately 147,000ha. The soil type is similar to that of the Stratford Clay plain, but contains more sand, making it better for agricultural use.

Moraines commonly occur in parallel groups as they are deposited by the receding glacier (Map 4). The Mount Elgin Ridges consists of the Ingersoll Moraine to the north; and the Westminster, St. Thomas, Sparta and Tillsonburg Moraines to the south. The Ingersoll Moraine varies in width from 1 - 10 km and trends east from an area southwest of London. The Westminster Moraine is 5 km south of the Ingersoll Moraine and runs parallel to it. The moraines are separated by till plains. The moraines of the Mount Elgin Ridges give the region a rolling topography, which in turn controls the surface water drainage patterns. The ridges are well drained while the hollows are imperfect to poorly drained. The hollows between the ridges are important groundwater recharge areas, where the trapped surface water infiltrates into the groundwater environment.

The Westminster Ponds / Pond Mills ESA straddles the northern part of the Mount Elgin Ridges and occurs primarily on the Ingersoll Moraine, although part of the ESA also lies on the till plain between the Ingersoll Moraine on the north and the Westminster Moraine to the south (Maps 3 and 4). The Ingersoll Moraine, which reaches elevations in excess of 290 metres (Map 5), is the oldest and most northerly moraine of the Lake Erie ice lobe (Hilts and Inch 1978). The Westminster Ponds / Pond Mills ESA is a headwater complex for the Dingman Creek, largely existing on the southern portion of the Ingersoll Moraine.

Numerous small but deep ponds known as kettle ponds formed on the south side of the high east - west trending ridges when large blocks of ice broke free of the glacier, became embedded and slowly melted within the ridge of glacial material into a predominant clay substrate. When the ice blocks melted in the till material, the depressions (kettles) remained and filled with water. Kettle ponds are not common in southwestern Ontario. The Westminster Ponds / Pond Mills ESA is unique in that it contains six large kettle ponds and numerous smaller ones.

The six main ponds located in the ESA, all of which are kettle depressions, were once completely independent of each other. Now, a municipal drain between Saunders Pond and Tumbleson Pond (Map 6, Marr Drain extension #2) and a culvert between Summerside Wetland and North Pond essentially connect several of the ponds. Together, the ponds in the ESA account for most of the naturally occurring standing water in the City of London.

3.2 Vegetation Habitats Surrounding the Ponds

The Westminster Ponds / Pond Mills ESA is composed of a cluster of kettle ponds surrounded by an interesting combination of cattail marsh, swamp forest, sphagnum bog, open thicket, meadow and upland forest vegetation communities. The ESA is significant because it possesses a rich variety of natural habitats in a relatively undisturbed state, even though it is situated within the boundaries of a major urban centre. The diversity of plant species is partly explained by the location of the ESA in an area of overlap between the northern Great Lakes Forest Zone and the Carolinian Floristic Zone (Map 7), and partly by the varied topography and moisture conditions found in the Westminster Ponds / Pond Mills ESA (Map 5). The presence of water between the ridges creates a locally cool microclimate which does not normally occur in the London area.

Each of the kettle ponds in the ESA has a different form of vegetation along its shore. Dry ridges between the ponds support a typical eastern-hardwood Sugar Maple forest, with a mixture of several other tree species including ashes, oaks, hickories, Basswood, Hop-hornbeam and American Beech. Several fine specimens of Black Cherry are also present, although the absence of large trees in these areas indicates that logging undoubtedly occurred here (Small 1976). Understorey upland species include Hazelnut, Witch Hazel, an uncommon Carolinian species of Eastern Flowering Dogwood, European Buckthorn, honeysuckles, Staghorn Sumac and Wild Crab Apple. The low wet areas between the ridges support an entirely different type of forest consisting of Red Maple, Yellow Birch, Silver Maple and White Elm. Understorey lowland species are very diverse in these forests and include Red-osier Dogwood, viburnums, Glossy Buckthorn, and Elderberry.

The Westminster Ponds / Pond Mills ESA is also rich in herbaceous plants, including trilliums, violets, Bloodroot, Jack-in-the-pulpit, ferns, etc. The shaded, cool and wet Red Maple swamps provide good conditions for several plants of northern distribution including Gold Thread, Bluebead Lily, northern ferns and mosses. Approximately 60 % of the vascular plant species found in Middlesex County occur in the Westminster Ponds / Pond Mills ESA.

The ponds and adjacent lowlands are part of a Provincially Significant Wetland (PSW) and are excellent examples of the variety of wetland communities found in the County of Middlesex. Appendix C describes the communities found in Westminster Ponds / Pond Mills ESA in more detail. Map 8 shows the Ecological Land Classification (ELC) codes for the vegetation communities listed in Appendix C. Map 9 shows the Community Polygon Identification Numbers for the vegetation communities listed in Appendix C. Detailed descriptions of the vegetation communities surrounding each of the ponds are provided for the three main areas of the ESA: the Westminster Ponds area, the Dayus Creek Valley and the Pond Mills area.

3.2.1 Westminster Ponds Area

The Westminster Ponds area is located in the western half of the ESA and includes three major kettle ponds: Saunders, Tumbleson and Spettigue and the habitat surrounding

these features. The ecological communities within this area include forest, shrub, old field, wetland and aquatic (pond) communities. The upland forest communities are primarily Sugar Maple - American Beech and Sugar Maple - Red Oak forests. The shrub communities, located along the edges of forest communities, are largely dominated by hawthorns, buckthorns and several dogwood species. Old field communities are a mix of perennial grasses, a variety of herbaceous plants and scattered shrubs. These communities are found along the perimeter of the other natural communities, on disturbed sites, former lawn and agricultural lands. These communities are important to the ESA as nesting and foraging sites for grassland birds and as suitable habitat for the Northern Brown Snake. The wetland communities are primarily associated with the ponds and exist as cattail marsh communities and wooded wetland (swamp) communities.

Saunders Pond Area

Cattails, sedges and rushes are found in small marshy areas on the margin of Saunders Pond (Map 8). Surrounding the shallow marsh areas are two swamp communities separated by wet channels - a Silver Maple, White Elm and willow community, and a willow and Buttonbush swamp thicket community. A Sugar Maple - American Beech forest and a Green Ash - poplar woodland occurs in the upland areas surrounding the swamp communities. Hop-hornbeam is also found in the upland communities. Introduced (planted) species, as well as associations of Red Maple, European Buckthorn, Silver Maple and poplars, occur between Saunders Pond and Tumbleson Pond. Some of the plants were introduced into this area by W.E. Saunders and include two species of pine, Wild Crab Apple, pear and an exotic grass.

Spettigue Pond Area

Spettigue Pond is the only pond in the ESA that is still completely surrounded by woodland (Map 8). It is also the most pristine kettle pond in the ESA. It lies within an enclosed depression surrounded by steep slopes rising six to 12 metres above the pond's surface (Map 5). This encircling wall is broken by a large swampy area at the west end of Spettigue Pond and a smaller swampy area at the east end. As a result of slope and drainage conditions, the pond is surrounded by three distinct habitats: 1) the lowland (any place less than one-half metre above the pond's water level), dominated by Yellow Birch and Red Maple, 2) the slope, dominated by American Beech, oaks and Sugar Maple and 3) the upland (beyond the crest of the slope), which supports a wide variety of species (Map 8). The variation in plant communities found among these habitats is largely controlled by moisture, which in turn is affected by slope (Small 1976).

Still water and steep slopes surrounding the pond have created a locally cool microclimate, providing favourable conditions for the growth of a number of plants that are not commonly found this far south in Ontario. A floating mat of sphagnum moss encircles the pond, forming a shrub-dominated band of peat bog immediately adjacent to the open water. This area is rich in northern species such as Leatherleaf, orchids, Pitcher Plant, sundews, Tamarack and Poison Sumac, as well as numerous fern species. This wetland vegetation is highly sensitive to trampling.

Beyond the bog is a lowland forest of Yellow Birch, Silver Maple and Red Maple with Glossy Buckthorn in the understorey. The lowland forest blends with the upland forest found further up the steep slopes. The upland forest contains American Beech, Sugar Maple, Red Oak and White Oak, with an understorey of Hop-hornbeam, American Beech, Witch Hazel, serviceberries, and Chokecherry.

Beyond the crest of the slope is an upland forest of American Beech, Sugar Maple, Red Oak and White Oak, with significant quantities of Bitternut and Shagbark Hickory. The

understorey of this upland forest consists of hawthorns, Sugar Maple, White Oak, ashes, Blue-beech, Black Cherry and Chokecherry. Hawthorns are common along the edge of the forest adjacent to residences. The great variety of species found in this habitat may be indicative of more local variations in moisture conditions due to irregularities of surface terrain. Grazing may also have occurred around Spettigue Pond, as remnants of an old fence are still found in the woodlands.

Tumbleson Pond Area

Tumbleson Pond is surrounded by thickets, deciduous forest and wooded lowlands (Map 8). Vegetation immediately north of Southdale Road East is a mixture of hawthorns and aspen. An upland deciduous forest of ashes, Sugar Maple, Blue-beech and Shagbark Hickory occurs at the north end of the pond. In the lowland areas on the south side of the pond, species such as Yellow Birch and Red Maple occur.

3.2.2 Dayus Creek Valley

The Dayus Creek Valley was created by a glacial waterway that breached the moraine. It occurs in the centre of the ESA and is found on either side of the Canadian National Railway (CNR) tracks. The main pond in this area is Thompson Pond. Within the valley, long steep ridges, oriented in many different directions, lie between the ponds and the streams (Map 5). The rolling terrain and slopes are covered by meadows and old fields changing into shrub thickets and dense woodlands Map 8). Several small ponds occur in the upper (southern) end of the valley. Cattails, sedges and rushes grow in marshes and standing water throughout the valley. The topography and drainage of the valley were disturbed by construction of the railway in 1915 (see Section 4.1, Historical Description). The section of the valley adjacent to Commissioners Road was disturbed by the establishment of a sanitary landfill site in the late 1960s.

Thompson Pond Area

Recent beaver activity in Thompson Pond has changed the shape of the pond and killed off several trees. Cultural thickets on the west side of the pond (Map 8) consist of dogwoods, hawthorns, buckthorns and Chokecherry with scattered Eastern Cottonwood, willows, White Elm and ashes. Growth of water lilies is very prominent during the warm months of the year.

To the south of the pond, the wooded area is dominated by Sugar Maple, ashes, Blue-beech and Bitternut Hickory, with an understorey consisting of Sugar Maple and Chokecherry (Map 8). The other small wooded area along the northern end of the pond consists mainly of American Beech and Sugar Maple, with an understorey of Sugar Maple and Black Cherry. The ridge that juts out into the pond is covered in a tall forest of Sugar Maple, oaks and American Beech. Several Black Walnut trees are scattered throughout many of the communities on the slopes surrounding the pond. Old field communities containing a mix of perennial grasses, herbaceous plants and scattered shrubs are found on the former landfill site.

3.2.3 Pond Mills Area

The Pond Mills Area is located in the eastern part of the ESA, east of Pond Mills Road. It includes two major kettle ponds: North Pond and South Pond, and the habitat surrounding these features. The slopes surrounding the mill ponds are short (Map 5). Several small communities dominated by Black Walnut are found in this area, as well as thickets and low-lying swamp areas (Map 8). Along the northwest border of North Pond is a forest community dominated by soft maples and Black Walnut. Willows, ashes and soft maples are found along the remainder of the perimeter. South Pond is also surrounded by lowland communities made up of soft maples, ashes and willows. A large plantation of ashes, maples, and Black-locust is found on the west side of South Pond.

The Summerside Wetland, located to the east of Highbury Avenue, drains into North Pond via a culvert under Highbury Avenue. Although the area was not visited in 2002 / 2003, it was inventoried in the late 1980s in conjunction with the development approval process for the Summerside subdivision (Gartner Lee 1990). The wetland lies to the south and west of the residential development.

There are three wetland communities that lie southwest of Westminster Ponds / Pond Mills ESA. Although these communities were not visited in 2002 / 2003, they were inventoried in the late 1980s by the Ontario Ministry of Natural Resources (OMNR) as part of a wetland evaluation. One wetland is the swamp and forest habitat immediately south of Bradley Avenue and west of Highbury Avenue South. This wetland drains south into the Elliot-Laidlaw Drain and eventually flows into the Dingman Creek (Map 6). It consists of a willow and poplar lowland, a cattail marsh and a high quality Sugar Maple forest (Map 8). The second wetland is the marsh and swamp wetland habitat immediately south of Bradley Avenue and east of Highbury Avenue South. It consists of a willow and dogwood thicket, a Red Maple swamp and cattail marshes with rushes, sedges and grasses (Map 8). The third wetland is the marsh and swamp habitat immediately north of the 401 Highway and east of Highbury Avenue South that drains south into another wetland area south of the 401 Highway. It consists of a willow and dogwood thicket, a Red Maple swamp and a mixed swamp of ashes, maples, Yellow Birch, cedars and Eastern Hemlock (Map 8).

3.3 Change in Vegetation Communities since 1981

There has been relatively little change to the core area of mature woodland at Westminster Ponds since the last biological survey of the area (McLeod 1981). Most of the changes have occurred along the perimeter of the woodlands and along the ESA boundary, as well as within Dayus Creek and Pond Mills. These changes can be grouped into the following seven categories:

3.3.1 Community forestry projects

Community forestry projects have assisted in the transformation of manicured lawns and old fields into young forests. Some examples are listed below.

- The old field southwest of South Pond (Map 9, Community 5) was planted with young trees in the early 1990s. There was a high mortality rate (only 55 % survival) and the site was replanted as a memorial forest in the late 1990s.

- The area cleared for the Bradley Avenue interchange (Map 9, Communities 21, 22 and 32) was planted with soft maples and ashes in the early 1990s.

- A manicured lawn south of Tumbleson Pond along Southdale (Map 9, Community 11), was planted into trees through the community forestry program in the early 1990s.

- A manicured area within the ESA behind residences on Ebury Crescent (Map 9, Community 70), was planted into trees through the community forestry program in the early 1990s.

- The areas adjacent to the baseball diamonds (Map 9, Communities 124, 133 and 158) were planted with trees and shrubs at various times. Community 158 was planted by Scouts in the 1980s; Community 124 was planted as part of a community forestry project in 2000. Supplementary plantings were completed in 2000 in Community 133 as part of a community forestry project.

3.3.2 Mature plantations

Many of these forests were planted decades ago (prior to City acquisition) and now resemble more of a forest than a plantation. Some examples are listed below.

- Plantations west of Tumbleson Pond (Map 9, Communities 57 and 41) have matured, with many hardwoods establishing underneath.

- An old plantation south of Saunders Pond (Map 9, Community 59) is difficult to locate because many of the planted conifers are dying, while hardwoods such as Green Ash, soft maples and poplars are becoming established.

3.3.3 Ornamental plantings

Ornamental plantings include conifers planted as hedgerows or windbreaks adjacent to buildings or in areas that were once open fields or manicured lawns. Some examples are listed below.

- Scots Pine was planted west of the Pond Mills Environmental Education Centre (Map 9, Community 82).

- Norway Spruce, Eastern White Cedar, White Spruce, Scots Pine and Red Pine were planted alongside the driveway leading to the Western Ontario Fish and Game Protective Association (Map 9, Community 17).

- The tall planted spruce located along the southern edge of Community 133 (Map 9) southeast of the baseball diamonds.

- Interesting specimen trees (i.e., buckeye) are found around the veteran's cottages.

3.3.4 Maturation of meadows and old fields to shrub lands and young forest

If undisturbed, fresh to moist meadows and old fields (i.e., treeless areas of goldenrods and grasses) will change to shrub and / or young trees. Examples of this type of change are listed below.

- The areas around South Pond that were meadows in 1981 (Map 9, Communities 2, 9, 26 and 10) have begun to grow into shrubs and young trees. The trees and shrubs seeding in are dogwoods, Glossy Buckthorn, ashes, soft maples, Eastern Cottonwood, Black Walnut and willows, indicating that the soils are moist.

- There has been a great deal of change around the North Pond. In 1981, the area around the pond was manicured grounds and an old field community. Now, in the absence of mowing, the area has become a young forest consisting of ashes, soft maples, Black Walnut and willows.

- A large portion of the Dayus Creek Valley on either side of the tracks was an old field and young shrub community (Map 9, Communities 180, 170, 154 and 129). This area has been left undisturbed and has matured in the last 20 years to an older

  shrub community of buckthorns, hawthorns and Grey Dogwood with some young trees. Black Walnut and Manitoba Maple seem to be dominating Community 129, while a variety of scattered trees such as ashes, Sugar Maple, Black Cherry and White Elm seem to be dominating communities 180, 170 and 154.

- Old field communities in Dayus Creek Valley (Map 9, Communities 118, 119 and 136) are maturing. Compared to twenty years ago, Community 118 has more mature Black Walnut, White Elm and Black Cherry, with an understorey of buckthorns, hawthorns and dogwoods. Community 136 has larger Sugar Maple, ashes, Basswood, hickories and Hop-hornbeam with an understorey of buckthorns and Chokecherry.

- The manicured ground and old field communities adjacent to the cemetery (Map 9, Communities 55, 200 and 46) have been left alone and are now developing into shrub thickets with scattered young trees.

- The shrub and old field areas adjacent to Tumbleson Pond (Map 9, Communities 60, 62, 19, 7, 201, 63, 69, 56, 42, 202, 15, 23 and 13) have matured into a shrub thicket with scattered trees coming through the shrubs.

- The old field southeast of Tumbleson Pond (Map 9, Community 25) is now a forest consisting of ashes and poplars.

- Old photos of the area south of Saunders pond show that it was once cleared. This area is maturing into a lowland forest (Map 9, Communities 74, 78, 67, 61 and 68).

3.3.5 Maturation of shrub lands to young forest

If left to naturalize on its own, fresh to moist shrub lands may slowly develop into a forest. Examples of this type of change are listed below.

- Communities 93, 97, 120, 142, and 135 (Map 9) in Dayus Creek are maturing shrub communities becoming young forests. The communities are mainly buckthorns, dogwoods, Chokecherry and hawthorns with scattered trees such as ashes, Black Cherry, White Elm, poplars and some Sugar Maple becoming established.

- The communities north of the CNR track by Pond Mills Road (Map 9, Communities 145, 147 and 165) are changing from shrub communities into young forests.

- Shrub communities adjacent to the old quarry site (Map 9, Communities 197 and 173) are in varying degrees of maturity. Community 197 contains tall shrubs with a scattering of young trees coming up, whereas Community 173 has changed to a more mature young forest with ashes, Red Oak, poplars, Hop-hornbeam, hickories and Sugar Maple.

- The shrub community southeast of the LHSC (Map 9, Community 163) is maturing into a young forest with scattered trees.

- The shrub community near Wilkins Street (Map 9, Community 116) is still a cultural thicket, although some ashes and White Elm are becoming established.

- The shrub thicket community adjacent to Wellington Road (Map 9, Community 108) is now a fairly mature lowland Green Ash forest with hawthorns and buckthorns in the understorey.

3.3.6 Maturation of Marsh into Thicket

Marshes can change into thickets over time as vegetation gradually fills in the wet areas. Other reasons can be a lowering of the water table or a change in disturbance. There are a couple of examples of marshes that have changed into wetland thickets. These are listed below.

- The marsh area within one of the forest communities southeast of the LHSC (Map 9, Community 162) is changing into a swamp thicket of Glossy Buckthorn and Red-osier Dogwood with an over storey of Black Willow and Eastern Cottonwood.

- The marsh communities surrounding Saunders Pond (Map 9, Communities 99, 100, 71 and 105) are starting to change into wetland thickets of Buttonbush.

- The marsh east of Spettigues Pond (Map 9, Community 117) is changing into an open swamp thicket of Silver Maple, Glossy Buckthorn, dogwoods and Staghorn Sumac.

- The edges of the marsh areas north of the Tourist Information Centre on Wellington Road (Map 9, Communities 104, 87 and 81), are slowly changing into woody thickets.

- The marsh habitat that existed in 1981 northwest of Thompson Pond (Map 9, Community 171) is beginning to mature with the establishment of water loving shrubs, willows and soft maples.

3.3.7 Change in disturbance regimes

A combination of human land use activities and beaver activities have changed the composition of vegetative communities by removing or altering habitats. Most of the human activities occurred before 1981, but the vegetation is still responding to these changes. Examples of this type of disturbance since 1981 are listed below.

- Water levels are rising in the Dayus Creek Valley. A large area that was once marsh and swamp has been flooded, changing the shape of Thompson Pond since 1981 (Map 9, Community 113). The swamp habitats that once surrounded the pond now consist of standing dead trees due to permanent standing water.

- Beaver activity has flooded areas on either side of the tracks and marsh plants have established along the edge of these flooded ponds.

- The water levels by the cemetery have also risen since 1981. The pond on the east side of the CN tracks (Map 9, Community 73) has become larger, flooding what used to be a shrub community (Map 9, Community 76). The remainder of the shrub community has become a Black Walnut stand.

- The old quarry sites at the north end of the ESA (Map 9, Communities 189, 175, 187, 198 and part of Community 197) are now cultural meadows with a few scattered shrubs and trees.

- A portion of what was a disturbed area immediately north of the Tourist Information Centre (Map 9, Community 75) is now a poplar grove.

- The swamp area around the west side of Tumbleson Pond (Map 9, Community 53) seems to have enlarged. The large number of dead trees around the edge suggests that there has been a shift in the water levels, perhaps as a result of changes to the drain from this pond.

- The manicured lawn west of the Western Ontario Fish and Game Protective Association's club house (Map 9, Community 27) was described as an old field community in 1981. However, the edges are starting to grow back into a meadow, suggesting that this area could naturalize back into an old field if current management practices were stopped.

- The Vegetation Community adjacent to residences on the east side of Tumbleson Pond (Map 9, Community 77) was considered a forest in 1981 but now consists of buckthorns and hawthorns with ashes in the understorey. It is unclear whether this change is the result of a disturbance over the past few years or a mapping error.

- The majority of the area immediately south of the Tourist Information Centre was not classified in 1981. Therefore, it is difficult to determine any changes. It is known that a meadow habitat was removed for the fire hall practice site. The other meadow habitat (Map 9, Community 40) is slowly maturing into a shrub land. However, the poor growing conditions at this site means that this process will be very slow.

- The periodic flooding of Communities 40 and 58 (Map 9) may be associated with training activities at the fire hall practice site and could be impacting the vegetation in these communities. The possibility of chemicals being flushed into the ESA should be investigated.

- The residential development at Milan Place east of North Pond and immediately adjacent to Community 89 (Map 9) was built on a cultivated field. Community 89 was described as manicured in 1981, but is now a swamp.

- The shrub land in the southwest corner of Dayus Creek (Map 9, Community 64) used to be maintained as manicured grounds in the early 1990s, but has since changed into an old field community.

- The mature swamp habitat on the eastern side of the large wetland located east of Highbury Avenue, which is situated within the Summerside development envelope, is being replaced by residential development.

- The addition of illegal fill in the summer of 2002 in the PSW located west of the landfill site and north of Communities 186, 187, 188, 189, and 190 (Map 9) has significantly altered the wetland communities in this area.

3.3.8 Future Change in the Area

It is expected that ecological change will continue in many of the communities in the ESA, provided that they remain undisturbed. Some communities have been identified for community forestry or naturalization projects. Most of these communities are currently manicured and are along the edge of the ESA.

The general trend in the lowlands appears to be a dying off of Yellow Birch and only limited regeneration of Red Maple. These species are being replaced by Red Oaks, ashes and Sugar Maple. The presence of these typically dryland species in the seedling layer of the lowland habitat may be indicative of a deepening litter layer and consequent drying of the root layer, or a lowered water table. As the buildup of lowland soils effectively lowers the water table, Sugar Maple may be able to extensively inhabit the lowlands as it is beginning to do in some locations.

The upland habitats all display a similar trend, with tolerant Sugar Maples, and sometimes American Beech, gaining importance throughout the upland. This process may have been disrupted by tree removal in some places, which allows for the invasion of pioneer species and increases the diversity of the upland vegetation.

Outbreaks in insect infestations may also have a significant impact on forest composition. For example, the Hickory Bark Beetle is affecting the hickories at Westminster Ponds, as in other locations in the City. Other recent insect outbreaks include the Oystershell Scale and associated Beech Bark Disease, the Roundheaded Borer (affects ashes and oaks), the Euonymus Webworm (affects strawberries, Common Lilac, and bittersweets) and the Gypsy Moth (affects Black Cherry, ashes, poplars, and oaks). There is also a potential loss of ash trees if the Emerald Ash Borer reaches London.

The cutting of dead trees, or mature trees with dead limbs, in response to perceived safety issues, will impact the wildlife that depends on these dead standing snags to fulfill their life cycle requirements (e.g., cavity nesting species) and may shift the balance of shade tolerant species.

We do not know how these disturbances will impact the ESA, nor do we know what development may happen on the adjacent lands in the future.

3.4 Hydrology

3.4.1 Surface Water Drainage

The relatively small water catchments of the ponds in the ESA (Map 6) are further decreased by the construction of storm drains that divert runoff to other watersheds (MacLaren Inc. 1981). A municipal drain system was originally constructed in 1915 (Map 6, Marr Drain extension #1) to replace a 15 cm tile drain located at the southerly bay of Tumbleson Pond Map 6, historical outlet). With this municipal drain, the outflow from Tumbleson Pond passed through the Marr Drain and eventually to Dingman Creek via a ditch inlet. In 1926, an extension of the Marr Drain was constructed between Saunders Pond and Tumbleson Pond (Map 6, extension #2). The Marr Drain is now part of the storm sewer system on Adelaide Street that still drains to Dingman Creek.

Although there is not enough information to calculate water balance equations for this area (refer to Recommendation 22), it is thought that most of the surface water in the Westminster Ponds / Pond Mills ESA eventually drains southward into Dingman Creek. The exception is the catchment area for Thompson Pond in the Dayus Creek Valley, which drains northwest into the Thames River (Map 6). The hospital lands bordering the Westminster Ponds / Pond Mills ESA to the north are in a catchment area that drains primarily northward and not into the Westminster Ponds / Pond Mills ESA. The exceptions to this are the open fields near the old veterans' buildings, which drain toward Saunders Pond, and the ball diamond fields that drain into Spettigue Pond (Map 6).

Table 1. Measurements of surface water area, catchment area, depth and pH of the six ponds (MacLaren Engineers, Planners and Scientists Inc. 1981).

Parameter	Saunders	Tumbleson	Spettigue	Thompson	South	North
Catchment Area (ha)	49	40	32	113	191 (includes North & South Ponds)	191 (includes North & South Ponds)
Surface Water Area (ha)	8.6	4.8	4	9.1	6.9	9.4
Depth (m)	9.1	9.1	6	3m	15.2	21.3
Surface pH	8	8.2	8	unknown	8	8.2

Spettigue Pond

Spettigue Pond receives surface water from a 32 ha catchment, which is almost entirely wooded (Map 6). Only a small portion of the Westminster Park subdivision that drains west into the Spettigue basin and the southern section of a mowed lawn / baseball field that lies at the northern extremity of the Spettigue watershed is not forested. There are no definable influent streams, so the pond is fed only by precipitation. The pond has no surficial outlet but does occasionally drain westward through a bog and wetland area to Saunders Pond. However, increases in the level of Saunders Pond of only a few centimetres can back up flow in this wetland to the extent that Spettigue Pond will discharge directly to Tumbleson Pond. The connection among all three ponds means that the pollution or destruction of any one of the ponds has the potential to pollute or destroy the others.

Saunders Pond

Saunders Pond receives occasional discharge from Spettigue Pond and surface water from a 49 ha catchment, some of which is wooded (Map 6). The remainder of the catchment area of Saunders Pond contains a greater diversity of vegetation forms and land uses than the Spettigue Pond drainage basin does. Some portions of the Saunders Pond catchment are dominated by mature upland and lowland woodlands, whereas other areas contain marsh, maturing successional stands and mowed lawns. A section of Wellington Road lies within the watershed catchment, as well as residential and commercial development to the west of Wellington Road. Runoff from these developed areas passes through the wetland on the western edge of Saunders Pond before reaching the open water. Saunders Pond drains to Tumbleson Pond through a 30-cm diameter clay pipe at its southeast limit (Map 6, Marr Drain extension #2). This drain was installed by the government in 1926, lowering the level of Saunders Pond and killing off much of the cattail growth at the east end.

Tumbleson Pond

The catchment of Tumbleson Pond contains both wooded and landscaped areas around the Dearness Home, as well as a portion of Southdale Road East (Map 6). Tumbleson Pond receives some discharge from Saunders Pond (including Spettigue Pond) through the Marr Drain (Map 6, Marr Drain extension #2), as well as overland flows from its 40 ha catchment.

The other direct drainage system into Tumbleson Pond is from the Dearness Nursing Home property, west of the pond. Surface flow from the northeast part of the Dearness

property enters the meadow to the east and eventually drains into Tumbleson Pond. This water is conveyed in part through a drainage pipe. Redevelopment of the Dearness Home in 2004 will direct all flows from paved areas toward the Wellington Road storm sewer, reducing the amount of runoff directed to the ESA. The remaining areas of the site that drain into the ESA will be covered in vegetation. With this diversion of contaminated runoff, the quality of water entering Tumbleson Pond should improve.

Tumbleson Pond drains southeast over a concrete overflow structure that leads to an open watercourse at Southdale Road East (Map 6, ditch inlet). At the road, the flow enters a storm sewer, which is a tributary of Dingman Creek. Dingman Creek eventually drains into the Thames River, southeast of London.

North Pond

North Pond receives discharge from a small creek that originates in the Summerside Wetland east of Highbury Avenue (Delcan Corporation 1991). The creek flows westward from the Summerside Wetland, through a culvert under Highbury Avenue, and then continues to the North Pond as a well-defined watercourse in a wooded valley. The North Pond also receives drainage along its westerly shoreline, including the discharge from a retention pond, which in turn receives the discharge of storm sewers along a section of Southdale Road East and from a small section of Pond Mills road. North Pond is hydrologically connected to South Pond and may also be discharging beneath Pond Mills Road either by natural flow or a man-made structure to Thompson Pond.

South Pond

South Pond receives most of its surface water directly from North Pond. It also receives water from a small catchment area (Map 6). South Pond empties south into the Elliot-Laidlaw Drain that passes under Bradley Avenue, through a swamp and then flows into Dingman Creek. Dingman Creek eventually drains into the Thames River near Delaware.

Thompson Pond

Thompson Pond receives surface runoff from the surrounding valley slopes in its 112 ha catchment (Map 6). A relatively large storm sewer, which receives runoff from the portion of the Pond Mills subdivision east of Pond Mills Road, empties into the lower southeast end of Thompson Pond at the start of the Dayus Creek Valley. A small pond located immediately east of the railway tracks also empties into the main section of Thompson Pond through a culvert beneath the railroad tracks. The Pond is deeper at its southern end, and may be a kettle pond, although it has a natural surficial outlet during wet seasons. It drains northwest into a municipal storm sewer at Commissioners Road, eventually emptying into the Thames River.

The construction of the railway through the Dayus Creek Valley in 1915 disturbed the natural drainage of the area and has contributed to the formation of marshy pockets on the east side of the railway line (Proctor and Redfern Ltd. 1980). Recent beaver activity in this area has also significantly increased the amount of standing water.

3.4.2 Groundwater

Old records from the numerous wells in the area describe three overburden aquifers in the Westminster Ponds area: shallow, intermediate and deep. Map 10 shows the cross sections and aerial view of the aquifers based on the drillers log. The shallow aquifer appears to be between three and ten metres in depth and exists within a relatively thin sand layer. The shallow aquifer may be buried under thin silt, clay or till layers. An intermediate sand aquifer lies between 19 and 25 metres below ground. Intermediate aquifers generally yield large quantities of water protected by overlying sediments

from contamination. Finally, a deep sand aquifer lies between 40 and 60 metres below ground. A thick overburden provides a high degree of protection from contamination to the deep aquifer.

East of Highbury Avenue, there is a shallow (perched) groundwater system near the surface, which is separated by a silty clay aquitard from a deeper aquifer that is 3.4 to 7.2 metres below the surface (Trow 1992). The deeper aquitard flows north and west. Low permeability of soils suggests that there is limited connectivity between the wetland and the deeper groundwater.

Saunders, Spettigue and Tumbleson Ponds are underlain by Port Stanley Till, which is characterized by low permeability silty clay and clayey silt till soils, resulting in a relatively slow flow of groundwater between the ponds (Gartner Lee Ltd. and Monteith Zelinka Ltd. 1993). As a result, the wetland ecosystems between the ponds are maintained primarily by surface water flow rather than by high ground water (Gartner Lee Ltd. and Monteith Zelinka Ltd. 1993). Given the low groundwater flow rates and restricted outlet conditions, virtually all runoff becomes pond storage. According to Gartner Lee Ltd. and Monteith Zelinka Ltd. (1993), groundwater flows from Spettigue Pond and Saunders Pond, to Tumbleson Pond, and then to Dingman Creek.

Water levels in the ponds and in the wetland margins fluctuate according to precipitation events (Gartner Lee Ltd. 1993, Gartner Lee Ltd. and Monteith Zelinka Ltd. 1993). The response to these precipitation events is rapid. The low groundwater flow rates means that if the ponds were to be polluted, it would take a very long time for the pollution to flush itself out.

3.5 Wildlife

3.5.1 Birds

In addition to its unusual and representative vegetation communities, the Westminster Ponds / Pond Mills ESA is also recognized as valuable habitat for migrating birds and waterfowl. The Westminster Ponds area attracts a large number of birds because of the diversity of vegetation associations and the presence of the ponds. A breeding bird survey by McLeod (1981) determined that the area is unsurpassed by other natural areas in the City or surrounding region with respect to the diversity of bird life.

The Westminster Ponds / Pond Mills ESA not only provides nesting habitats for birds, but also serves as a staging area for spring and fall migrants passing through the London area. Many of these birds are declining in North America. In the past, interesting birds such as the Common Loon, Peregrine Falcons, Bald Eagles, every warbler ever recorded in Middlesex County except two, numerous finches, flycatchers, woodpeckers, Ring-necked Pheasants, owls, thrushes and other songbirds have been spotted in this area. Great Horned Owls and Red-tailed Hawks have been reported nesting in the Dayus Creek Valley and have nested for many years in the woodland north of Spettigues Pond. Waterbirds such as ducks, grebes and herons have also been recorded. The Western Ontario Fish and Game Protective Association has erected Wood Duck nesting boxes and nesting platforms for Mallards and American Black Ducks in various places around Tumbleson Pond. During the late 1970s and early 1980s, the Association released more than 200 Ring-necked Pheasants in the area (McLeod 1981).

3.5.2 Mammals

The Westminster Ponds / Pond Mills ESA contains mammals common to urban areas including Rabbits, Raccoons, rodents and Opossums, as well as larger mammals such as the Red Fox, White-tailed Deer and Beaver.

3.5.3 Amphibians and Reptiles

Vernal ponds are prevalent throughout the Westminster Ponds / Pond Mills ESA because of the rolling topography and fine textured soils. Vernal ponds are important in the breeding cycle of frogs and salamanders. The abundance of water in the vernal ponds as well as in the larger kettle ponds provides habitats for the many interesting amphibians found in the ESA, including nine species of toads and frogs and six species of salamanders and newts (Table D1 Appendix D). The ESA also contains at least five species of snakes and four species of turtles (Table D1 Appendix D)

3.5.4 Fish Species

Fish and insect surveys have been conducted at the Westminster Ponds / Pond Mills ESA since the mid-1960s. Nineteen species of fish have been recorded in the ponds (Table D2, Appendix D). None of the ponds, with the exception of the stocked Tumbleson Pond, contains a very large quantity of fish. However, each pond contains some interesting species.

Saunders Pond
In 1973, the OMNR found populations of Bluegill, Largemouth Bass, Smallmouth Bass, Yellow Perch, Pumpkinseed, Iowa Darter, Brown Bullhead and Northern Pike.

Spettigue Pond
Past surveys have recorded Yellow Perch, bass species, Pumpkinseed, Iowa Darter, Northern Pike, Brown Bullhead and Bluegill.

Tumbleson Pond
The Western Ontario Fish and Game Protective Association manage and stock the pond for a sport fishery. In the 1960s, this pond had many coarse fish. These species were killed in the mid-1960's by the Western Ontario Fish and Game Protective Association and stocked with Rainbow Trout. In 1973, the pond was noted in OMNR surveys to contain populations of Rainbow Trout, Common Carp, Brown Bullhead, Pumpkinseed, Bluegill, Largemouth Bass and Yellow Perch. In 1993, additional Largemouth Bass were added to Tumbleson Pond. In 2003, the UTRCA recorded Black Crappie, Bluegill, Common Carp, Largemouth Bass, Pumpkinseed, White Sucker and Yellow Perch.

Thompson Pond
Sampling of the pond by the UTRCA in 2001 determined that Iowa Darter, Brook Stickleback, Golden Shiner and the Central Mud-minnow occur on both sides of the railroad tracks, while Pumpkinseed was only found in the pond west of the CNR tracks.

North and South Pond
Both ponds were surveyed by Hayman (1984). Two major warm water sport fish species (Largemouth Bass and Yellow Perch) were caught, as well as a variety of other species including Smallmouth Bass, Northern Pike, Pumpkinseed, darters and Bluegill which serve as bass and Yellow Perch food. In 2003, the UTRCA recorded Black Crappie, Bluegill, Common Carp, Largemouth Bass, Pumpkinseed, Rock Bass, White Sucker and Yellow Perch at South Pond.

3.5.5 Insect Species

Aquatic insects were recorded by Judd (1964) in Saunders Pond. The insects were dominated by Diptera, although a total of seven orders of insects was found emerging from this pond. Judd (1961, 1966) also studied aquatic insects as they emerged from Spettigue Pond. As with the other ponds, Diptera dominated the insect fauna, although a total of eight insect orders was captured.

Invertebrate fauna of Tumbleson Pond experienced a change between 1960 and 1980. Judd (1960) reported a wide diversity of insects with seven orders and sixty genera in Tumbleson Pond. The invertebrate fauna deteriorated to six orders of insects and eight identified genera in 1979 (Proctor & Redfern 1980). It is probable that a deterioration in water quality in Tumbleson Pond resulted in a deterioration of the invertebrate fauna.

Semi-aquatic species such as damselflies, dragonflies and mosquitoes, as well as various butterflies, are also found in the ESA. Insect species listed in Table D3 (Appendix D) are from an informal survey conducted by the McIlwraith Field Naturalists from 1998 to 2000 during the spring and fall seasons in Communities 123, 128, 157, 149, 162, 163, 146, 166, 152, 164, 253, 254, 132, 133 and 124 (Map 9), and from opportunistic observations throughout the Westminster Ponds / Pond Mills ESA by W. Wake from 2000 to 2004 and by the UTRCA during summer and fall of 2002 and 2003.

4.0 HISTORICAL DESCRIPTION OF LAND USE AND EVENTS IN THE ESA

4.1 History of Land Use and Preservation Efforts

4.1.1 Pre-European

Archaeological studies in the area surrounding the current boundary of the Westminster Ponds / Pond Mills ESA (all of which are related to specific development proposals) have found 73 cultural components and more than 60 registered archaeological sites (Archaeologix Inc. 1999a, 1999b). Artifacts from campsites near the current boundary of the Westminster Ponds / Pond Mills ESA date from the late Archaic (circa 2500 BC to 1000 BC) to the Middle Woodland Period (circa 500 BC to 700 AD). Based on these findings and on the City of London Archaeological Master Plan (Wilson and Horne 1995), the remainder of the natural area has a very high potential for containing significant archaeological resources. It is reasonable to infer that an equal density of undiscovered archaeological sites is preserved within the natural area of Westminster Ponds / Pond Mills ESA.

The Westminster Ponds / Pond Mills area would have been very attractive to the First Nation people because of the easy access to water, the diverse assortment of wild foods, cultivable soils and suitable topography for settlement (Hilts and Inch 1978). Aboriginal peoples, who had been living south of the Great Lakes, established settlements in southwestern Ontario after the retreat of the ice from the Wisconsin glaciation (Wilson and Horne 1995, London and Middlesex Historical Society 1998). During this Paleo - Indian period, the environment of southwestern Ontario was similar to the conditions presently found along the transition zone between the boreal forest and tundra. Pollen core analysis from this time suggests that the environment began as spruce parkland and changed to dense pine forests found in association with deciduous species such as Yellow Birch and poplar (Wilson and Horne 1995).

4.1.2 1800 - 1849

The earliest written reference of the Westminster Ponds / Pond Mills area is found in the 1793 diary of the wife of the first Lieutenant - Governor of Upper Canada, John Graves Simcoe (Judd 1981). The diary mentions the Westminster Ponds / Pond Mills area as the location where the party camped overnight while on their way to the Forks of the Thames, an area that the Lieutenant - Governor had chosen as a site for the provincial capital.

The first settlement of Europeans (British) in the area began shortly after Simcoe's 1793 visit. At this time, the Westminster Ponds / Pond Mills area was part of Westminster Township (Map 11) and the countryside was completely forested between Westminster Township and St. Thomas. The settlement was concentrated in the southwest corner of the township along North Talbot Road, and was supervised by Colonel Talbot (Wilson and Horne 1995). Later settlement in Westminster occurred along Commissioners Road East, after it was surveyed in 1810. The southeast portion of Westminster Township was the last to be settled.

At the beginning of the War of 1812, Westminster Township was sparsely settled. In the years following the War, more settlers began to move into the area. Most of these early pioneers were from Scotland. By 1817, only seven years after the surveying of

Commissioner's Road, the Westminster Township had a population of 400, with two schools and two churches. The soil was excellent for farming, and the most rapid decline in forest cover in this area occurred during the first half of the 19th century. By 1825, the settlement boasted a blacksmith shop located near Commissioners Road, a grist mill built in the Dayus Creek ravine west of North Pond, and a log building on the current site of the Pond Mills Heritage Cemetery that served as a schoolhouse through the week and as a church on Sunday. Today, the Pond Mills Heritage Cemetery on Pond Mills Road contains more than 135 original Scottish settlers and their descendants.

Settlement in the Westminster Ponds / Pond Mills area predates the first settlement at the Forks of the Thames by several years. It was not until 1818 when the first settlers, who were Irish immigrants, arrived in London (Wilson and Horne 1995). Even by 1826, when all of what constitutes old London was officially surveyed, only a small degree of clearing had been accomplished in London, while the community of Pond Mills already had a school, a church and a mill.

4.1.3 Saunders family (1849 - 1943)

The Saunders family is one of London's well-known families. On May 24, 1849, William Saunders, aged 12, arrived in London with his family. He went on to apprentice as a druggist and in 1857 he married Sarah Robinson. They had six children - one daughter and five sons. The oldest son, William Edwin (W.E.) Saunders, was one of London's most beloved and honoured citizens. Born in 1861, W.E. Saunders lived out all of his 82 years in London. He followed his father in the family pharmaceutical business and was a professor of Practical Chemistry at the London Medical School from 1884 to 1889. He also served terms as Parks Commissioner and Water Commissioner for the City of London. In 1936 he was presented with an honorary L.L.D. from the University of Western Ontario for outstanding contributions to society.

William Saunders (father) organized the London Branch of the Entomological Society of Canada in 1864. W.E. Saunders (son) was also keenly interested in the natural sciences, especially entomology and ornithology. His field notes comprise one of the most significant collections of natural history in Ontario. He was the founder of the London Horticultural Society, was director of the American Society of Mammalogists, was president of the Federation of Ontario Naturalists (FON) from its inception in 1931 until his death in 1943, and was one of seven active members of the American Ornithological Union when it formed in Boston in 1885 (Judd 1979). W.E. Saunders was also the founding president of the ornithological section of the London Branch of the Entomological Society of Canada when it organized in 1890 into four different sections: botany, ornithology, geology and microscopy. In 1902, the name of the ornithological section changed to the McIlwraith Ornithological Club, and again in 1965 to the McIlwraith Field Naturalists. In 1972 the club was incorporated as the McIlwraith Field Naturalists of London.

In 1913, W.E. Saunders purchased approximately 12 ha of land adjacent to Saunders Pond and conducted outings with the McIlwraith Ornithological Society throughout the area. He made several studies of the area. He purchased another 20 ha in 1918 and owned the entire 32 hectares until his death in 1943, after which the Department of Veterans Affairs expropriated it as part of the Westminster Hospital lands.

The land surrounding Saunders Pond was considered a fine bird sanctuary and was one of the first wildlife preserves in the Province of Ontario. When Saunders purchased the land, it was home to the only known colony of Tree Swallows in London and the only pair of Least Bitterns known to be nesting in Middlesex. W.E. Saunders built a modest prefabricated cabin (6.7 metres by 4.9 metres in size) from either Eaton's or

Simpson's with two bedrooms, a living room, a kitchen with stove and a verandah on the property. The posts were put in by a carpenter while the rest of the cabin was built by W.E. Saunders and a friend. Originally the cabin site was surrounded by an open field overgrown with daisies. Saunders introduced a number of shrubs, trees, and exotic grasses to his property, as well as other horticultural specimens including walnuts, pines and Japanese Honeysuckle. Most of the conifers in the plantation have been naturally replaced by deciduous trees species, but a few remain adjacent to Saunders Pond.

4.1.4 1850 - 1939

The earliest reference of the natural significance of the Westminster Ponds / Pond Mills area is in the Atlas of Middlesex County (1878) where the ponds are described as "aids in imparting variety and beauty of the landscape." Early attempts to protect the area began in 1913, when W.E. Saunders purchased land adjacent to Saunders Pond and began the establishment of a private nature sanctuary. During Saunders' ownership, various public groups were invited to come and enjoy the property. This encouraged groups such as the McIlwraith Ornithological Society to become active in recognizing and preserving the Westminster Ponds / Pond Mills area. At the same time, the Western Ontario Fish and Game Protective Association, which was founded in 1885, purchased and protected land around Tumbleson Pond. More property was added in 1925 and the last portion was acquired by the Western Ontario Fish and Game Protective Association in 1946.

In 1915 an inter-urban railway was constructed from London to Port Stanley. Passing through the Dayus Creek Valley, it had a stop adjacent to the Westminster Pond / Pond Mills area at Commissioners Road East. This train carried commuter traffic from Westminster Township, the City of London and St. Thomas, as well as recreational traffic to Port Stanley. The railroad is still in operation, but is used for freight only. It is now owned by the CNR.

4.1.5 1940 - 1959

In 1943, the Federal Department of Veterans Affairs initiated a program called Plan 86 to secure lands in Lots 23 and 24 in Westminster Township for returning war veterans. Plan 86 was a "plan and description of property taken for use of His Majesty the King as a site for public works known as The Westminster Occupational Colony." The lands were to become part of a major Military Health Campus, dedicated by the Crown in honour of the country's military history and contributions made by veterans during wartime.

Two months after Plan 86 was initiated, Dr. Saunders passed away. The McIlwraith club applied to have the Westminster Ponds declared a sanctuary in that year. However, no formal action was taken. Instead, Saunders land was expropriated by the Department of Veterans Affairs as part of the Westminster Occupational colony. Veterans' housing and an occupational facility were built on land to the east of Saunders property and the pond was used for boating and fishing. It was described by The London Free Press in 1949 as "one of the beauty spots of Middlesex County."

The veterans' colony, which still stands northeast of Saunders Pond, consisted of 11 buildings including:

- several large residential cottages for the veterans,
- a treatment building (the Waterloo building),
- an administrative building (the Wellington building),
- an occupational therapy workshop (the Middlesex building).
- Saunders' uninhabited cabin, which was moved to a location east of the veterans' quarters. It was used as a chicken house and then as a shed for a number of years until it was torn down in the mid 1960s.

In 1946 the Western Ontario Fish and Game Protective Association became more involved in general conservation efforts including tree planting, stream improvement and fish stocking. A preserve for small game and birds at the rear of the club house (partly on Westminster hospital lands) was begun in 1948. Trees were planted and Ring-necked Pheasants were released in this area.

In 1956 a number of studies of the insect populations of the three Westminster ponds (Saunders, Spettigue and Tumbleson) were initiated by Dr. W.W. Judd from the Department of Zoology at the University of Western Ontario.

4.1.6 1960 - 1969

The land that now comprises the Westminster Ponds / Pond Mills ESA became part of the City of London through annexation of Westminster Township in 1961. At this time, the City Planning Committee proposed that any surplus hospital grounds could be used as a park. In 1963, the Official Plan for Ward 5 argued in favour of having the Ponds preserved, and by 1964 the Public Utilities Commission proposed a park for the area. A chain link fence was erected south of Saunders Pond in 1966 after the federal land to the south of the fence was sold to the City of London. However, long-range commitments for development of park lands along the Thames River, combined with the excessive prices being asked for the properties surrounding the Westminster Ponds / Pond Mills area, effectively halted efforts to preserve the Westminster Ponds / Pond Mills area. Instead, rapid development of residential holdings in this area began in the 1960s and continued until the late 1970s.

The City of London also began using portions of the Westminster Ponds / Pond Mills area for storage of materials. Land east of the federal hospital lands in the northeast section of the Westminster Ponds / Pond Mills area was used as a sanitary landfill site during the 1960's. The public became upset when proposals were made to extend this landfill further south along the Dayus Creek Valley. Also at this time, the City of London stockpiled a sand and salt mixture for winter maintenance at the southwestern corner of Saunders Pond (McLeod 1981). This activity had a localized impact on the water quality of the pond (Appendix E).

4.1.7 1970 - 1974

By 1970, many groups began expressing concerns about land use activities within what is now the Westminster Ponds / Pond Mills ESA. Hearn and Wake (1970) argued in favour of preserving the Westminster Ponds / Pond Mills area in a document entitled "Ponds Profile" because of its ecological and historical significance. Concern was raised that development would undesirably and permanently impact the ponds. The report recommended that much of the area should remain permanently preserved for public use as a natural environment. In 1971, City Council passed a resolution supporting the preservation of the Westminster Ponds. Also in 1971, an International Biological Programme (IBP) report was prepared for the Westminster Ponds site that described the high quality and regional uniqueness of the area.

In 1973 City Council resolved to acknowledge the site of Saunders' cabin with a suitable marker showing the placement of the cabin posts as a memento of one of the most ardent admirers of the Ponds. Since then, Dr. W.W. Judd has taken a personal interest in keeping this site clear of shrubs and fallen trees and repeatedly staking, marking and signing the area in recognition of W.E. Saunders. The Conservation and Valley Lands Advisory Committee and the school boards also played an active role in promoting the protection of the area.

Three main development issues emerged in the early 1970s. One issue of concern was the City of London's plan to extend the landfill in operation south along the railway from Commissioners Road East at Adelaide Street toward Southdale Road East. There was a lot of public pressure to change the zone of this landfill site, as well as others in the area, from landfill to park. In 1971, nearby residents and concerned naturalists were able to successfully block the extension, and the landfill site was closed and landscaped.

Another issue of great concern was a proposed Adelaide Street extension, which would have effectively severed the current Westminster Ponds / Pond Mills ESA in half, causing pollution problems from runoff of road salts and oils, and disrupting the drainage system. The possible extension of Adelaide Street from Commissioners Road East to Southdale Road East was indicated on the 1971 City of London Official Plan and seemed to be in direct opposition to the initiative proposed by the Public Utilities Commission that the Westminster Ponds / Pond Mills area become a conservation area (City of London 1974). Although it was suggested that the Adelaide Street extension could be adjusted to follow the railway bed, this idea was abandoned because of issues with runoff. The idea of an Adelaide Street extension continued to remain on the City agenda until the mid-1980's, when a lengthy hearing at the Environmental Assessment Board did not approve the extension of Adelaide Street. City council then voted to remove the Adelaide Street extension from its plans.

A third important issue at this time was the quality and quantity of drainage coming from the proposed Pond Mills subdivision. Debate raged over whether the ponds could adequately deal with the pollutants from the subdivision, whether the water should be diverted to the Dayus Creek system with the potential of drying up the Ponds, or whether the runoff should be directed to a low ponding area with a controlled outlet in the form of a dam near the CNR line. A storm water pond that dealt with quantity (not quality) was installed with an outlet to the Dayus Creek system.

4.1.8 1975 - 1979

In 1974, a submission was made to the Province of Ontario by the UTRCA and the City of London for the purpose of establishing a shared-cost land acquisition program to develop a Westminster Ponds / Pond Mills Conservation Area. The submission was based in part on the 1970 Hearn and Wake document and was approved. Funding was set aside under a land acquisition program known as Project 44 to acquire property in the Westminster Ponds / Pond Mills area, and to ensure preparation of a comprehensive master plan that would carry out appropriate development sensitive to the natural features and functions of this area. The program was a success. Between 1977 and 1993, approximately 32 hectares were purchased for just over half a million dollars. Half of the money came from the City of London and half from the Province of Ontario. In 1993, the program was discontinued.

Increasing concern that the hospital lands around Westminster Ponds would be sold to developers began in the late 1970s. In 1977, the Federal government turned Westminster Hospital and Veteran care over to provincial responsibility. The lands immediately south and north of Commissioners Road East and east of Wellington Road, including Saunders Pond, were transferred from the Federal government to the Province in 1979. In 1980, the Victoria Hospital Corporation (precursor of LHSC) acquired the lands bounded on the north side, between Commissioners Road East and Baseline Road, to operate the former Westminster Hospital (veterans care) and to rebuild the South Street Hospital. Some of the functions from the South Street Hospital were transferred to the buildings at the Westminster site.

The lands on the south side of Commissioners Road East were established as leased lands to Victoria Hospital to administer Psychiatric and domiciliary care The Victoria Hospital Corporation acquired the lands on the south side subject to the proviso that 10 ha would be provided to the Woman's Christian Association (WCA) to move the Parkwood hospital from the Grand Avenue site and to build an addition for veterans care. The transfer of these lands from the Federal government to Victoria Hospital Corporation were accompanied by a restrictive covenant which stated that "such lands shall be used exclusively for public park purposes and for purposes related to a health care centre for veterans and other persons and for egress to and from such parkland and health care centre".

4.1.9 1980 - 1984

The City of London and the UTRCA initiated several technical studies during the early 1980s in anticipation of the eventual need for a Master Plan for the Westminster Ponds / Pond Mills area. A biological survey by Dave McLeod was completed and published in 1981, along with a water quality report by MacLaren submitted the same year. The biological inventory of the Ponds was the first complete inventory of the flora and fauna of the area.

In the early 1980's, a portion of the land owned by Victoria Hospital Corporation (10 ha on the south side of Commissioners Road East) in the Westminster Ponds / Pond Mills area was transferred to the WCA for construction of the second phase of Parkwood Hospital. Parkwood Hospital had assumed responsibility for the care of veterans in 1980, and the new Parkwood Hospital would assist in their care. The new Parkwood Hospital opened in 1984 at the present-day site on Commissioners Road.

In 1984, the Victoria Hospital Corporation applied for an Official Plan amendment and change in zoning in order to permit development on the remaining land for the manufacturing and wholesaling of products related to health care. Although the application was approved by City Council, the decision was overruled by the Federal Department of Veterans Affairs, claiming the amendment was not in keeping with the restrictive covenant.

4.1.10 1985 - 1989

The increasing number of proposals for development within the Westminster Ponds / Pond Mills area prompted the UTRCA and the municipality to initiate a Master Plan in 1984. To provide guidance for the management and protection of the area, the Master Plan identified key issues and produced a set of guidelines relating to the development of adjacent lands (Upper Thames River Conservation Authority 1985). The first Master Plan for the site was published in 1985, incorporating the biological work completed in the 1970s and early 1980s. Since there were no formal criteria for designating ESAs at the time, portions of the boundary of the Westminster Ponds / Pond Mills area in the Master Plan were based on property lines and did not reflect the boundary of the natural features. The boundary bisected, rather than included, many of the wooded areas and did not include the Summerside Wetland located east of Highbury Avenue. Rather than conducting a scientifically defensible ESA boundary analysis for the Westminster Ponds / Pond Mills area, the 1985 Master Plan boundary that was based only on property boundaries became the official ESA boundary for the City of London Official Plan. It was not until 1988 that the Westminster Ponds / Pond Mills area was designated an ESA. The boundary for the ESA was based on mapping from the 1985 Master Plan (Upper Thames River Conservation Authority 1985a). Although the City of London eventually adopted criteria for delineating ESA boundaries in 1996 (City of London (1997a), the boundary of the Westminster Ponds / Pond Mills ESA was not changed until 1996. At this

time, the boundary of the Westminster Ponds / Pond Mills ESA was changed according to the new criteria for ESA boundaries developed by the City of London (1997a) and the area was re-evaluated for its significance (City of London 1998).

The 1985 Master Plan identified several areas for public acquisition (Upper Thames River Conservation Authority 1985). The McLellan lands east of Tumbleson Pond were one of the areas identified in the Plan, since they acted as an important buffer to the wetland habitat in Westminster Ponds. The existing Official Plan designation, dating from the 1970 Official Plan, was Open Space. Mr. McLellan attempted to change the zoning of the lands to permit development. He objected to the OMB ruling that the precise natural area boundary had to be established to determine where and what type of development could occur. As a result, the City of London, the OMNR and the UTRCA paid for a wetland impact study and land use analysis of the area in 1993 (Gartner Lee Ltd. and Monteith Zelinka Ltd. 1993). Once completed, the property was appraised (Warner and Simmons 1993) and the City of London purchased the entire property (5 ha) in 1994 for half a million dollars on behalf of the UTRCA, with the understanding that if the land acquisition program (Project 44) was re-instated, the UTRCA would pay back the City half of the cost.

In the 1985 Master Plan, active water-oriented recreation was proposed on non-sensitive lands surrounding the South Pond (Upper Thames River Conservation Authority 1985). It was proposed that the natural area would benefit from the development of a dive centre that included water craft rentals, a retail dive and windsurfing store, an upgraded access road, a swim safe supervised beach zone and submerged vehicles for diver interest. The rationale for the proposal was that the development would eliminate algae, silt and mosquitoes from the pond (Pryce Enterprises 1983). However, the proposals never received acceptance.

In 1985, two new towers on the north side of Commissioners Road East were built to accommodate the pediatric and women health programs from the South Street Hospital. In 1987, the London Regional cancer program from the South Street campus was added as part of the daily operations of the towers. Construction is currently underway to renovate the Westminster hospital and to finish the new North tower to house the balance of services from South Street Hospital by 2008 / 2009 and to finish program transfers from the SJHC at this site.

An Energy From Waste (EFW) plant was opened by the Victoria Hospital Corporation in 1987. In this plant, garbage was to be converted to an economical fuel source for the expanding Westminster campus of the hospital. However, the lack of economic success, as well as environmental issues such as air emissions and disposal of ash, caused the LHSC to close the plant in 1999. By the spring of 2003, the EFW plant was completely demolished.

In 1988, a proposed residential development near the Summerside Wetland east of Highbury Avenue prompted the initiation of nine separate biophysical and engineering background field reports. These reports were prepared at the request of agencies and the City of London to determine potential effects associated with development and to characterize features and functions of the wetland. Disagreements regarding the findings of the reports led to an Ontario Municipal Board (OMB) hearing. The OMB decision called for protection of a variable buffer around the Summerside Wetland and a zoning of urban reserve for adjacent lands 120 m outside the buffer. In 2004 a development application was received by the City of London for the lands adjacent to the Summerside Wetland. Further ecological and hydrological studies were completed for this area. A new buffer to the wetland edge was established from the proposed residential development and accepted by the City, the UTRCA and provincial agencies.

It is expected that residential development will occur in the next few years to the north and east of the Summerside PSW.

In 1989, three of the former Veterans' cottages at Saunders Pond were converted to an Education / Nature Interpretation Centre for the local school board while several of the other cottages were used for hospital-related purposes.

4.1.11 1990 - 1994

In 1990, a new agreement between the City of London and the UTRCA was signed, providing for the ongoing implementation of the objectives of the 1985 Master Plan and the transfer of management and development responsibilities to the UTRCA (including interpretive, resource management and recreation programs). A three-party agreement was also formulated with the London Board of Education to facilitate their use of the area.

In 1993, a study of the drain outlet and concrete outlet chamber, originally constructed in 1979 to improve the recreational fishery, wildlife viewing and boat use at Tumbleson Pond was conducted to characterize pond levels and ensure that the Western Ontario Fish and Game Protective Association's building and associated septic bed would not be flooded during periods of high water. There was also concern about the impact of high water levels on the trees. It was found that the drain pipe was partially blocked and the UTRCA designed and paid for improvements to the drain that would mimic the natural water flux in the pond.

4.1.12 1995 - 1999

In 1997, an agreement was signed by the LHSC, Parkwood Hospital (which had transferred its governance to SJHC in 1997), the Federal Ministry of Public Works and the City of London that would have released the LHSC from covenants restricting the use of their property. This agreement was prepared and signed with no public consultation and ceded 89 ha of the LHSC lands on the condition that 36 ha of this area, which included Saunders Pond, be conveyed to the City of London for use as a public park in perpetuity. In turn, the Federal government would receive monetary compensation for the removal of the restrictive covenant that prevented the division of the property. However, the agreement and transfer of land was as part of a subdivision agreement, and therefore required the LHSC to submit and receive public approval for their plan of subdivision. During the public consultation process, the LHSC encountered considerable opposition to its proposals (Wake 1998a), which effectively delayed the process of a zoning change and the approval for a plan of subdivision.

As a result of the strong public opposition to the proposal, the LHSC Board passed a motion to withdraw the 1997 Plan of Subdivision and do further studies before bringing its proposals before City Council. A Westminster Ponds Advisory Steering Committee (ASC) was established in 1998 by the City of London to review the LHSC plan, propose Environmental Impact Studies (EIS), identify blocks of appropriate land use and seek community input and consensus. The ASC included representation from the community, the City of London, LHSC, SJHC, EEPAC, UTRCA, the Ponds Action Committee and the McIlwraith Field Naturalists.

At the request of the ASC, an EIS was completed in 1998 to review the boundary of the ESA on LHSC property following the new criteria for ESA designation and boundary delineation developed by EEPAC in 1997. The LHSC revised the application for amendments to the City's Official Plan and Zoning By-Law after detailed comments were provided by ASC on the EIS (Wake 1999). Agreement was reached on the

designation of three Environmental Review (ER) zones, but not on the amount of land to be transferred for conservation purposes. In 1999 the LHSC held community forums to develop plans that the community would support (Wake 2000a).

In 1998, the McIlwraith Field Naturalists asked the OMNR to review the boundary of the PSW at Westminster Ponds after the 1997 submission by the hospitals (Wake 1998b). The original wetland boundaries had excluded supporting wetland habitats found in smaller ponds and swales adjacent to the main ponds in the ESA. The OMNR agreed that reconsideration of the wetland boundary was warranted, but failed to act on those boundary changes.

Also in 1998, the London and Middlesex Historical Society requested that the Westminster Ponds / Pond Mills area be designated as a Heritage Conservation District. The designation was never adopted or approved by the City of London because it was believed that the criteria for designation were to be applied in an urban landscape as opposed to natural or cultural heritage landscapes. However, this request did cause the London Advisory Committee on Heritage (LACH) to recommend that cultural heritage be considered in the review of any development proposals in the Westminster area and that efforts to preserve and excavate historical and prehistorical archaeological resources be done wherever practical and feasible.

In 1999, SJHC also proposed building a Neurobehavioural Rehabilitation Centre that was located within the existing ESA as defined in the City of London Official Plan, but outside the edge of the existing woodland. Since the LHSC had not yet submitted its revised proposal, City Council did not have the opportunity to approve the revised ESA boundary. On September 13, Planning Committee passed a motion requiring that planning for the lands owned by both hospitals be handled in a comprehensive manner. Given public opposition to the SJHC proposal and the legal ramifications of ignoring proper amendment protocol (i.e., ESA boundaries should be defined before approval for development can move forward), the SJHC withdrew its application on September 20 at a special meeting of the Planning Committee. In response to concerns from the public, the final location of the Neurobehavioral Rehabilitation Centre was moved farther from the ESA boundary than the original 1999 proposal. Construction started in the summer of 2000 and was completed by September 2001.

4.1.13 2000 - present

In 2000, it was decided that the 1985 Westminster Ponds / Pond Mills Conservation Master Plan needed to be reviewed and updated to account for ownership changes, including the anticipated transfer of lands from the LHSC and SJHC hospitals to the City of London, and to evaluate and prepare a new vision for conservation and recreation in this unique area. The process was initiated in 2003 and this document is the culmination of that effort.

In 2000 an EIS was carried out for the reconstruction of the Dearness Home, since the Home is situated within 50 metres of the Westminster Ponds / Pond Mills ESA. The proposed redevelopment did not involve any changes to the zoning or zoning boundaries. A minor variance was granted for the building to reach a maximum height of 20 metres, since it was determined that a lower profile building would not be as well suited to the needs of residents and the efficient operation of the facility. The EIS recommended that stormwater flows from paved surfaces be directed away from the storm sewer that drains into the ESA and instead be directed to the Wellington Road / Southdale Road East storm sewer system. Stormwater from grassed areas would continue to drain into the ESA (Wake 2002).

Also in 2000, the LHSC and SJHC hospital boards jointly submitted a revised application for a Plan of Subdivision which required amendments to the Official Plan and the Zoning By-Law. The revised plan reflected the input of the community over the preceding several years, and was approved by City Council in April 2000. The revised pan incorporated the following features:

- no Wilkins Street extension
- a larger proportion of Open Space than the 1997 proposal
- an ESA boundary, largely based on the City's ESA criteria
- a larger area of land to be dedicated to the City of London.

As well, a portion of the eastern ball diamond north of Spettigue Pond was to continue to be designated as Open Space (OS), while the remainder of the ball diamond to the west was to be designated as Regional Facilities (RF), which would permit a wide range of development and possible building cover of 30 % (Map 12). In the plan approved in April 2000, a small area near Wellington Road on SJHC property was also designated as Environmental Review (ER). In 2001 a preliminary study of the ER lands near Wellington Road concluded that the boundaries of the ESA had to be revised to reflect the inclusion of these lands in the ESA.

5.0
REVIEW OF THE 1985 MASTER PLAN

A review of the recommendations from the 1985 Master Plan was undertaken to summarize actions that have occurred in the area since the original plan was developed and to identify new recommendations for the Master Plan update (Table 2). Many of the recommendations had a strong emphasis on land acquisition and most were implemented. The main recommendations that were not fully implemented, but have been revisited in the update of the Master Plan, are related to monitoring programs (Recommendations 1, 2, 4, and 14) and trail improvement (Recommendations 15, 18, 19, 20 and 21). New recommendations that address these unfulfilled recommendations are in bold.

Table 2. A summary of the 1985 Master Plan recommendations (Upper Thames River Conservation Authority 1985). Recommendations that were not implemented or only partially implemented are indicated by an asterisk (*). New recommendations that address these unfulfilled recommendations are in bold.

RECOMMENDATION	OUTCOME
*1. UTRCA to coordinate interpretive, recreational and resource management programs including: - control and mitigation of human activities on the bog habitat at Spettigue Pond - maintenance of natural succession processes in areas consisting of upland hardwoods, marshes and swamps - retention or enhancement of meadow, shrub and old field habitats - reformation of derelict sites	Partially implemented. A board walk and observation docks were constructed to control impacts to the bog habitat. The UTRCA does have a naturalization program for the area to enhance or maintain the natural habitats in the area. However, the UTRCA does not monitor impacts or changes in vegetation over time. Addressed in recommendations 10-12, 59, 65 and 66.
*2. UTRCA to meet with stakeholders, including community associations and interest groups, once a year.	Partially implemented. Although there are not annual meetings, the stakeholders meet from time to time. Addressed in recommendations 75 - 77.
3. UTRCA to develop resource management programs.	Implemented. The ESA management team of the UTRCA partners with city parks staff.
*4. UTRCA will develop a water quality and quantity monitoring program.	Not implemented. The monitoring program was never established. Appendix E provides some historical information on water quality that was gathered sporadically since 1970. Addressed in recommendations 16 - 25.
*5. UTRCA, Boards of Education and other interest groups will develop interpretive programs.	Partially implemented. School groups, nature hikers, etc. use the area on a regular basis and the Boards of Education have developed interpretive programs that make use of the ESA. Brochures of the area have been developed by the UTRCA. Addressed in recommendation 81.

RECOMMENDATION	OUTCOME
6. Determine feasibility of developing water-oriented recreational facilities at South Pond.	Implemented. It was decided that water recreational facilities at South Pond were not feasible given the sensitivity of the area.
7. Western Ontario Fish and Game Protective Association retain ownership of land it currently occupies.	Implemented. There has not been a change in ownership of these lands.
8. Review and modify boundary north of Saunders Pond.	Implemented. This was finally resolved through City Council's approval of Official Plan amendments in the year 2000.
9. The Boards of Education develop a residential outdoor education centre on property owned by hospital.	Implemented. There is an outdoor education centre at the old veterans' centre, but it is a day-use program, not a residential program.
10. Evaluate proposed extension of Adelaide Street through study area.	Implemented. It was determined that an extension of Adelaide Street was not feasible given sensitivity of the area.
11. Devise a property acquisition scheme to reflect master plan priorities.	Implemented. Properties were prioritized into three categories and the first priority lands were acquired under scheme 44 until the program was discontinued in 1993.
12. The City of London to mitigate contamination of Dayus Creek from toxic chemicals leaching out of the landfill site near Commissioners Road East and Adelaide Street.	Unclear. There is a leachate collection system in place, but outbreaks are appearing south of the CNR tracks. Not sure how effective the system is. Addressed in recommendations 20 and 42.
13. Evaluate if the meadow at the former landfill site near Commissioners Road East can be reforested.	Implemented. It was determined that the landfill could not be reforested since it is still leaching toxic chemicals and the roots of trees would extend too deep, disrupting the integrity of the soil cap. Other plants, such as wildflowers, may be more appropriate.
*14. Assess nature of runoff into surface catchments of Westminster Ponds.	Not implemented. There has not been any comprehensive analysis of surface water quality or quantity since the 1981 MacLaren report. Addressed in recommendation 20-23 and 25.
*15. Improve shoreline access to Saunders Pond.	Not implemented. The shoreline of Saunders Pond was owned privately by the hospital until the fall of 2004 and could not be accessed by the public. Addressed in recommendation 66.
RECOMMENDATION	OUTCOME

16. Develop recreational fisheries at highly productive North Pond and moderately productive South Pond and Saunders Pond.	Partially implemented. The infrastructure for recreational fishing has been developed at North and South Pond including floating docks at both North and South Ponds and parking facilities at South Pond. Infrastructure has not been developed for Saunders Pond. Addressed in recommendation 63.
17. Determine if a thorough and systematic archaeological survey of the area can be conducted.	Implemented. It was determined that archaeological surveys should not be conducted in the area since they can be very disruptive to the natural environment and are usually initiated as part of the development process.
*18. Steep slopes should be traversed with stairways and switchbacks.	Partially implemented. Some areas have such structures, but other areas are in need of erosion control measures or trail closure. Addressed in recommendations 61 and 65.
*19. Damp, and low-lying areas should be bridged with board walks to provide year-round access.	Partially implemented. Some areas have such structures, but other areas are in need of these control measures or trail closure. Addressed in recommendations 57, 59, 60, 61, 64, 65 and 67.
*20. Viewing platforms and piers will be used to control shoreline access in biologically sensitive portions of the site.	Partially implemented. Some areas have such structures, but other areas are in need of these control measures. Addressed in recommendations 65 and 66.
*21. Reduce the accessibility of the site to designated parking areas along the perimeter of the site and use board walks (not fences) to keep people on the trails.	Partially implemented. Some areas have such structures, but other areas are in need of these control measures. Addressed in recommendations 48, 51, 52, 61, 64 and 65.
22. Designate the area as a project area under Section 23 of the Conservation Authorities Act.	Implemented. The area was designated to facilitate acquisition of lands
23. The City of London and / or UTRCA acquire Priority 1 lands identified in the 1985 Master Plan.	Implemented. All priority one properties were acquired.
24. The City of London and / or UTRCA to acquire as many Priority 2 lands identified in the 1985 Master Plan as possible.	Partially implemented. The following properties were acquired in whole or in part: 2.2, 2.3, 2.4, 3.16, 3.17, 3.18, 3.19, 3.20, and 3.21. Although not essential, property 2.12 was also acquired. On the other hand, the following properties were not acquired: 1.6, 2.1, 2.5, 2.6, 3.1, 3.2, 3.3, 3.4, 3.14, 3.15, and 3.22 (Upper Thames River Conservation Authority 1985).

6.0 RECOMMENDATION/SPECIFIC OUTCOMES

6.1 Maintain and Enhance Ecological Integrity

Objective One: Update Biological Information

Rationale

Information about the birds, plants, and wildlife found in the Westminster Ponds / Pond Mills ESA is either dated (the last comprehensive biological survey of the area was in 1981 by Mcleod) or has been collected in response to site-specific development applications rather than as a comprehensive study of the ESA. Many of the recommendations in this Master Plan are dependent upon an accurate record of species locations.

Recommendation 1
Complete a full three-season Ecological Land Classification (ELC) to Vegetation Type for the Westminster Ponds / Pond Mills area. A survey of the entire ESA would provide a complete baseline inventory of all plant species and their locations.

Recommendation 2
Compile and review all background information on animals recorded for the ESA, with field verification, to develop a complete and current list.

Recommendation 3
Conduct a thorough inventory of vernal pools to determine what habitat is present and to understand the impacts of various management activities.

Vernal ponds play an important role in the breeding cycle for frogs and salamanders. Larvae of salamanders of the genus Ambystoma have been found in various locations, as well as calling Wood Frogs. Since salamanders of the genus Ambystoma and Wood Frogs require vernal pools for all or part of their life cycle, this places considerable importance on this habitat. Some of the vernal pools may be influenced by various management activities, such as the removal of canopy trees that shade these pools, the application of larvicide in response to concerns about WNv, and the application of herbicide to control non-native plant species.

Objective Two: Update ESA Boundaries

Rationale

Consideration should be given to revising portions of the ESA boundary based on background information and landscape metrics. It is anticipated that before any future change is made to the PSW or ESA boundaries based on vegetation, there will be an extensive three season field survey to determine the precise positioning of the boundary. Changes in the boundary due to mapping errors, etc. can be made without extensive field surveys.

Recommendation 4
Wetland habitats outside the PSW but within 750 metres of them should be evaluated to determine if they should be part of the wetland complex. Any changes to the wetland boundary must be approved by the OMNR. Soil profiles should be used to help determine wetland boundaries.

Two examples include:
Reference Point 1 (West of Landfill, Map 13):
Vegetation Communities 156, 172 and 176 (Map 9) are in varying stages of succession. These swamp thicket and marsh communities are areas of unevaluated wetland habitats and are not separated by permanent cultural barriers from the PSWs in this area. This wetland patch should be evaluated by the OMNR.

Reference Point 2 (East of Highbury and North of Highway 401, Map 13):
This vegetation patch appears to contain wetland (swamp) communities (Map 9, Communities 244 - 250) and is within 750 metres of the PSW. This wetland patch should be evaluated by the OMNR.

Recommendation 5
The ESA criteria (City of London 1997a) should be applied to unevaluated vegetation patches within 100 metres of the ESA.

Examples include:
Reference Point 1 (West of Landfill, Map 13):
Vegetation communities in this patch may fulfil the following ESA criteria (City of London 1997a):

- The steep remnant valley slope that extends through the middle of the vegetation patch might be an unusual land form within the City of London and, as a result, appears to fulfill ESA Criterion 1. The abandoned aggregate pit contains steep bluffs that are used by bank nesting birds. Areas surrounding the pit should be preserved and allowed to naturalize.
- If the patch is complexed to an adjacent wetland habitat (i.e., within 750 metres), it is highly probable that it would then fulfill Criterion 2 since it would be a high quality natural land form vegetation community classified as distinctive in the Province of Ontario.
- If the patch is complexed to the adjacent wetland, it is highly probable that it would then fulfill Criterion 4 since it would have hydrologic characteristics that contribute to the healthy maintenance of a natural system beyond its boundaries.
- The vegetation patch also appears to fulfill Criterion 6, since it could provide important habitat and linkage to the other communities in the patch for migratory and breeding birds. Communities 175, 189 and 198 (Map 9) may be suitable nesting sites and habitat corridors for the large turtle population from the nearby pond. The area north of the pond formerly provided nest sites for turtles, but was largely destroyed by filling activity in July 2002.

The patch appears to meet boundary assessment Guideline 5 since it is a satellite woodland less than four ha in size with a square shape that is located within 100 metres of a larger woodland not interrupted by permanent cultural barriers.

The London Health Sciences Centre has committed to protecting this area as Open Space 1 (OS 1) and to avoid development within this area (Map 12).

Reference Point 2 (East of Highbury and North of Highway 401, Map 13):
Vegetation communities in this patch appear to fulfill many of the ESA criteria (City of London 1997a):

- If the patch is complexed to the adjacent wetland, it is highly probable that it would then fulfill Criterion 2 since it would be a high quality natural land form vegetation community classified as distinctive in the Province of Ontario.
- If the patch is complexed to the adjacent wetland, it is highly probable that it would then fulfill Criterion 4 since it would have hydrologic characteristics that contribute to the healthy maintenance of a natural system beyond its boundaries.

- The patch appears to fulfill Criterion 5 because it has a high biodiversity of biological communities, plants and animals.
- The vegetation patch also appears to fulfill Criterion 6, since the vegetation patch provides important habitat and linkage to the other communities in the patch for migratory and breeding birds.
- The vegetation patch may fulfill Criterion 7 if it contains significant habitats for rare, threatened or endangered species.

It would have to be determined whether this patch would be part of the Westminster Ponds / Pond Mills ESA or if the permanent cultural barriers separating the two areas warrant consideration of this patch as a separate ESA. Either way, the new boundary of the ESA for this patch should follow the Open Space 5 (OS 5) and Environmental Review (ER) zoning boundaries (Map 12).

Reference Point 3 (South of South Pond, Map 13):
This vegetation patch is a mid-age forest (approximately 65 years old) and is a high quality Sugar Maple and American Beech forest with ashes, hickories and Black Cherry. This vegetation patch appears to fulfill the following ESA criteria (City of London 1997a):

- Criterion 2 since it is a high quality fresh Sugar Maple - American Beech forest on Till Plain tablelands.

The patch appears to meet boundary assessment Guideline 5 since it is a satellite woodland less than four ha in size, has a square shape, is located within 100 metres of a larger woodland that is part of the Westminster Ponds / Pond Mills ESA and is not isolated by permanent cultural barriers. The new boundary of the ESA should be redrawn to follow the current Open Space 1 (OS 1) and Open Space 5 (OS 5) zoning boundaries, whichever provides greater area (Map 12).

Reference Points 4 (East of Highbury on Bradley Avenue, Map 13):
Both of these vegetation patches are part of the Provincially Significant Wetland (PSW) complex found within the Westminster Ponds / Pond Mills ESA. They are surrounded by the 250-year flood line. As a result, they appear to fulfill the following ESA criteria (City of London 1997a):

- Criterion 2, since they have high quality natural land form vegetation communities classified as distinctive in the Province of Ontario.
- Criterion 4, since they may have hydrologic characteristics that contribute to healthy maintenance of a natural system beyond their boundaries.
- A more extensive survey of these woodland patches may determine that they also fulfil Criteria 5, 6 and 7 if they have a high biodiversity of biological communities, plants and animals; serve an important wildlife habitat or linkage function; or if they contain significant habitats for rare, threatened or endangered species.

It would have to be determined whether these patches would be a part of the Westminster Ponds / Pond Mills ESA, or if the permanent cultural barriers separating the two areas warrant consideration of these patches as a separate ESA. The boundary of the ESA should follow the 250-year flood line boundary (Map 13).

Reference Points 5 (Commissioners and Adelaide Street and West of Highbury Avenue, Map 13):
There is not enough information to provide any sort of guidance as to whether these areas should or should not be included in the ESA. The old landfill site just south of Commissioners is currently within the legal boundary of the ESA and inventory work needs to be done to determine whether it should remain in the ESA. The hydro corridor adjacent to Highbury is not currently in the ESA, but should be inventoried to determine

if it should be added to the ESA. More information regarding the plant and animal species that occupy these locations is needed. Although not forested, these areas may be important-habitat for grassland / shrub species.

Recommendation 6
The ESA boundary should follow the vegetation patch outline and / or 250-year flood hazard line, whichever is greater, since this hazard line usually matches the location of the wetland soil boundary. Developed areas should not be included within the ESA boundary.

Examples include:
Reference Points 6 (along the edge of the ESA boundary, Map 13):
The current ESA boundary does not follow the vegetation patch. According to the City of London guidelines for assessing boundaries of ESAs (City of London 1997a), the initial boundary should be drawn at the interface between the vegetation patch and adjacent lands, conforming to the vegetation patch outline.

Reference Points 7 (along the edge of the ESA boundary, Map 13):
The current ESA boundary incorrectly includes developed areas within the ESA boundary. According to the City of London guidelines for assessing boundaries of ESAs (City of London 1997a), residential and institutional areas within an ESA and surrounded on three sides by the ESA are not affected by the ESA designation.

Reference Point 8 (east of Highbury at Summerside Wetland, Map 13):
This vegetation patch has been reduced in size over the years due to various land use practices. To enhance some of the ecological function of the wetland feature, the extreme southern boundary should be extended out to follow the 250-year flood line boundary since this hazard line usually matches the location of the wetland soil boundary. The boundary to the north has recently been updated to follow the limit established for the proposed development, since it has been accepted by the City, the UTRCA and the provincial agencies.

Objective Three: Develop Recommendations For Property Acquisition

Rationale

Additional open space is needed at this site to meet the recreational needs of the local community, to relieve some of the pressure on the ESA, and to act as a buffer against any future development. Although the majority of the ESA lands are in public ownership, there are properties under private ownership that have been identified as important to the ESA.

Recommendation 7
The City of London should consider acquiring properties that are located either within the current ESA or within the proposed ESA boundary.

Examples include:
Reference Points 1 (Map 2):
These are areas currently within the existing ESA boundary that are owned privately.

Reference Points 2 (Map 2):
These are areas currently within the proposed ESA boundary (Map 13) that are owned privately.

Recommendation 8
The City of London should acquire the abandoned gas station found east of the ESA at Southdale and Adelaide Street.

Reference Point 3 (at Southdale Road and Adelaide Street, Map 2):
This property could be redeveloped into a parking lot for accessing the trail network within the ESA and for the proposed sidewalk along Southdale. The City might be able to recondition the existing structure, making it into a visitor's centre with accessible washrooms. Proposed improvements to the trail network may lead to a greater demand for parking and visitors' facilities in the future.

Recommendation 9
The City of London should acquire the right of way for the hydro corridor that runs parallel to Highbury Avenue.

Reference Point 4 (east of Highbury, Map 2):
If naturalized with low-lying shrubs and / or meadows, the hydro corridor would provide an excellent buffer protecting the adjacent ESA from Highbury Avenue. If the City if unable to acquire this property, then Hydro One should be approached to naturalize the corridor.

Objective Four: Recommend Areas For Increasing, Maintaining Or Restoring Habitat Through Naturalization Or Buffers

Rationale

Naturalization refers to any effort to convert managed landscapes, such as lawns or fields, to more naturally evolving landscapes. Naturalization can entail planting native species, removal of nonnative species, or ceasing intensive management practices such as lawn mowing. The purpose of naturalization in the Westminster Ponds / Pond Mills ESA is to increase, maintain or restore the existing natural vegetation communities by connecting areas, filling in open bays, or enhancing the amount of interior using indigenous plants or by allowing an area to regenerate on its own. Note that rehabilitation should not be regarded as a substitute for preservation and protection of natural areas. Note also the City of London Planning Committee report and Municipal Council amendment outlined in the Executive Summary of this document, in regards to the use of herbicides in this ESA.

Buffers are strips of vegetation (mixtures of trees, shrubs and grasses) that provide protective space between a sensitive natural feature or habitat and an adjacent habitat or activity, where proximity can cause negative effects. Vegetated buffers can protect water and other natural areas from contaminants in runoff by acting as living filters to trap and treat sediments and other materials. Buffers can stabilize streambanks, prevent erosion, increase the soil's water-holding capacity, reduce the impacts of flooding and drought, separate land use activities from sensitive natural areas, connect natural areas and provide fish and wildlife habitats through shade and greater plant diversity (Ontario Ministry of Agriculture and Food 2004). Buffers can also provide a zone of transition between habitat types.

Buffers can be a variety of shapes and sizes. Table 3 lists a range of minimum buffer widths needed to perform a particular function. It is generally accepted that a terrestrial buffer or riparian strip must be at least 30 - 60 metres wide to effectively protect water resources (Lee and Samuel 1976, Phillips 1989, Hartman and Scrivener 1990, Davies and Nelson 1994, Brosofske et al. 1997, Lowrance et al. 1984, Forsythe and Roelle 1989, Ontario Ministry of Agriculture and Food 2004). However, wider buffers perform

a greater number of functions more effectively. For example, wider buffers are needed for wildlife habitats and on steeply sloping land to be effective in filtering runoff.

Buffers will be targeted in open, or manicured, areas along the edge of the ESA. In general, sensitive habitat surrounding any of the ponds should be buffered. High water levels around the ponds should be used to determine the maximum extant of the buffer. Buffers adjacent to various terrestrial boundaries will also be beneficial.

Table 3. The minimum size for buffer strips to perform a particular function (Catelle et al. 1993, Semlitsch and Bodie 2003)

FUNCTION	MINIMUM SIZE OF BUFFER (m)
Stabilize Bank	5+
Remove Sediment	10 - 30
Trap Soil-bound Nutrients	10 - 30
Create Corridor for Mammals	15 - 30
Provide Habitat for Edge Bird Species	15 - 30
Enhance Aquatic Habitat	15 - 30
Trap Soluble Nutrients	15 - 30
Provide Habitat for Tree and Grassland Bird Species	50+
Provide Habitat for Nesting Waterfowl	50+
Provide Habitat for Mammals, Amphibians and Reptiles	30 - 300

A number of areas in the Westminster Ponds / Pond Mills ESA have been naturalized in the past and some of these are listed below:

- A community forest project initiated by the UTRCA in 1991 that became the Furtney Memorial Forest is located in the large area surrounding the parking lot adjacent to South Pond (Map 14, reference point 1). Approximately twenty-eight hundred stems were planted in rows in 1991 to allow for mowing of the area while the trees established. Species included Sugar Maple, ashes, Red-osier Dogwood, River Birch, Red Maple, Staghorn Sumac, Chokecherry, Wild Crab Apple, and Norway Spruce. However, this planting only had a 55 % survival rate and was replanted as part of the City of London Memorial Forest Program in 1995. Species included Black Ash, serviceberries, poplars, White and Green Ash, Red Maple, Sugar Maple, Kentucky Coffee-tree, Sycamore, Butternut, hawthorns, Wild Crab Apple, Basswood, Hackberry, ashes and Bur Oak.
- Trees were planted behind houses adjacent to the ESA in the early 1990's, but were often destroyed by neighbouring landowners or were out competed by weeds (Map 14, reference point 3).
- The area cleared for the Bradley Avenue Interchange was planted with soft maple and ashes in the early 1990s (Map 14, reference point 4).
- A manicured lawn east of the baseball diamonds was planted into trees by the Scouts (Map 14, reference point 6).
- The vegetation communities southeast of the SJHC and north of Saunders Pond were originally naturalized to help create interior habitats and provide a linkage with the main forest to the south (Map 14, reference point 13).
- An area south of the baseball diamonds (Map 14, reference point 15) was planted as part of a community forestry project to create interior habitat and fill in a pocket along the edge.

- An area south of the Neurobehavioural Rehabilitation Centre was originally naturalized to protect the ESA boundary (Map 14, reference point 14). This is a low-lying area that collects surface runoff and conveys it intermittently into a gully channel that leads to a cattail marsh (Map 9, Community 104) and to Saunders Pond.
- An area east of the driveway leading to the Western Ontario Fish and Game Protective Association off of Southdale Road (Map 14, reference point 5) was planted by school groups in November 2003 with 200 native trees and shrubs to buffer the west edge of the pond. Species included Green Ash, Ninebark, Pussy Willow, Red Maple, Red-osier Dogwood, serviceberries and Eastern White Cedar.

When planting native species in ESAs, only plants derived from local populations should be used to reflect the species composition at or near the area. The selection of trees, shrubs and grasses for naturalization or buffer strip plantings should be based on soil conditions, recommended native species for the ESA (Appendix F), flood tolerance, shade tolerance, growth rate and wildlife value. Species selected for planting should also follow the Guide to Plant Selection for ESAs (City of London 1994a) and the Guide to Native Woody Plant Selection for Middlesex County (City of London 1994b). It is especially important to use species native to Middlesex County and the London area when planting vegetation in or adjacent to ESAs in the City of London, and only plants derived from local populations should be used since they are better adapted to local conditions. Techniques such as pit and mound can be used before planting to create micro habitats such as vernal pools. All plantings should be mulched with wood chips to reduce competition from nonnative species and to retain moisture. The procedures followed and the results achieved in all rehabilitation projects should be fully documented.

It is also important to establish meadow habitats within the ESA. Meadows provide nesting, food and cover for waterfowl and game birds, shelter for songbirds, essential habitat for meadow-dependent species. Meadows need periodic disturbance by flooding or fire to prevent the natural succession of shrubs and trees. Prior to establishment of a meadow habitat, the area must often be cleared of Kentucky Bluegrass through chemical or mechanical means.

The Westminster Ponds area is used by the Westminster Ponds / Pond Mills Environmental Education Centre for many of its programs. They should be contacted prior to any changes in the area. As well, it is important that naturalization and buffering efforts near trails and multi-use pathways follow the City of London trail design standards for hiking, multi-use and shared use trails. Trail design standards are outlined in Section 8 of the Medway Valley Heritage Forest Site Planning Study (IMC Consulting Group 1996).

Recommendation 10
Naturalize or buffer the following areas by planting native trees and shrubs.

Reference Point 16 (Map 14)
Naturalize the area immediately north of the vegetation communities southeast of the SJHC lands and north of Saunders Pond to round out the woodland feature. The vegetation in the patch is Grey Dogwood, White Elm, ashes, European Buckthorn, willows, raspberries, Bitternut Hickory, Basswood, White Oak, Trembling Aspen, Ninebark, Sugar Maple, Highbush Cranberry, hawthorns and Black Maple.

Reference Point 17 (Map 14)
Naturalize the area southeast of the SJHC and north of Saunders Pond with trees and

shrubs to connect the isolated woodland patch to the remainder of the ESA. Mature Sugar Maple, Red Oak, Hop-hornbeam and American Beech, with an understorey of invasive species, are present in Communities 109, 157 and 115 (Map 9). Naturalizing this area will protect and possibly enhance the habitat of the nesting and migratory birds found in wetland habitats. Any habitat management must be reviewed in a co-ordinated manner with consideration for the proposed multi-use pathway.

Reference Point 9 (Map 14):
Planting trees and shrubs in the area between South Pond and Bradley Avenue will provide more shelter to the pond. Ensure that trees and shrubs are planted to allow for the possible future widening of Bradley Avenue.

Reference Point 19 (Map 14)
The area immediately north of the Dearness Home staff parking lot should be planted with trees and shrubs to buffer the ESA from the Dearness Home. This recommendation is in compliance with the Dearness Home EIS (Earthtech Canada Inc. 2001a, 2001b). At one time, a portion of the staff parking lot drained into the ESA, and the nearby area received concrete waste, excavation fill and other debris. Planting in this area should discourage this type of encroachment.

Reference Point 8 (Map 14):
The ball diamond area drains into Spettigue Pond, which is the most significant and sensitive of the wetland areas in the complex and is the least affected by existing development. Naturalization in this area is very critical since it will protect Spettigue Pond from any form of development on adjacent lands. The baseball fields could be naturalized with native plants if no longer used.

Recommendation 11
Naturalize or buffer the following areas by planting or seeding with wetland and meadow plants after Kentucky Bluegrass has been eliminated through chemical or mechanical (tillage) methods. This will provide some protection of the area from contaminants in surface runoff and discourage dogs from chasing the waterfowl, while still allowing an unobstructed view of the ESA. Consider options for maintaining meadow habitat over the long term

Reference Point 7 (Map 14):
Southwest of Tumbleson Pond is a manicured lawn of Kentucky Bluegrass with a swale running through the centre that may naturalize into a wetland. Currently the area is maintained (mowed) by the City of London. A few native Silver Maple and several varieties of exotic Norway Maple are present. If possible, the Norway Maple should be removed. Native trees and shrubs could be planted in clumped orientation at the northern end of this area, immediately adjacent to the ESA boundary. Some of the hedgerow vegetation has been pruned back or damaged by brushing and lawn maintenance equipment. Mowing within meadow habitats may adversely effect nesting success of certain ground-nesting species and should be stopped. A pathway could be developed with possible wheelchair access for the Dearness Home residents.

Reference Point 11 (Map 14):
The area immediately adjacent to South Pond and south of the residential development can be naturalized with wetland species to increase wetland habitats and to protect the edge of the pond from the adjacent subdivision. Planting wetland species will also allow nearby residents an unobstructed view of the pond.

Reference Point 18 (Map 14)
The access area off of Worthington Avenue is currently manicured. Although some maintenance activity is needed for visibility, this activity could be reduced to encourage succession of meadow species, which would be consistent with the character of the area. If necessary, remove Kentucky Bluegrass through chemical or mechanical (tillage) methods.

Reference Point 20 (Map 14)
The community garden at Pond Mills Road and Deveron Crescent should be naturalized to a meadow to protect the steep slopes and marsh habitat to the south (Communities 140 and 160, Map 9).

Reference Point 21 (Map 14)
The open fields on lands near the old veterans' buildings, which drain toward Saunders Pond, should remain as passive Open Space and be buffered with meadow to discourage dogs from chasing the waterfowl. It will also provide visitors with an unobstructed view of the pond.

Reference Point 12 (Map 14)
Seek opportunities to restore degraded habitat north of communities 188 and 189 (Map 9) and, through a series of connected wetlands of various types, provide a corridor link directly to the Dayus Creek Valley.

Recommendation 12
Allow natural succession to proceed in the areas identified below, where it is currently prevented by mowing and pruning. If necessary, remove Kentucky Bluegrass with chemical or mechanical (tillage) methods.

Reference Point 10 (Map 14):
The northwestern portion of the ESA at Wilkins Street and Wellington Road was the site of a residence that has naturally changed into an old field community. It is a highly disturbed area with an open canopy, scattered Siberian Elm and Manitoba Maple. Grasses, goldenrods, Riverbank Grape and Virginia Creeper are prevalent throughout. The site is characterized by sandy loam soils. Allow natural succession to proceed and consider featuring the historical aspect of the former residence.

Reference Point 22 (Map 14)
Mowing should be stopped in the isolated tree stand located on a portion of the SJHC property. As a result of these mowing activities, there is no understorey or mid-storey vegetation growth. Instead, the stand is an unnatural ring of mature ornamental trees, predominantly Siberian Elm, with Silver Maple and Green Ash, surrounded by manicured lawn. Over time, the Siberian Elm should be slowly removed and replaced by more appropriate species. If mowing is stopped, the area can naturalize and develop an understorey. Mowing should also be discouraged between Vegetation Communities 252 and 121 (Map 9), to encourage naturalization. Any habitat management must be reviewed in a co-ordinated manner with consideration for the proposed multi-use pathway.

Reference Point 23 (Map 14)
The slopes around the staircase should be left to naturalize, while the utility corridor can continue to be maintained.

Reference Point 24 (Map 14)
The area surrounding the Tourist Information Centre is a large, manicured lawn that slopes toward the ESA. Allowing areas closest to Saunders Pond to naturalize would increase the amount of protective buffers to the ESA. Any habitat management must be reviewed in coordination with the removal of the fence and the adjustments to trails.

Recommendation 13
Any development application on lands adjacent to the Westminster Ponds / Pond Mills ESA must be considered in the context of the ecological features and functions of the relevant portion of the ESA, as well as opportunities to maintain, enhance, or restore habitat within of adjacent to that portion of the ESA.

Objective Five: Develop Recommendations For Wildlife Corridors Outside Of The ESA

Rationale

Habitats adjacent to wetlands can serve as staging areas and corridors for species moving to other nearby wetlands. Westminster Ponds / Pond Mills ESA has many linkage opportunities. Meadowlily ESA occurs northeast of the Westminster Ponds / Pond Mills ESA, while the Locally Significant Elliot Laidlaw wetland and portions of the Westminster Ponds / Pond Mills PSW occur to the south east. Carolinian Canada has developed a long term natural heritage vision for southwestern Ontario called the Big Picture Project that identifies existing natural cores, corridors and outlying natural areas, as well as potential connecting links east and west of the Westminster Ponds / Pond Mills ESA (Map 15).

Recommendation 14
Establish a partnership with Carolinian Canada and others, with the goal of linking the Westminster Ponds / Pond Mills ESA to other areas identified by the Carolinian Canada Big Picture Project (Map 15) and to other recognized natural features (e.g., Meadowlily Woods, Elliot-Laidlaw Locally Significant Wetland). Although the value of such linkages may be diminished somewhat by the existence of road crossings and urbanized areas, the linkages should be pursued. Refer to recommendation 12 about linking the wetland communities within and adjacent to the ESA.

Recommendation 15
Investigate opportunities to link the biological communities in Westminster Ponds to adjacent, semi-natural service corridors. Build upon partnerships with owners of adjacent service corridors (Map 14). Explore the possibility of land acquisition or the use of these locations for a trail network adjacent to, but outside of, the ESA. Communicate with owners of service corridors to encourage adoption of land use practices that are consistent with the Master Plan update for Westminster Ponds / Pond Mills ESA.

Objective Six: Develop Program For Monitoring Water Quantity And Quality

Rationale

In the past, water quality and quantity studies within the Westminster Ponds / Pond Mills ESA have either been site-specific, in response to development applications, or have occurred at only one point in time (Appendix E contains historical information on water quality that has been collected since 1970.). Since there is not a systematic monitoring program in place in the ESA, it is very difficult to draw conclusions or determine trends. It is essential that the interaction between surface water and groundwater be established in order to protect the ESA. A monitoring program must be developed to gather baseline information, to enable routine monitoring of groundwater and surface water flow, and to evaluate changes to the aquatic system resulting from implementation of various recommendations in the Master Plan update.

Recommendation 16
At South Pond, establish a nest of monitoring wells that terminate in as many aquifers as encountered during drilling (ideally this will include shallow, intermediate and deep aquifers). Equip each of the monitoring wells with a continuous water level recorder (a pressure transducer). This system should become part of the provincial water monitoring network.

The hummocky terrain at South Pond, combined with pond features, suggests the area may be a groundwater recharge zone. Installation of monitoring wells could be achieved with minimal disturbance since there is a parking lot that would provide relatively easy access to the area.

The type of information that will be collected at each well site is based on the MOE monitoring program for the Thames River Basin (Ministry of the Environment 1981) and includes:
- hourly water levels (from the continuous water level recorder)
- yearly samples for a suite of anions / cations, fluoride, pH, conductivity
- description fo the drillers log (profile of the well)
- gamma ray log (to interpret geology)
- location of hydraulic head (the hydraulic heads of the shallow and intermediate aquifers in relation to the depth and water level in the ponds can be used to determine if the ponds are groundwater discharge zones).

Recommendation 17
At Saunders, Spettigue, Tumbleson, Thompson, North and South Ponds, as well as on the east side of Highbury Avenue where water enters the culvert, conduct monthly monitoring of physical parameters to determine consistency of pond conditions from year to year and to calculate water balance budgets. Review needs, costs and benefits of the Marr Drain joining Saunders Pond and Tumbleson Pond.
A description of the physical factors affecting the aquatic environment includes information on atmospheric conditions (air temperature, relative humidity, wind velocity and direction, cloud conditions, type and intensity of precipitation, etc.) as well as information on water parameters (surface water temperature, current velocity, turbidity, conductivity, etc.).

Recommendation 18
At Saunders, Spettigue, Tumbleson, Thompson, North and South Ponds, as well as on the east side of Highbury Avenue where water enters the culvert, conduct monthly monitoring of chemical parameters recommended for partners in the Provincial Water Quality Monitoring Network (PWQMN) to determine consistency of pond conditions from year to year and to compare to the Ministry of the Environment (MOE) water quality objectives (Maaskant et al. 2003). Analysis of sediments should follow guidelines established by Miller and Dorkin (2003) and Environment Canada (1994).

Recommendation 19
At Saunders, Spettigue, Tumbleson, Thompson, North and South Ponds, as well as on the east side of Highbury Avenue where water enters the culvert, monitor biological parameters including fish, invertebrate, plants and plankton communities to assist in understanding pond ecology.

Plants are particularly useful wetland health indicators since they are in intimate contact with water and sediments. Individual plant species show differing responses to human disturbance (Gernes 2002). Methodology should follow Jones et al. (2004), Barbour et al. (1999), Almendinger 1987) and Gerritsen et al. (2003). In closed systems with soft substrates, conduct annual benthic sampling using a recognized Rapid Bioassessment

Protocol (RBP) plus periodic fish sampling every 2 - 5 years as outlined in the Upper Thames River Watershed Report Cards (Upper Thames River Conservation Authority 2001).

Recommendation 20
Monitor overland flows that enter the catchments of Saunders, Spettigue, Tumbleson, Thompson, North and South Ponds from developed areas (e.g., Wellington Road, Neuro behavioural Unit, areas around the former veterans buildings). This includes the periodic flooding in communities 40 and 58 (Map 9) that may be associated with the fire hall practice site nearby. Monitor the presence of chemicals in this area that may be associated with the fire hall.

Recommendation 21
Review and field verify surface catchment divide lines (Map 6). The areas shown on Map 6 were derived using a DEM and should be reviewed and field verified to incorporate site alterations and other conditions. Where subdivision development is located, verify Map 6 using the most recent storm sewer mapping from the City of London, elevation models, stormwater designs, and special drainage facilities or practices. Determine surface catchment area for Dayus Creek Valley.

For example, catchment lines associated with sewers were based on typical development street right of way drainage design cross-sections, where drainage to roadways and streets begins at the centre of subdivision lots or buildings. The remainder of the lots drain to the rear. Parking lots would be assumed to drain entirely to the sewers. Some examples of stormwater system modifications that have been constructed include the Storm Water Management (SWM) pond at the intersection of Pond Mills Road, Southdale and the CNR tracks and the SWM pond just off of Pond Mills Road.

Recommendation 22
Develop water budgets for the ponds. Consider pre- and post development conditions, contributing land areas, land use and drainage characteristics.

For example, it may be important to consider that storm sewers are designed to only pick up minor storm runoff and that runoff from major storms may potentially flow overland away from storm collection systems and towards the ponds. As well, the City of London has a program to assist home owners with pumped foundation drainage systems for alleviating flood problems to hook into the storm system. The areas where this is practised should be identified and possibly quantified.

Recommendation 23
Evaluate all man-made drainage structures draining into and out of the ESA to determine if they are fully functional and / or necessary (Map 6). This includes the two drains off of Pond Mills Road (Map 9, Communities 151 and 199), the drains flowing out of Tumbleson and Saunders Ponds (Map 6, Marr Drain extensions #1 and #2 and ditch inlet), the east side of Highbury Avenue where water enters the culvert, as well as the drain located in the area north east of the Tourist Information Centre which is draining northwards toward Saunders Pond. The quality and quantity of water flowing through these drains should be monitored. Assess whether plugging the drainage structures would benefit the ESA.

Recommendation 24
Investigate and then decommission all abandoned wells to protect groundwater sources and to ensure public safety.

For example, at the northwestern portion of the ESA at Wilkins Street and Wellington Road (Communities 251, Map 9) is the site of a former residence. The land surrounding

the former building has changed into an old field community. It may contain an old well that has not been properly decommissioned.

Recommendation 25
Analyse historic information, including air photos and water quality and quantity measurements, to determine natural fluctuations in pond conditions.

Objective Seven: Develop Recommendations For Minimizing The Impact Of Invasive Species

Rationale

An invasive exotic species is an aggressive nonnative plant or animal that threatens or replaces native species. The insects and blights that kept them in control in their countries of origin are not present in North America, allowing them an unfair advantage over native plants. Exotic plants can create mono cultures and disrupt the balance of nature by displacing other native plants and animals (Vaughn and Berhow 2000, Schmidt and Whelan 1999). More than 900 exotic species have been introduced to Ontario over the last 240 years (Society for Ecological Restoration 2004). Fortunately, only a few nonnatives are invasive and pose a serious threat to natural areas.

It is usually easier to prevent the establishment of invasive exotic plant species and to focus efforts on specific problem areas (e.g., a 0.1 ha patch within woodlands) rather than eliminate well-established colonies. A combination of mechanical (e.g., pulling) and chemical (e.g., herbicide) methods are often needed to adequately control invasive plants. Control efforts must balance improvement of the natural community with damage caused by the management. It is always best to take the least damaging approach in controlling exotic species. Herbicides are sometimes the only effective method of control, but even their careful use can pose a threat to the native vegetation and wildlife. Note the City of London Planning Committee report and Municipal Council amendment outlined in the Executive Summary of this document, in regards to the use of herbicides in this ESA.

In general, healthy and undisturbed ecosystems are more resistant to invasions by new species. There are several preventive actions that can be carried out to improve a natural area's health and, in doing so, create conditions less favourable to invasive species. Some of these actions include the following:

- Limit soil exposure and the spread of exotic seeds by closing unofficial trails.
- Control encroachments (e.g., tree cutting, garden waste dumping) that kill native plant species.
- Plant shrubs and trees around natural areas to buffer the site from wind damage. Excess wind blows away leaf litter on the forest floor, exposing the soil to exotic seeds. Staghorn Sumac propagates swiftly and makes an excellent windbreak, especially on south and west exposures (e.g., along the east side of Wellington Road). Birds use the seed heads as a food source.
- Plant native species in openings or disturbed areas before exotics can get a foothold
- Increase the size of the habitat to reduce the amount of edge.
- Reduce compaction, one of the main reasons that exotic species secure a foothold. Encourage visitors to stay on designated trails by maintaining good trail conditions (good marking, board walks or culverts in wet areas, etc.).
- Minimize the amount of human disturbance or movement in high quality or sensitive terrestrial and aquatic habitats (e.g., in and around Spettigue Pond).
- Do not introduce or release nonnative species to natural areas.

Recommendation 26
Monitor terrestrial and aquatic communities annually for presence of new invasive species.

Recommendation 27
Where measures for control of invasive species are introduced, establish experimental plots to determine effectiveness of control measures.

Specific Recommendations for the Three Most Common Invasive Species
Common and Glossy Buckthorn
Glossy Buckthorn is a tall shrub or small tree native to the bogs and swamps of Eurasia and introduced to North America as an ornamental shrub. It is found most frequently in wetland communities such as fens, wet prairies, and sedge meadows. However, it also invades mesic upland sites including prairies, roadside ditches and old fields. Common Buckthorn is more sun-tolerant and is found in prairies and abandoned fields.

All exotic buckthorns produce a fruit that is eaten by birds. The laxative effect of these fruits results in the distribution of the seeds in the bird's droppings, enabling these shrubs to spread widely. Once established, exotic buckthorns shade out native herbs and shrubs and can form large mono cultures.

Large sites with widespread buckthorns may be impossible or impractical to treat. Effort may be best spent eradicating it from specific, sensitive areas where rare plants or plant communities are being threatened. Mechanical control techniques are not very successful since the shrubs sprout prolifically from cut or damaged stems and roots. Currently, there is no biological control agent for buckthorn.

Recommendation 28
Where severe infestations of buckthorns are found, cut the buckthorns, then apply the herbicide Garlon 4 (20 %), which has been found to be effective at killing exotic buckthorns (Packard and Mutel 1997). Use great care within the ESA, to ensure the chemical does not kill desirable species. After the buckthorn is dead, and the stems and branches have been removed, plant native species in the newly opened area, before the buckthorn begins to invade again. Staghorn Sumac can be planted to rapidly overgrow areas where buckthorns have recently been removed.

Purple Loosestrife
Purple Loosestrife is a tall European perennial plant with a showy spike of purple flowers. It grows in a variety of habitats that are wet for at least part of the year (Haber 1996) and can form dense single-species stands that crowd out existing wetland vegetation. This species can spread rapidly since each plant produces enormous numbers of seeds that can remain viable for a number of years in the soil. As well, root and stem segments can form new flowering stems (Bowe 1998). Seeds and plant segments may be dispersed by water, wind and mud attached to animals, and can germinate over a wide range of environmental conditions. Its ability to spread has been further enhanced by the absence of natural enemies and by the disturbance of natural systems by human activity. As a result, it is difficult and costly to control.

Mechanical control methods are very labour-intensive and not effective with older, larger stands (Keddy 1992, Malecki et al. 1993). Purple Loosestrife has been found in all ponds in the Westminster Ponds / Pond Mills ESA except for Spettigue Pond. Galerucella beetles were released at Tumbleson Pond in May 2000 to control Purple Loosestrife. Although it takes a couple of years for the beetles to become established, preliminary results indicate that the beetles are controlling the Purple Loosestrife. Future monitoring will determine the success of this program.

Recommendation 29
Monitor known colonies of Purple Loosestrife, to determine effectiveness of the Galerucella beetles that were introduced in May 2000.

Recommendation 30
Monitor throughout the ESA to identify any new colonies of Purple Loosestrife as they become established and assess need for future releases of Galerucella beetles

Garlic Mustard
Garlic Mustard, a cool-season biennial herb in the mustard family, was brought to North America by European settlers as an edible herb. It germinates in early spring and the young plants overwinter as basal rosettes. The following spring the adults bloom, set seed, then die. Garlic Mustard is extremely difficult to control due to its rapid spread, prolific seed production, early spring growth, and lack of insects/predators. It has spread widely throughout the forests of southern Ontario and many parts of North America. It can invade shaded areas, especially disturbed sites, as well as areas receiving full sunlight, such as old fields or flood plains where wind or water exposes the soil on the forest floor, creating ideal conditions for Garlic Mustard seed germination.

Garlic Mustard spreads rapidly and can dominate the ground layer, displacing native plants. Although the negative effects on native plant and animal communities are not well documented, there is some evidence that it impacts ground-nesting birds, small mammals, insects and amphibians. It also contains phytotoxins that inhibit the germination and growth of neighbouring plants (Vaughn and Berhow 2000, Nuzzo 2000).

Recommendation 31
Establish a test site in an area where Garlic Mustard is the only plant in the ground layer and no sensitive native plants or amphibians are present. Spray the foliage with a mixture of 2 % Roundup and 2 % 2,4-D (in water) in early spring or late fall when most native vegetation is dormant but Garlic Mustard is green. Plant native species once the Garlic Mustard is dead to give them a foothold before the Garlic Mustard re-invades. Mayapple can be transplanted in the early spring. It spreads well and should crowd out areas where Garlic Mustard ordinarily flourishes. Monitor the test site to determine whether this method is suited to the site-specific conditions in the ESA.

Objective Eight: Develop Recommendations For Minimizing Negative Impacts Of Nuisance Wildlife

Rationale

Some wildlife species have adapted so well to humans and human disturbance that they have become nuisance species. These animals thrive in urban environments because of the abundance of food, including human refuse and ornamental plantings. In the Westminster Ponds / Pond Mills ESA, the nuisance wildlife species include Beaver, Canada Geese, Raccoons, Striped Skunks and White-tailed Deer.

The OMNR recognizes hunting and trapping as the most effective means of keeping nuisance wildlife populations in balance. However, these methods are not always practical or safe in an urban environment. Recognizing that wildlife is protected by one of three acts - the Fish and Wildlife Conservation Act, the Endangered Species Act or the Federal Migratory Birds Convention Act, all control measures must have regard for these pieces of legislation and for the location of the area.

Recommendation 32
Implement a wildlife monitoring program to identify the species of wildlife present, determine the size of the populations, location of habitats (e.g., beaver dams, wildlife dens) and record instances of complaints regarding nuisance wildlife. Investigate appropriate methods of deterring wildlife if necessary.

Specific Recommendations for the Four Most Common Nuisance Species of Wildlife
Beaver
The Beaver is a semi-aquatic mammal. At two years of age, Beaver leave the home colony to search for winter quarters (Novak 1976). Their life span is between five and 10 years, with some living up to 20 years. In London, predators of Beaver such as Coyotes, Wolves and other large carnivores have either disappeared in this area or have become uncommon. In the absence of significant predation, trapping is the only major cause of death, yet Beavers can maintain their numbers with an annual trapping rate of 40 per cent.

Beaver ponds can play a valuable and significant ecological role by contributing to the stabilization of water tables and reducing rapid rain runoff. Beaver habitats are often rich in plant and animal life, making beaver ponds excellent sites for observing nature. By removing trees from the banks of a pond, the Beavers allow native marsh grasses, reeds, sphagnum, pond lilies and iris to grow, where they flourish in the added sunlight and create habitats for nesting waterfowl, spawning amphibians, and insects. Dead trees in standing water can be used as perches and nesting sites for insect-eating birds, raptors and woodpeckers and therefore become a valuable component of the ecosystem.

Beaver problems can also occur wherever there are trees and water. In the Westminster Ponds / Pond Mills ESA, beaver activity is drowning trees, increasing mosquito habitats and destroying the trail system around some of the ponds. The beaver dams in and around the ponds are temporary, small structures. Despite their small size, these structures disrupt drainage in the Pond Mills and the Dayus Creek area, leading to localized flooding near buildings, yards, trails and roadways. The Beavers are also girdling and destroying the Trembling Aspen and ashes on the wooded slopes and swamps surrounding the ponds.

Relocation of Beaver is costly. Relocated Beavers either return to the problem area or do not survive relocation. As well, it is difficult to find new areas to relocate the Beavers to. Other solutions must be developed.

Recommendation 33
Initiate a study to determine the feasibility of allowing Beaver to remain within the ESA because of the ecological contribution they can make in diversifying the habitat types in the immediate area and because of the educational opportunity they provide. In the interim, reduce Beaver damage by installing a water level control pipe at the desired level and by placing mesh guards over culverts. When necessary, problem animals should be removed by a professional licensed trapper.

Canada Goose
In the early 1970s, the London Waterfowl Association was formed with the intention of setting up a waterfowl sanctuary at the Westminster Ponds (McLeod 1981). At this time, two pairs of Canada Geese were introduced at Saunders Pond. In their second year they nested and the young returned the following spring with other geese. Within a few years, hundreds of geese were counted on Saunders Pond during the fall migration. As well, several hundred geese over winter in the ESA, where they rest on Saunders Pond and have been fed in the past at Tumbleson Pond. They appear to be well established at the Ponds.

Unfortunately, springtime grazing by Canada Geese and their goslings can cause defoliation around the ponds. They leave droppings along the shoreline and on human structures. Canada Geese are prevalent in ponds that have exposed shorelines and lots of human activity, such as Tumbleson Pond and Saunders Pond.

Recommendation 34
Plant quick growing native shrubs and herbaceous plants from Appendix F along shorelines to impede sight lines and discourage the Canada Geese from residing near ponds. Since adult geese will not leave their flightless goslings, place a snow fence around the plantings to protect them from grazing geese. By the time the goslings are able to fly, the plants are high enough to discourage the geese.

Recommendation 35
Monitor success of planting treatments to discourage Canada Geese. If unsuccessful, consider implementation of more drastic population control measures, such as egg oiling, to reduce the number of Canada Geese.

Raccoons / Striped Skunks
Raccoons and Striped Skunks are omnivores and will feed on a variety of plants and animals including nuts, sweets, domestic pet food, insects, small mammals and eggs of ground-nesting birds. Their scavenging natures make them nuisance wildlife for the landowners adjacent to the Westminster Pond / Pond Mills ESA. Raccoons and Striped Skunks also adapt to urban environments, and will establish their dens in sheds, garages, attics, or under various structures including sheds and decks. Both animals hunt at night and do not hibernate during the winter.

Raccoons are found in woodlands near water and use hollow trees as dens. They are intelligent and very curious, allowing them to easily adapt to new situations. Their slender, agile hands, combined with their problem solving skills and fierce natures, make these animals difficult to control. Striped Skunks are not as clever as Raccoons, but have an excellent defence mechanism (i.e., a pungent spray) and sense of smell that make them difficult to trap and relocate. Striped Skunks prefer to live along forest edges or shrub lands in dens on the ground. Striped Skunks are preyed upon by Badgers, Coyote, Red Fox and large owls, while Raccoons do not have many natural predators.

Recommendation 36
Eliminate food sources such as garbage, and open compost containers. Replace garbage bins with raccoon-proof containers, and encourage residents bordering the ESA to adopt a similar approach.
White-tailed Deer

The White-tailed Deer is the most visible large mammal in southwestern Ontario. The deer's breeding season, or rut, takes place in the fall with young born six and a half months later, usually toward the end of May. Although fawns are able to walk shortly after birth, the doe (female deer) will hide them in a dry location sheltered by long grass or shrubs. Female deer prefer to keep a little distance from their fawns in an effort to keep them hidden, and will have direct contact with them only when nursing. A fawn found alone should never be touched or moved; its mother is nearby and it is important not to get human scent on the fawn.

White-tailed Deer are browsers that feed on the tender shoots of a variety of plants. Grass is eaten only in early spring. In the summer, White-tailed Deer eat the leaves and tips of shrubs and trees as well as a wide range of herbaceous plants. Late summer

and autumn bring on the ripening fruit and nuts that the White-tailed Deer depend on for fattening up to help them survive the rigours of winter. In the winter, White-tailed Deer feed on the bark and cambium (inner bark) of twigs and small branches and winter green herbaceous plants. Because White-tailed Deer feed on shrubs, small trees and herbaceous plants, they are not found in deep, dense forests but along the edges of forests or in open woodlands.

For most of the year, White-tailed Deer are solitary or found in small groups. In winter, however, White-tailed Deer may congregate ("yard") in areas that provide shelter from storms, are free from deep snow, and have a supply of food. The White-tailed Deer disperse in the spring and summer, when food is once again abundant and accessible.

White-tailed Deer in the Westminster Ponds / Pond Mills ESA might move out of the area and onto the busy roads surrounding the area more frequently as the population of White-tailed Deer grows, as more land is added or connected to the ESA, and when the LHSC fence is removed.

Property owners bothered by White-tailed Deer foraging in their backyards can consider the following suggestions:

- Make the property boundary and garden unappetizing to deer.
- Block the view, since deer want an unobstructed view to detect approaching predators and will not leap into a yard if they cannot see where they will land.
- Tidy-up the yard by removing fruit such as apples and pears as they ripen, and tilling under plants in the vegetable garden after harvest.
- Fence out White-tailed Deer using at least a three-metre fence.

Recommendation 37

Monitor the presence of White-tailed Deer in the area and review traffic reports annually as they pertain to accidents involving White-tailed Deer. Urge the City of London to develop a policy to control deer populations when numbers and / or accidents reach unacceptable levels.

Objective Nine: Develop Recommendations For West Nile Virus (WNv)

Rationale

The spread of WNv in Ontario has attracted the attention of public health officials, the media and Ontario residents. WNv is spread to humans through the bite of infected mosquitoes. At this time, the human health risk of WNv remains minimal compared to other human health risks. According to the Centres for Disease Control (CDC), the chance that any one person will become seriously ill from an infected mosquito bite is extremely low.

One misconception is that any type of standing water, such as wetlands and waterways, may produce large numbers of virus-infected mosquitoes and that all potential sites should be drained, filled, sprayed or managed to eliminate the possibility of WNv transmission. However, not all water bodies are home to the mosquito species that propagate WNv. Instead, mosquito-producing habitats vary in the species of mosquito that they support. Culex, the primary mosquito species that propagates WNv, is a small container breeder. It is more likely to be found in greater numbers in puddles of water in a residential backyard than in a wetland.

Healthy wetlands also have features that reduce the number of mosquitoes. Mosquitoes are an important part of the food chain and healthy wetlands are home to hundreds of

mosquito-eating aquatic insects (beetles, back swimmers, water striders, dragonflies, etc.), birds, frogs, fish, turtles and bats. This balanced predator-prey relationship provides natural mosquito control. In addition, water levels naturally fluctuate in wetlands, or surface water is stirred by the wind, which helps reduce the number of mosquitoes. Disturbance by humans, or the elimination of other life forms through the inappropriate use of pesticides, may increase the number of mosquitoes in a wetland. Therefore, it is important to preserve the natural balance in a wetland. Wetland restoration and preservation decrease the mosquito population by providing habitat for the natural enemies of mosquitoes and by reducing or preventing floods in areas that aren't normally wet (i.e., areas that will support mosquitoes but not their predators).

Control of nuisance mosquitoes is not recommended in the Westminster Ponds / Pond Mills ESA since these insects are an important component of the food chain. However, control of WNv is a public health issue. The Ontario Ministry of Health and Long-Term Care, in association with local health units and municipalities across the Province, has the primary responsibility for research and public education about WNv. They monitor mosquito populations throughout the City of London, including the Westminster Ponds / Pond Mills ESA, and determine when it is appropriate to apply control measures.

Recommendation 38
Encourage the presence of natural predators for mosquitoes, and reduce the amount of artificial or disturbed habitats to reduce WNv mosquito populations.

Recommendation 39
Encourage visitors to the ESA to take preventive measures as this is the most effective way of protecting oneself against WNv. Preventive measures include limiting your outdoor activity during dawn and dusk, wearing long sleeved, light-colored clothing and long pants and using insect repellent containing DEET on skin or clothing.

Recommendation 40
Encourage neighbours of the ESA to eliminate mosquito habitats in backyards.

Objective Ten: Develop Recommendations For Ecological Succession of the Retired Landfill

Rationale

The sanitary landfill site located on either side of the CNR tracks near Commissioners Road East (Communities 193 and 194, Map 9) has been closed since 1971. The largest part of the landfill is on the west side of the railway line (Community 193, Map 9). It extends approximately 762 m south and 305 metres west of the railway at its maximum width. On the east side of the railway, there is a much smaller landfill extending approximately 122 metres east of Leathorne Street and south to the railway (Community 194, Map 9). Another portion of this landfill site (not surveyed in this study) is located behind the apartment buildings north of Community 194 (Map 9). The landfill site contains old field communities, consisting of a mix of perennial grasses, a variety of herbaceous plants and scattered shrubs. While these communities may change over time, they are important to the ESA as nesting and foraging sites for grassland birds and as suitable habitat for the Northern Brown Snake. There are bare areas where leachate or erosion is preventing any plant growth and there are still several active methane flares.

Substantial quantities of methane gas are still venting off the site and this is probably the main reason that there has been limited vegetation growth in the area. Vegetation growth is usually slow on landfill sites due to the combined effects of low soil moisture,

slightly elevated soil carbon dioxide and methane gases, elevated soil temperature and depressed oxygen concentration. Although a leachate collection system occurs on the site, there are outbreaks south of the railway tracks. It is unclear whether the collection system is effective.

The site is used for tobogganing, dog walking, birding, etc. The open habitat is used by more than 28 bird species, including the Eastern Meadowlark and the American Kestrel (Level 2 priority species for conservation in Middlesex County) as well as the American Goldfinch and Field Sparrow (Level 3 priority species for conservation in Middlesex County). Several species of small mammals also live here and are part of the diet of the American Kestrel and the Red-tailed Hawk that nest nearby.

In the long term, it is desirable to establish native vegetation over the entire site to enhance biodiversity and create a habitat connection between the western and the eastern halves of the ESA. Good vegetation cover is also desirable since plants intercept rainfall, thereby reducing the volume of leachate coming out of the landfill. Four options for the retired landfill site are outlined in Appendix G.

Recommendation 41
Investigate the importance of the landfill site to grassland birds, determine its suitability for continuing as grassland habitat and consult with experts on prairies, grasslands and landfills to determine appropriate native species that could be introduced. Plant small, hospitable sites rather than large areas (Option 2, Appendix G).

Recommendation 42
Consult with Pollution Control Technician and the Project Manager for solid waste at the City of London to reduce leachate.

Objective Eleven: Develop Recommendations For The LHSC Fence

Rationale

An old fence that separates the recently donated LHSC lands from the Westminster Ponds / Pond Mills ESA is an unnatural barrier to the west and south of Saunders Pond restricting movement by both humans and wildlife. An inventory of the trees and sensitive herbaceous plant species along and within 2.5 metres of the fence line on the trail side was conducted to assess any damage that might occur in removing the fence, including damage from the equipment needed to remove the fence (Appendix H). The removal of the fence will be difficult, given that the metal posts are cemented into the ground, that it is a long fence, and that some trees have grown into the fence.

Recommendation 43
Remove the fence, by taking down the chain link and barbed wire, and cutting the posts at their base, leaving the cement in place (Option 4 Appendix H). This is the least damaging option for removal of the fence. Fence removal should occur in conjunction with the creation of appropriate new trails and signing to discourage visitors from wandering at random in the vicinity of the Tourist Information Centre and Saunders Pond.

Objective Twelve: Develop Recommendations To Eliminate Encroachment

Rationale

Encroachment occurs when a property owner intrudes on, in, under or over the ground space of another property owner, including those properties that are publicly owned (e.g., parkland, natural areas, road allowances and easements), either deliberately or

inadvertently. Examples of encroachment include structures or activities commonly located on adjacent public parklands such as:

- play structures including sand boxes, play gyms, play houses, swings and slides,
- garden or storage sheds, trailers, campers, boats and building materials,
- stairs, patios, down spouts, lighting, fences, decks and recreation structures (e.g., volleyball nets),
- dumping/storing of leaves, brush and garden waste, which spreads nonnative horticultural plants into the ESA,
- cutting down vegetation in the ESA,
- trails extending from private properties into the ESA.

Public agencies such as municipalities and Conservation Authorities are charged with the responsibility of protecting open space and ESAs for the enjoyment of their residents, now and in the future. They are the stewards of the land and are to act in the best interest of the public. Conservation Authorities and municipalities are concerned with encroachment onto public property for a number of reasons:

- Encroachments can cause irreparable damage to ecologically sensitive ecosystems.
- Encroachments on public lands can be safety hazards to the public. They may give rise to serious liability claims from resultant injuries and may destabilize public lands with resultant damages to adjacent private lands. They may increase costs to the taxpayer for restoration of public lands.
- Encroachments restrict or limit the use and enjoyment of public lands that are maintained by a Conservation Authority or municipality for the benefit of all its watershed residents or citizens.
- Encroachments reduce the amount of parkland available to the general public.

In 2001, the UTRCA entered into an agreement with the City of London to manage six of the ESAs within the City's jurisdiction. The UTRCA is now responsible for the day to day management of the areas including trail development, risk management, education, and enforcement of regulations.

An Encroachment Deterrent Program has been developed by the UTRCA to create a change in behaviour. The UTRCA wants to motivate landowners bordering publicly owned lands to stop encroaching onto these lands. The program is designed to ensure that landowners are aware 1) of the negative effects of their actions and 2) that they run the risk of being punished. The components of education, when coupled with enforcement, will result in an increased knowledge and appreciation of the impacts of encroachment and an increased understanding of the consequences.

Recommendation 44
Implement the Encroachment Deterrent Program that has been developed by the UTRCA in consultation with member municipalities.

Recommendation 45
Coordinate garbage collection with the City of London, the UTRCA, adjacent property owners, school groups and community organizations.

6.2 Determine Compatible Uses

Objective One: Develop Recommendations For Compatible Recreation Within The ESA And On LHSC And SJHC Property Immediately Adjacent To The ESA

Rationale

The Westminster Ponds / Pond Mills ESA is used for a number of passive outdoor activities such as walking, running, birdwatching, research, outdoor educational programs and cross-country skiing, as well as to gain access to fishing, canoeing, skating, picnicking and tobogganing areas. It is also used for a number of active recreational activities that may present a growing threat to the wildlife and vegetation, such as trail biking, wood cutting, tree carving, trail blazing, dumping, littering, running dogs off-leash, and campfires. For example, two dead specimens of Northern Brown Snake were observed on July 2, 2004 in the old landfill site (Wake, pers. comm.). Both had been run over by bicycles.

A list of acceptable and unacceptable uses was created by the Local Advisory Committee (LAC). An acceptable use had to conform to the City of London Parks and Recreation Area By-Law (PR-1, Oct 18, 1999), the EEPAC policy on bicycle and pedestrian trails in ESAs (City of London 1997b), and have minimal impact on the environment. The following activities were considered acceptable recreational activities at the Westminster Ponds / Pond Mills ESA:

- Hiking / walking
- Snowshoeing
- Cross country skiing (classical skiing only) on managed trails
- Nature interpretation
- Picnicking in designated areas (Map 16)
- Walking leashed dogs (stoop and scoop). Ensure that dogs do not wander into the sensitive habitats of the ESA and disturb wildlife including ground-nesting birds.
- Public fishing (under Provincial regulations) in designated areas on the Ponds (Map 16). Private fishing club at Tumbleson Pond.
- Canoeing / kayaking (only in South Pond as this activity would deter the visiting and nesting waterfowl that use the ponds during migration and breeding seasons)

All other activities were considered unacceptable recreational activities at the Westminster Ponds / Pond Mills ESA.

Recommendation 46
Enforce policies regarding unacceptable uses, with the objectives of changing behaviour over time and increasing understanding of the consequences of noncompliance.

Recommendation 47
Review the feasibility and necessity of establishing an off-leash dog park on the City of London property at the retired landfill site south of Commissioners Road East, north of the CNR tracks (Map 16, general recommendation 49). This recommendation may be acted upon only if biological inventory provides reasons to remove this area from the ESA. The City of London Parks and Recreation Area By-Law (PR-1, Oct 18, 1999) may have to be amended to permit a dog park in this area. As well, the park would have to be fenced off and adequately signed from the ESA proper to

Objective Two: Develop Recommendations For Access And Trail Signs

Guiding Principles for Access Points

Starting with existing access points, establish priorities that will:
- reduce the number of access points to the minimum needed to serve main user groups and ensure reasonable level of access from different directions;
- ensure parking is available, or can be made available, if the access point accommodates users arriving by car;
- identify natural features that cannot withstand having an access point nearby, and avoid placing accesses near these features.

Rationale

Currently, the area is too readily accessible from a number of points along its boundary. Access to the ESA is uncontrolled and occurs in numerous locations along the boundary of the ESA. Vehicular parking is provided at several locations along the perimeter of the site. To prevent confusion, a better delineation of trails and proper signage is needed. Trail signs and markers are needed to provide direction and information to the users of the area. Fencing in parts of the area is also not acceptable since it would affect the appearance of the area and the movement of the animals.

Recommendation 48
Establish four main access points.
1) Southdale and Adelaide Street (Map 16, access 20). It is recommended that the City of London acquire the abandoned gas station to the east of the ESA to use as a parking lot since there is no easy access to this area. The commemorative Rotary Club kiosk at this location may attract more users to this access point.
2) Tourist Information Centre off Wellington Road (Map 16, access 1). The parking lot may need to be expanded.
3) The Westminster Environmental Education Centre off Commissioners Road East on the Western Counties Road (Map 16, general recommendation 22). Although the most direct route to Saunders Pond is the Western Counties Road (Map 16, trail 23), the road is in poor condition and needs to be improved. There is an easement for the City to have access over the road, and shared costs for its upgrade and maintenance. The area may also need more parking spaces in the small field adjacent to the buildings. One of the three entrance points in this area (Map 16, access 3) could be decommissioned to reduce the number of access points.
4) South Pond off of Pond Mills Road (Map 16, access 14). This area has an established interpretive trail and a large parking lot (Upper Thames river Conservation Authority 1994).

Recommendation 49
Erect the official City of London ESA signs at the four main access points identified in Recommendation 48. Determine the exact placement of these signs, and remove any existing signs as needed.

Recommendation 50
Establish large, highly visible kiosks with interpretive information at the four main access points identified in Recommendation 48. These kiosks will incorporate the recommendations in Appendix I and highlight the cultural and biological features of each section of the natural area at the trail head. The kiosks will be visible and adequately lit to discourage vandalism. Cooperation could be sought from interested organizations regarding the presentation of history and the maintenance of the interpretive trails.

Recommendation 51

Establish community (neighbourhood) access points along the edge of the ESA and install small entrance signs incorporating recommendations in Appendix I (i.e., signs can be used to identify the ESA property, provide information on location and list acceptable / unacceptable activities).

For example:

- entrance points off of Parliament Crescent (Map 16, access 18), Shaftesbury Avenue (Map 16, access 17), Pond Mills Road (Map 16, access 15), Pond View Road (Map 16, access 12), Worthington Avenue (Map 16, access 11), Agincourt Place (Map 16, access 7), Silverdale Crescent (Map 16, access 6) and the Pond Mills Environmental Education Centre (Map 16, access 10).
- entrance to the Henderson Trail off of Pond View Terrace (Map 16, access 13). This is a community access point because it is isolated and difficult to access from main roads.
- entrance at Adelaide and Commissioners Road East beside landfill (Map 16, access 5). The design of the parking lot may need to be improved to accommodate additional cars. As well, it is hard to enter the parking lot from the east. Appropriate agencies would have to be contacted about perhaps establishing a turning lane or a parking lot on the north side of Commissioners Road East with a pedestrian overpass.
- if trails are developed around Saunders Pond, then an access point at Wilkins Street that would connect the hospital lands with the northern half of Saunders Pond be warranted (Map 16, trail 28). Wilkins Street can possibly be an access point for the proposed multi-use trail.
- if trails are developed in the Dayus Creek Valley (Map 16, trails 40 and 42), then access points off of Southdale Road East (Map 16, access 16) and Pond Mills Road (Map 16, access 8) should remain as community access points. If these trails are not developed in Dayus Creek, then these two access points should be decommissioned.
- the development of a new wheelchair accessible trail-loop in the manicured area adjacent to the Dearness Home (Map 16, trail 27), with a concrete walkway to the Southdale Road East and Adelaide Street entrance (Map 16, trail 26), would provide an additional recreational opportunity for residents of the home and an opportunity to restore the manicured site.

Recommendation 52

Decommission all other entrances or access points currently in use but not listed above as main or community access points. Discourage direct access from private properties, and consider such activities as encroachment issues.

For example:

- decommission access 3, 19 and 21 (Map 16).
- decommission access points off of Southdale Road East (Map 16, access 16) and Pond Mills Road (Map 16, access 8) if new trails are not developed in Dayus Creek.
- decommission the low lying and unmarked trail (Map 16, access 21) if a more suitable trail is placed to the west of Dearness Home that connects to the main trail at the Tourist Information Centre (Map 16, trail 25)
- decommission access 9 (Map 16) on Millers Road since it does not connect to the trail system of the ESA and is being used as an illegal dumping site. The fence along the railroad at this location has also been illegally cut to allow people access to the tracks. If a trail network cannot be developed in this area, then Access 9 should be decommissioned.

Recommendation 53
Install hazard signs in areas where hazards cannot be mitigated (e.g., at certain steep slopes).

Recommendation 54
Install small signs that identify the boundary of the ESA in areas adjacent to urban development.

Recommendation 55
Mark all major trails with different names or colors to prevent confusion. Locate these trails using the Global Positioning System (GPS).

Objective Three: Develop Recommendations For Trail Design

Note: Specific trail recommendations and Map 16 are conceptual at this point. Final placement of trail location will need to occur in consultation with experts in trail design and with appropriate stakeholders.

Guiding Principles for Trails

All trails will cause some degree of damage. Therefore, in order to maintain the ecological integrity of the ESA, the trail network provided should:
- connect to recognized access points only;
- be the minimum trail network required to connect access points and provide access to interpretive features;
- use existing routing and trail infrastructures (e.g., board walks) where feasible;
- avoid, as much as possible, sensitive areas, including those with poor drainage, steep slopes and sensitive vegetation;
- minimize the fragmentation of core natural habitats;
- minimize redundancy (i.e., do not establish two parallel trails within 20 metres of each other and / or limit trails around ponds to just one loop trail for each pond);
- be constructed of suitable materials, bearing in mind soil conditions and expected usage;
- where sensitive or steep locations cannot be avoided, incorporate board walks, stairways or ramps, as required;
- conform to the guidelines established in the Medway Valley Heritage Forest Site Planning Study (IMC Consulting Group 1996) adopted by the City of London

As well, it is important that trail designs follow the City of London trail design standards for hiking, multi-use and shared use trails. Trail design standards are outlined in Section 8 of the Medway Valley Heritage Forest Site Planning Study (IMC Consulting Group 1996).

Rationale

Currently, access to the interior of the Westminster Ponds / Pond Mills ESA is achieved through an extensive network of unplanned trails. Since each trail can act as a barrier to certain types of wildlife and as a corridor for disturbance by humans, predators and invasive plant species, the abundance of trails in the area is problematic. Many of the trails show signs of damage from overuse or improper location.

Almost all trails occur on either clay or muck substrates, both of which are very prone to becoming muddy. Muddy conditions arise throughout the year, during and after rain, although they also occur when frost is coming out of the ground in the spring, and during mild winter days. The existence of muddy conditions contributes to trail widening,

when people try to avoid muddy areas by going around them, in many cases creating a wider expanse of mud. Some mud-prone sections of trail are now up to four metres wide. In some cases, parallel trails have become established nearby, and are used when the main trail is muddy. Trails are also being compacted and eroded from heavy use, as evidenced in many areas by tree roots protruding above ground level. Protruding tree roots and slippery, muddy conditions are also hazardous to public safety.

Examples of trail widening and erosion can be found throughout the Dayus Creek Valley and the Westminster Ponds area. Any increase in human visitation rates, without improvement to the trail system, will increase the ongoing degradation of these trails. If the area is to be protected, controls must be introduced on the location, number and extent of trails; and action must be taken to improve the surface of the trails.

All official trails in the ESAs are managed for hazards, including the felling of dead and standing trees (snags) that might fall on the trail (i.e., snags that are within 20 metres of either side of the trail). Map 17 shows the zone around the official managed trails in the ESA where hazard trees have been dropped since 2001, demonstrating the amount of loss of dead standing snags. Dead snags are an important food and habitat source to many birds and small mammal species within the ESA. Table J1 (Appendix J) shows the number of trees dropped in Westminster Ponds / Pond Mills since 2001 compared to those dropped in all ESAs. Hazard trees were removed from other areas in the ESA prior to 2001, but their locations and numbers were not recorded.

Negative impacts associated with the presence of trails include:
- fragmentation of natural habitats by an excessive number of trails (the greater the number of trails, the greater the fragmentation);
- erosion from enhanced water flows and disturbed soils surfaces, especially on sloping sections of the trail, or at drainage points across the trail;
- compaction of soil, which contributes to disruption of soil structure and exposes tree roots;
- loss of nesting or den sites for birds and mammals requiring cavities, through perceived need to remove hazard trees;
- excessive damage to vegetation by users who, by seeking to avoid muddy conditions, create wider trails, or contribute to the development of redundant, parallel trails;
- excessive damage to vegetation by users seeking shortcuts, or trampling at attraction sites;
- improved access by predators and nonnative plants.

Recommendation 56
Since the Westminster Ponds / Pond Mills Environmental Education Centre uses the Westminster Ponds area for many of its programs, contact the Centre prior to any changes in the area to ensure recommendations and environmental education activities are compatible.

Recommendation 57
Identify and map all existing trails, and gather information on their current level of use by all user groups. In particular, identify the many side trails throughout the ESA, to determine their importance to movement and user perceptions of crowding. Conduct a field visit in the spring, after the snow melts, to review trail conditions.

For example:
- Contact the Thames Valley District School Board (TVDSB) to verify level of school board use of the wood chipped trails adjacent to the environmental education centre at North Pond (Map 16, trail 46).
- Determine level of use for the existing trail behind Milan Place (Map 16, trail 47).

- Determine level of use for the small loop trail north of Tumbleson Pond (Map 16, trail 38).
- Conduct surveys to determine user groups and levels of use of all trails.
- Conduct surveys, where appropriate, to determine need for parking (e.g., Map 16, trails 46 and 47).

Recommendation 58
Reduce the number of trails to minimize overall impacts to the ESA, including those related to the removal of standing dead trees.

For example:
- Map 17 shows the zone around the official managed trails in the ESA where hazard trees have been dropped since 2001. All standing dead trees that can potentially fall on the trail (i.e., are located approximately 20m on either side of the trail) are removed, leaving a footprint 45 - 50 metres wide along the managed trail network. Removal of dead standing trees can have an impact on wildlife in the ESA, since the trees are an important food and habitat source to many birds and small mammal species.

Recommendation 59
Minimize the number of trails in sensitive areas of the Westminster Ponds / Pond Mills ESA. Emphasize the modification or improvement of existing trails, rather than provision of new trails, but close or re-route trails in the most fragile and sensitive locations (e.g., steep slopes, gullies, waterways, wetlands, erodible soils, historic places).

For example:
- Upland trails to the east of the proposed additional dock at Spettigues Pond (Map 16, trail 34).
- Portions of the trail along the fence from the Tourist Information Centre.
- One of the three entrance points near the baseball diamonds (Map 16, access 2, 3 and 4) should be closed to increase the amount of interior habitat in the ESA. Access 2 (Map 16) should remain open, since it is a well-established trail and leads from the TVDSB environmental centre directly to two board walks. Access 4 (Map 16) leads in a different direction and can remain open since it does not occur in sensitive habitat. Access 3 (Map 16) can be closed as it leads to the same area. If a smaller loop is necessary, an additional small trail could be developed (Map 16, trail 24).
- Close the trail from Access 21 (Map 16) to reduce habitat fragmentation and to protect the dense wetland thicket.

Recommendation 60
Develop a strategy for physically closing trails and ensuring that closed trails remain closed.

For example:
- Rehabilitate trampled area at the top of the steps between Saunders and Spettigue Ponds (Map 16, recommendation 36).
- Take measures such as obstacles and signs to discourage access (refer to Appendix I for recommendations on trail closures).

Recommendation 61
Improve safe passage by means of constructing or repairing stairways in steep locations where trails cannot be decommissioned.

For example:
- Repair the damage to the stairs off Parliament Crescent (Map 16, access 18).
- Repair the damage to the erosion control boards at the access off Shaftesbury Avenue (Map 16, access 17).
- Repair the damage to the elaborate wooden staircase behind the school located on Frontenac Road (Map 16, general recommendation 45).

Recommendation 62
Develop a partnership with all stakeholders to provide safe passage across the CNR tracks that meets CNR and City of London safety standards.

Some possible suggestions include:
- an overpass
- a crosswalk with alarms and gates that signal when a train is near.

Unsafe CNR crossing occurs at two locations:
- at one of the main trails that connect the two subdivisions located on either side of the CNR tracks (Map 16, trail 43). Several students use this trail daily, yet it is hazardous because of steep slopes, protruding metal stakes, a concrete drain pipe, as well as frequent train activity (at least seven trains pass per day).
- another uncontrolled CNR crossing is located off Pond Mills Road (Map 16, trail 44).

Recommendation 63
Identify and map natural features that may enhance the trail experience (vistas, fishing areas, meadows, interpretive places) and consider incorporating such features into the trail design, so long as this does not compromise the overall principles for trails.

For example:
- manage the existing unofficial trails in the vicinity of Saunders Pond (Map 16, trail 28, 30, 32, and 50) according to the principles for trails. This will entail closing some sections of the trail system in this area, such as sections of the shoreline along Saunders Pond (Map 16, general recommendation 31), which are habitats to a large number of resident and migratory birds. As well, a boardwalk or bridge that allows water movement may be needed to traverse the wetland area to the west of the pond (Map 16, trail 32).

Recommendation 64
Develop design standards for trails.

For example:
- determine which materials are suitable for the development of durable trails throughout the ESA. Areas with extensive water damage may require board walks, bridges, or water bars to stop erosion processes, while other areas that are being damaged from high use may require the placement of large rocks or stone underlain by geo textile. Pavement, asphalt and wood chips are not recommended as a suitable type of trail material in the ESA and PSW. Large, chain linked fencing is also not acceptable since it affects the appearance of the area and the movement of animals.

Recommendation 65
Examine existing and proposed trails for areas requiring implementation of mitigation measures, in order to reverse or prevent damage.

For example:
- construct a boardwalk or bridge, as required, to provide water passage under the trail to the west of Saunders Pond (Map 16, trail 32).
- construct additional board walks and bridges as required to provide safe access, and minimize damage, throughout the Westminster Ponds / Pond Mills ESA, including the Dayus Creek Valley and Pond Mills (Map 16, general recommendation 35, 36, 37, 48 and Trail 41).

Recommendation 66
Examine pond shorelines for areas where previous access has caused damage. Consider appropriateness of upgrading access, decommissioning access, or maintaining existing access. Provide a limited number of viewing platforms at strategic locations.

For example:
- extensive pedestrian traffic in certain areas adjacent to Spettigue Pond has caused considerable damage to the sphagnum mat surrounding the shoreline of the pond. This sphagnum mat supports a number of rare plants. Construction of a boardwalk and viewing platform on the south (Map 16, dock 34) shoreline should relieve some of these impacts, while providing an additional opportunity for viewing the pond and adjacent habitat.

Recommendation 67
Develop a monitoring system to determine if the improved trails, board walks, etc. are providing the desired mitigation of impacts. Along established trails and new trails, conduct a vegetation survey of the plants within five metres of the centre of the trail to provide baseline data.

Recommendation 68
Construct new trails to link access points to the trail network or to connect isolated trails so long as this does not compromise the overall principles for trails.

For example:
- construct a new trail linking the Dearness home to the rest of the trail network (Map 16, trail 25). Site visits with all stakeholders (including the Fire Department and the Dearness Home) will help determine the best route. Consider making this trail wheelchair-accessible.
- connect the trail adjacent to the ponds southwest of the CNR tracks to the rest of the valley (Map 16, trail 40, 41).
- develop a looped trail on the northeast side of the CNR tracks (Map 16, trail 42) or close access 8 (Map 16).
- create a trail around the wooded and relatively flat land surrounding Saunders Pond, as recommended in the 1985 Master Plan (Map 16, trail 30, 32, and 50).

Recommendation 69
Develop wheelchair accessible trail loops, in selected locations, where design requirements can be met without compromising ecological integrity.

The City of London is mandated to provide accessible pathways in their parks and open space system to meet the requirements of the Ontario Disabilities Act. In the Westminster Ponds / Ponds Mills ESA, this makes particular sense given the adjacent land uses - a senior's residence and hospitals. The City's main tourist centre is also adjacent to the ESA and offers an excellent opportunity to highlight the ESA. Examples of areas appropriate for wheelchair accessible trails in the ESA include:

- a looped, interpretive boardwalk that describes the historical aspects of the Saunders Tract that begins at the Tourist Information Centre and passes by the interpretive sign at the site of the former Saunders cabin (Map 16, trail 29). This trail would replace the existing trail along the fence, when the fence is removed. The original trail in this area would be decommissioned.
- a small looped wheelchair trail can be extended from the multi-use path to the north of Saunders Pond (Map 16, trail 50). This area would provide a scenic outlook / view of Saunders Pond and could be accessible to wheelchairs. This lookout may relieve some pressure from the more sensitive areas adjacent to this pond.
- a sidewalk that would be wheelchair accessible can be developed from the Dearness home and run parallel and adjacent to Southdale Road East until Adelaide Street (Map 16, trail 26). A looped section of this trail can branch off into the manicured lands west of Tumbleson Pond (Map 16, trail 27). These manicured lands should be rehabilitated or naturalized.
- a small looped boardwalk can be extended from the Tourist Information Centre to the Dearness home, linking Dearness Home to the rest of the trail network (Map 16, trail 25).

Recommendation 70
Create a multi-use path on the City of London property, north of the northern ESA boundary. The path would enter from Wellington Road, north of Wilkins Street (Map 16, trail 28 and 23), connect to the Western Counties Road, and follow that road to Commissioners Road (Map 16, trail 23) . Proposed buffers and naturalization efforts in this area would have to consider the final configuration of the pathway.

The multi-use recreational pathway may reduce the use of passive trails within the natural area, thereby reducing human impacts on natural communities and wildlife habitat. It would also connect to the existing bike network in the City of London. However, there is concern that this pathway may lead to increased off-leash dog usage and off-road bicycling. Consultation with all stakeholders is required before a path can be established through this area.

Objective Four: Develop Recommendations To Limit The Impact Of Domestic Pets

Rationale

The City of London bylaws require dogs to be on a leash except in designated areas. Domestic animals such as cats and dogs that are off-leash can have an immediate and devastating effect on wildlife (Wake 2000b). Off-leash cats and dogs can cause wildlife to flush from nests or cover, leaving the young vulnerable to predation or trampling. Dogs can also cause wildlife to abandon their young, and can interrupt wildlife mating rituals, foraging and nesting activities. Both dogs and cats will catch and kill birds and small mammals. Constant disturbances cause wildlife to expend valuable energy reserves needed to survive. Currently, dogs on and off-leash use the manicured hospital grounds and the ESA daily, while cats freely roam from nearby residential developments.

Recommendation 71
Continue and expand efforts to enforce leash-laws in the ESA.

Recommendation 72
Provide educational information for neighbours of the ESA, regarding impacts that domestic pets have on wildlife

6.3 Preserve And Promote Cultural Heritage

Objective One: Identify Historical Cultural Features

Rationale

The rich cultural history of Westminster Township means that there are many historical cultural features within the Westminster Ponds / Pond Mills ESA that can be used for interpretation / education.

Recommendation 73
Develop stewardship / educational materials for the area that include the precise locations of the following historical cultural features:

Saunders property
- delineate the 32 ha parcel of land that once belonged to W.E. Saunders. This land now houses the fire hall, the Dearness home and the Tourist Information Centre.
- delineate location of W.E. Saunders cabin (pre and post Plan 86).
- delineate the plantation area with conifer specimens and Plume Grass that Saunders planted, which persist along the chain link fence south of the cabin site.
- delineate the location of the old guard cabin for Saunders (close to Tourist Information Centre)
- GPS the stake locations of Saunders cabin and manicure the site with woodchips.

Pond Mills Area
- delineate the Baty property located at 700 Pond Mills Road. 700 Pond Mills Road is a one-and-a-half storey white brick, three bay Ontario farmhouse built circa 1865. It is an important remnant of the original settlement of Pond Mills and has been designated as a site of historical and contextual value or interest under Bylaw No. L.S.P.-3360-62 in March 2004. The house was built for Charles Stewart but bought by a relative of the Baty's. Members of the Baty family continued to live there until the mid-1950's. The Baty family was important in the life of the Pond Mills area, socially and economically. Most of the Baty family is buried in the cemetery.
- delineate the Coffey property located on the west side of Pond Mills Road, north of Southdale Road East. Just north of the Coffey property is the foundation of the North Pond flour mill.
- delineate the remains of the North Pond water mill (on the easterly bank of Pond on the westerly slope of Pond Mills Road across from the cemetery at North Pond) that was powered by water from the ponds starting in 1820. The Baty family purchased the water mill in 1829.

O'dell settlement
- delineate the former hamlets of O'Dell. The O'Dell settlement was a pioneer community located between Wellington Road and Saunders Pond (now the military hospital site on Wellington Road and Commissioners Road East near Saunders Pond). Some parts of the O'dell settlement were beyond the ESA, west of Wellington Road. The site was studied in an archaeological dig in 1973.
- delineate the early log school that was built to serve the O'Dell settlement on Commissioners Road just west of Wellington Road.

Walker property
- delineate the Walker family holdings (Wellington Road to Saunders Pond) which include the Walker blacksmith shop (located on a rectangular plot on the east side of Wellington Road) and associated property that extends along Saunders Pond.

Scotch Settlement
- delineate the two cemeteries located east and west sides of Pond Mills Road immediately north of the CNR crossing. The Pond Mills Heritage Cemetery on the west bank of North Pond contains more than 135 of the original settlers and their descendants.
- delineate the location of the Presbyterian church erected in the centre of the Scotch settlement that became the First United Church
- delineate the site of the first schoolhouse on the west bank of North Pond in Pond Mills adjacent to the cemetery. This school was a log structure built in 1823 on the site of the present cemetery.
- delineate the site of the brick school built in 1860 to replace the log school in Pond Mills. Remnants are still present at the north end of the pond beside the replacement structure built in 1955.

Veterans' buildings
- delineate the Western Counties Wing developed for veterans. The property was purchased between 1940 and 1943 and the buildings were opened in 1946 (Historica Research Ltd. 2000). These were living quarters and an occupational facility for veterans. Structures were designed by the Herbert George Project Architect and by C.D. Sutherland, Chief Architect for the Public Works Department.

Miscellaneous
- delineate the remnants of a brick yard north of the baseball diamonds
- delineate the very large white oak tree
- delineate Swartz's Tavern (Guthrie Home) on Lot 22, Concession 1 of the old Westminster township (871 Commissioners Road East). This tavern was owned by the Spettigue family for a time. It burned down in 1975 during a training exercise for the London Fire Department.
- delineate the cart trail that runs through Dayus Creek, across the CNR tracks and into Westminster (check old Westminster Township and air photos at UWO Library for precise location)
- delineate the location of the Westminster station along the former London and Port Stanley Railroad.
- delineate the location of the house on Wellington Road, across from Wilkins. This house burned in the late 1940s or early 1950s and resulted in the death of a child.

Objective Two: Develop Recommendations For Veterans' Buildings And Their Relationship To The ESA

Rationale

The LHSC owns the Waterloo and Wellington Veteran Pavilions, in the Westminster Ponds / Pond Mills ESA. These properties are part of the Western Counties Wing buildings. The Wellington Pavilion spans 0.08 ha on two floors and a basement. The Wellington building was in fair condition in 2000, but would require extensive renovations. The Waterloo Pavilion spans 0.09 ha on two floors, with a swimming pool and large auditorium. The Waterloo Pavilion was in fair condition in 2000 and had minor maintenance issues at the time.

Recommendation 74
Support concepts for veterans' buildings that complement the Westminster Ponds / Pond Mills Master Plan update.

It is the LHSC objective to form a partnership with an organization interested in renovating and operating one or both of these buildings. This partnership will factor in the initial renovation capital, and will result in tenancy of the buildings. The LHSC wishes to create a partnership with an organization who will renovate these buildings in a manner that promotes healthy living, who will operate with a purpose that is compatible with LHSC's mission and who will respect the surrounding environment, user groups and architectural significance of the buildings. Some examples may include an Eco-Village, an Outdoor Education Centre or an interpretive centre of special history and natural science exhibits with a focus on a museum quality presentation of the entire pond ecosystem. These buildings could include a library, meeting rooms and dioramic views to increase public awareness.

6.4 Engage Community Partners

Objective One: Create Recommendations For Communicating With Related Agencies, Organizations, And Neighbours

Rationale

One of the Guiding Principles of the Master Plan update is to "utilize a community-based approach for planning and implementing". The mission statement for the Master Plan update calls for the City of London, the UTRCA, and community partners to work together. Identifying how often community partners should meet with agencies related to the management of Westminster Ponds / Pond Mills ESA will help vision become action.

Recommendation 75
Create a list of potential community partners (neighbours, industry, business, community associations, schools) and use it to develop and expand community partnerships.

Since habitats adjacent to wetlands can serve as stopping grounds and corridors for dispersal to other nearby wetlands, there may be opportunities to link the biological communities in the Westminster Ponds / Pond Mills ESA to adjacent, semi-natural service corridors. Build upon community partnerships when considering land use management options or areas of acquisition adjacent to, but outside of, the ESA.

Recommendation 76
Create an ongoing implementation network that meets a minimum of twice per year to ensure communication and integrated implementation.

Recommendation 77
Host a Community Meeting once per year, to hear about emerging issues, new opportunities and feedback on the implementation of the Master Plan update. Use this meeting to provide information about the Master Plan update to adjacent landowners, and to receive input for annual review of the Master Plan update.

Objective Two: Develop Recommendations For Engaging Organizations And Volunteers

Rationale

One of the Guiding Principles of the Master Plan update is to "consider long - term sustainability". By engaging organizations and volunteers, funding sources needed to sustain the Westminster Ponds / Pond Mills ESA can be secured over the long term.

Recommendation 78
Identify corporate sponsors on signs, in recognition of their donations.

Recommendation 79
Create a multi-organization collaborative to apply for $200,000 Trillium Grants as seed funding to implement priority recommendations by 2008.

6.5 Encourage Awareness And Environmental Education

Objective One: Develop Recommendations For Interpretation And Education For Casual Users

Rationale

One of the Guiding Principles of the Master Plan update is to "use the area wisely." Stewardship is one mechanism to help create value for this ESA. By developing stewardship opportunities, community members can be educated about the importance of protecting and caring for this biological resource.

Recommendation 80
Actively engage citizens in stewardship projects. Encourage local community associations and local school eco-clubs to adopt amenities in the ESA to maintain cleanliness and environmental integrity.

For example:
- Clean and Green London members meet with community groups to encourage regular cleanups (weekend sweeps) of their areas. All members of the community should be encouraged to take part in these events, which could run semi-annually. Adopting a certain section of the ESA would give families and individuals as better sense of their community. The target sites with the worst problem are the roadsides along Southdale Road East from Adelaide Street to the entrance to the Western Ontario Fish and Game Protective Association property, and along Wellington Road from the Tourist Information Centre to Wilkins Street.
- Secondary schools could build sections of the boardwalk in shop classes following a standardized frame to ensure that all the pieces were identical.

Recommendation 81
Encourage development of nature interpretation programs with community organizations.

For example:
- nature walks organized by naturalist groups such as the McIlwraith Field Naturalists of London Inc., and special events such as the Doors Open London.

Objective Two: Develop Recommendations For Environmental Education With School Boards

Rationale

One of the Guiding Principles of the Master Plan update is to "create opportunities for awareness & education." General awareness of this area will increase through integration of awareness and education recommendations into the Master Plan update.

Recommendation 82
Develop alliances with neighbouring schools.

For example:

- the TVDSB and UTRCA, as partners, could approach schools in close proximity to the ESA to educate students about the importance of these natural areas. This could lead to the development of eco-clubs that may enable the students to feel some ownership toward these spaces. Initially, visits to the schools could be undertaken to assist with any problems or for setting direction for those groups.
- a joint effort (perhaps London Clean & Green) can go into high schools to encourage students to take part in weekend clean ups of the ESA lands. This time could be documented as part of their 40 hours of required volunteer hours. This not only gives students a way to fulfill their volunteer commitment, but is a way of physically and visually bringing home the impact of human actions on a natural environment. These could take place at the first (end Sept.) and end (mid June) of each school year.

6.6 Implement Recommendations

Objective One: Create An Implementation Plan And Develop Reporting Program

Rationale

An implementation plan will prioritize recommendations. To ensure that the plan remains relevant and that all interested agencies, neighbours and community groups remain informed, a reporting program should be established.

Recommendation 83
Create an implementation plan from the recommendations (Table 4, Section 7) to direct implementation committees

Recommendation 84
The Master Plan should be reviewed annually at the community meeting with updates on the past year's activities.

Recommendation 85
Circulate regular updates of the implementation plan within City of London departments and committees and within the UTRCA.

Recommendation 86
Ensure publicly owned lands within the Westminster Ponds / Pond Mills ESA are managed in accordance with the goals and objectives of the Master Plan update.

7.0 IMPLEMENTATION PLAN

Over 85 recommendations were prioritized according to perceived urgency (e.g. trail use is more important to protecting the natural area than naturalizing the landfill), logistical progression (e.g. delineate all the trails before determining which trails to close down) and availability of resources. Based on these criteria, the recommendations were grouped into 6 priority classes, where:

A: top priority to start in 2005
B: high priority to start in 2006
C: need time to set up so start delayed until 2007
D: beneficial but not essential to the area so start delayed until 2008
E: big picture ideas that rely on a lot of information so start delayed until at least 2009.

Table 4. Summary of recommendations and priorities for implementation.

GOAL 1: MAINTAIN AND ENHANCE ECOLOGICAL INTEGRITY						
Objective One: Update Biological Information						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
1	Complete a full three season ELC for entire ESA	UTRCA	2007-2010 C	$20,000	Foundations	background information on all plant species and communities in the ESA, provide information for recommendations
2	Compile background information on birds and wildlife	UTRCA	2007-2010 C	$8,000	Foundations	background information on all bird and wildlife species in the ESA, provide information for recommendations
3	Inventory presence and condition of vernal pools	UTRCA	2006-2010 B	$10,000	Foundations	background information on vernal pool habitat, understand the impacts of various management activities
Objective Two: Update ESA Boundaries						
4	Evaluate unevaluated wetland habitats	OMNR	2007-2009 C	$1500	OMNR	all wetland communities have a registered wetland evaluation.
5	Apply ESA criteria to unevaluated patches	City of London	2007-2009 C	$1000	City of London	all potential vegetation patches have been reviewed with the ESA criteria
6	Update maps to match vegetation patch outlines / hazard lines	UTRCA /City of London	2005-2006 A	$1000	City of London	all maps clearly delineate ESA according to updated vegetation data

Objective Three: Develop Acquisition Recommendations						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
7	Acquire privately owned properties within the current / proposed ESA	City of London	2010-2020 E	Unknown	Foundations Agency Grants	additional protection and buffering of ESA, address recreational demands, reduce amount of edge within ESA
8	Acquire abandoned gas station at Southdale Road East and Adelaide Street	City of London	2005-2010 B	Unknown	Foundations Agency Grants	parking for the Adelaide Street/Southdale Road East access
9	Acquire hydro corridor easement west of Highbury Avenue	City of London	2010-2020 E	Unknown	Foundations Agency Grants	additional protection and buffering of ESA, reduce the amount of edge within ESA
Objective Four: Recommend Areas for Increasing, Maintaining or Restoring Habitat						
10	Naturalize targeted areas with trees and shrubs	UTRCA	annually ongoing	$4,000/ yr.	Env. Canada/ Foundations	increase, restore, and maintain vegetation communities, reduce non-natives
11	Naturalize targeted areas with meadow habitat	UTRCA	annually ongoing	$4,000/ yr.	Env. Canada/ Foundations	increase, restore, and maintain vegetation communities, reduce non-natives
12	Allow targeted areas to naturalize	UTRCA / City of London	annually ongoing	N/A	N/A	increase, restore, and maintain vegetation communities, reduce non-natives
13	Review development proposals for adjacent lands	UTRCA / City of London	annually ongoing	N/A	N/A	increase, restore, and maintain vegetation communities, reduce non-natives
Objective Five: Develop Recommendations for Wildlife Corridors Outside the ESA						
14	Implement linkages identified in Carolinian Canada Big Picture Project	UTRCA / Property Owners	2009-2020 E	Unknown	Carolinian Canada/ Foundations/ Agencies	corridor linkages between regional natural areas and Westminster
15	Partner with adjacent landowners of service corridors	UTRCA / Property Owners / City of London	2009 E	N/A	N/A	influence current management practices, develop corridor linkages

Objective Six: Develop Program for Monitoring Water Quantity and Quality						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
16	Establish wells to monitor groundwater and surface water	UTRCA	2005-ongoing A	$20,000/ continuous well $ 3,000/ shallow well	Geological Survey of Canada	baseline data on 3 aquifers will be used to evaluate changes to the aquatic system
17	Monitor physical parameters of the Ponds	UTRCA	Monthly / begin 2006 B	$5,000/yr.	City of London	baseline data will be used to evaluate changes to the aquatic system and calculate water balance budget
18	Monitor chemical parameters of the Ponds	UTRCA	Monthly / begin 2006 B	$5,000/yr.	City of London	baseline data will be used to evaluate changes to the aquatic system using MOE standards
19	Monitor biological properties of the Ponds (fish, invertebrates, plankton, etc.)	UTRCA	3 times / year begin 2006 B	$3,000/yr.	City of London	baseline data will be used to evaluate changes to pond ecology
20	Monitor overland flows into catchments of the Ponds	UTRCA	3 times / year begin 2006 B	$3,000/yr.	City of London	baseline data will be used to evaluate changes to pond ecology and calculate water balance budget
21	Review surface catchment divide lines	UTRCA	2006 B	$5,000	City of London	data can be used to evaluate changes to the aquatic system and calculate water balance budget
22	Develop water budgets for the ponds	UTRCA	2006 B	$5,000	City of London	data will be used to calculate water balance budget
23	Evaluate functionality of man-made drainage structures	UTRCA	2006-2007 B	$10,000	City of London	data will be available to support drainage recommendations
24	Decommission abandoned wells	UTRCA	2005 ongoing	$10/ ft. for each well	City of London	protect groundwater sources and public safety
25	Review historical information of water levels (e.g., air photos)	UTRCA	2006-2007 B	$3,000	City of London	data will be available to support water level changes

GOAL 2: DETERMINE COMPATIBLE USES						
Objective One: Develop Recommendations for Compatible Recreation Within the ESA and on LHSC and SJHC Property						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
46	Implement regulations/ enforcement of acceptable and unacceptable uses	UTRCA	annually ongoing	ESA Team	City of London	improved public behaviour within the ESA
47	Review feasibility of off-leash dog park adjacent to ESA	City of London	2010-2011 E	$5,000	City of London	dog owners can be referred to a nearby off-leash dog park, reduce number of off-leash dogs in ESA
Objective Two: Develop Recommendations for Access and Trail Signs						
48	Create 4 main trail access points	UTRCA	2005-2008 A	$20,000 ea.	City of London	control access & improve ESA awareness
49	Identify placement of the 4 main City of London ESA signs	City of London	2005 A	N/A	N/A	improved awareness of ESA
50	Create 4 highly visible main trail access kiosks with interpretive information	City of London	2005-2008 A	$25,000 ea.	Foundations/ grants/ corporate	control access & improve ESA awareness, recognize partners
51	Improve numerous community / neighbourhood access points	City of London	2006-2010 B	$3,000 ea.	City of London	control access & improve ESA awareness
52	Decommission all unofficial access points	UTRCA	2006-2010 B	$10,000	City of London	control access & improve ESA awareness
53	Create hazard signs where mitigation isn't practical (certain steep slopes)	UTRCA	2006-2010 B	$5,000	City of London	public safety & improve ESA awareness
54	Create boundary signs to identify ESA property	City of London	2006-2010 B	$10,000	City of London	control access & improve ESA awareness
55	Mark all major trails	UTRCA	2006-2008 B	$10,000	City of London	public safety & improve ESA awareness

Objective Three: Develop Recommendations for Trail Design (note: Spettigue and Saunders trails need to be developed early since school programs use these areas)						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
56	Contact Westminster Ponds / Pond Mills Environmental Education Centres about trail use	UTRCA	2005-2008 A	N/A	N/A	compatible use of trails
57	Identify and map all existing trails and record condition of trail	UTRCA	2005 A	$5,000	City of London	understand proliferation of trails and their use
58	Reduce total number of trails	UTRCA	2006-2008 B	$20,000	City of London	reduce proliferation of trails, non-native species and hazard tree removal
59	Close or re-route trails in fragile and sensitive areas	UTRCA	2006-2008 B	ESA Team	City of London	protection of sensitive soils and plants
60	Develop protocol and techniques for physically closing trails	UTRCA	2006 B	$1,000	City of London	protection from erosion, public safety
61	Improve safe passage by repairing steep slope locations (stairs, erosion control)	UTRCA / City of London	2006-2010 B	$150,000+	Foundations / City of London	protection from erosion, public safety, fewer side trails
62	Design safe passage for crossing CNR tracks	City of London / CNR	2005-2010 A	$200,000+	Foundations/ City of London	public safety and access, protection from erosion
63	Identify and incorporate interpretive features into trail design	UTRCA	2005-2010 A	$5,000	Foundations/ grants	increased awareness of ESA significance
64	Develop design standards for trails	UTRCA	2005-2008 A	$1,000	City of London	public safety and access, protect the ESA
65	Mitigate impacts of trails at sensitive sites using natural materials (e.g., rocks, board walks, vegetation)	UTRCA	2005-2010 A	$100,000+	Foundations/ grants	protection from erosion, public safety, fewer side trails
66	Mitigate shoreline impacts with viewing platforms	UTRCA	2006-2009 B	$50,000	Foundations/ grants	protection from erosion, protection of sensitive soils and plants, fewer side trails

#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
67	Monitor trail use and impacts	UTRCA	2005 (ongoing) A	$5,000	City of London	understand changing user demands on trail system over time, understand impact of trails
68	Create new trails where necessary	UTRCA	2006-2010 B	$50,000	Foundations/ grants	improve public access, increased awareness of ESA significance
69	Develop wheelchair accessible trail loop with board walks	UTRCA	2007-2010 C	$60,000	Foundations/ grants	improve public access
70	Create a multi-use paved path adjacent to ESA boundary on City of London property	City of London	2010 D	$80,000	City of London	promotion of healthy, environmentally friendly lifestyles, increased awareness of ESA significance
Objective Four: Develop Recommendations to Limit the Impact of Domestic Pets						
71	Enforce leash-laws in the ESA	UTRCA	as needed ongoing	ESA Team	City of London	reduced negative impact on wildlife
72	Educate neighbours and users of ESA	UTRCA	as needed ongoing	$1,000	City of London	reduced negative impact on wildlife
GOAL 3: PRESERVE AND PROMOTE CULTURAL HERITAGE						
Objective One: Identify Historical Cultural Features						
73	Develop stewardship materials and map identified cultural heritage features	UTRCA / City of London	2006-2010 B	$5,000	Heritage grant	historical cultural data can be used as a GIS layer for mapping within the ESA, public appreciation of cultural heritage, incorporation of cultural heritage in interpretive programs
Objective Two: Develop Recommendations for Veterans' Buildings and the Relationship to the ESA						
74	Support concepts for Veterans' buildings that complement the Westminster Master Plan update (e.g., Eco-Village, interpretive centre, door education centre)	T V D S B / LHSC	2005-2015 A	N/A	N/A	synergistic relationships are created for the improvement of the ESA

GOAL 4: ENGAGE COMMUNITY PARTNERS						
Objective One: Create Recommendations For Communicating with Related Agencies, Organizations and Neighbours						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
75	Expand community partnerships	UTRCA	as needed ongoing	$1,000	City of London	synergistic relationships are created for the improvement of the ESA
76	Create an ongoing implementation network	UTRCA	2005 A (ongoing)	$4,000	City of London	synergistic relationships are created for the improvement of the ESA
77	Host annual community meeting	UTRCA	2005 A (ongoing)	$2,000	City of London	become aware of any emerging issues and update email network group
Objective Two: Develop Recommendations for Engaging Organizations and Volunteers						
78	Recognize corporate sponsors	UTRCA / City of London	as needed ongoing	N/A	corporate sponsors	synergistic relationships are created for the improvement of the ESA, secure ongoing funding for long term projects
79	Create a multi-organization collaboration	UTRCA	as needed ongoing	$4,000	City of London	synergistic relationships are created for the improvement of the ESA
GOAL 5: ENCOURAGE AWARENESS AND ENVIRONMENTAL EDUCATION						
Objective One: Develop Recommendations for Interpretation and Education for Casual Users						
80	Actively engage citizens in stewardship projects (clean and Green, board walks)	UTRCA	as needed ongoing	$1,000/ yr	City of London	synergistic relationships are created for the improvement of the ESA
81	Develop nature interpretation programs with community organizations	UTRCA	2006-2015 B	$3,000/ yr	City of London	synergistic relationships are created for the improvement of the ESA
Objective Two: Develop Recommendations for Environmental Education with School Boards						
82	Develop alliances with neighbouring schools	TVDSB / UTRCA	as needed ongoing	$3,000/ yr	City of London	synergistic relationships are created for the improvement of the ESA

GOAL 6: IMPLEMENT RECOMMENDATIONS						
Objective One: Develop Reporting Program						
#	Recommendations	Who's Responsible	Schedule & Priority	Cost	Potential Funding	Anticipated Outcomes
83	Create an implementation plan	UTRCA / City of London	2005 A	$1,000/ yr	City of London	direct implementation committees
84	Review Master Plan annually	UTRCA / City of London	2005 A ongoing	$2,000/ yr	City of London	set annual targets based upon the Master Plan update
85	Circulate regular updates of implementation plan	UTRCA	2005 A ongoing	$1,000/ yr	City of London	communicate successes and challenges of implementing the Master Plan update
86	Ensure public lands are managed in accordance with the Master Plan	UTRCA / City of London	2005 A ongoing	N/A	N/A	synergistic relationships are created for the improvement of the ESA

The next step will be to develop an implementation plan for each year. For 2005, Priority A was further broken down into projects that already occur in the area and should continue (e.g. naturalization and buffering), and projects that are not ongoing but must be completed immediately so that other recommendations can be acted on in subsequent years (e.g. identifying all existing trails). Projects that already occur and should remain ongoing include:

- naturalization and buffering efforts (Recommendations 10-13)
- monitoring Purple Loosestrife and wildlife (Recommendations 26, 29, 30, and 32-38)
- implementation of an enforcement and encroachment program (Recommendations 36, 44 - 46 and 71 - 72)
- expansion of community partnerships (Recommendations 75- 80 and 82)

A time-line was developed for those projects that must be completed immediately (Table 5).

Table 5. A breakdown of implementation recommendations for 2005.

DATE	RECOMMENDATION (description and number)	TOTAL COST (includes annual ESA budget)	FUNDS SECURED (outside annual ESA budget)	FUNDS REQUIRED (outside annual ESA budget)	DESCRIPTION OF ACTIVITY
March 2005 -May 2005	Create access point and Rotary Kiosk at Southdale and Adelaide (#48- #50)	$22,500 $200/yr to upgrade annually	$10, 000 (Rotary) $5,000 (TD Friends) $5,000 (City of London	$2,500 (UTRCA) $200/yr to upgrade annually	Upgrade entrance with fencing, painting and naturalization, order and install kiosk and develop interpretive sign

DATE	RECOMMENDATION (description and number)	TOTAL COST (includes annual ESA budget)	FUNDS SECURED (outside annual ESA budget)	FUNDS REQUIRED (outside annual ESA budget)	DESCRIPTION OF ACTIVITY
April 2005	Establish groundwater wells and decommission abandoned wells (#16 and #24)	$20,000 / continuous well $500/yr to assess $10 / ft to decommission	$20,000 (Geological Survey of Canada)	$500/yr $10 / ft	Drill well at S. Pond and assess feasibility of other sites
May 2005	Create a yearly implementation plan (#83)	$1,000/yr		1,000/yr (City of London)	Review Master Plan and develop a yearly implementation plan
May 2005	Use of Veteran's buildings (#74)	N/A	in-kind	N/A	Support applicant submitting a feasibility study to Canadian Mortgage Housing Corporation
May 2005	Naturalize areas within and adjacent to ESA (#10- #13)	$8,000/yr	in-kind	$8,000/yr	Identify areas for naturalization, develop partnerships, review development in adjacent lands
May 2005	Monitor non-native species (#26, #29, #30, #32- #38)	$15,000/yr		$10,000	Monitor non-native plants and nuisance wildlife, develop non-native database
May 2005	Educate adjacent landowners about encroachment (#44-46, #71, #72, #80, #82)	$15,000/yr	N/A	N/A	Develop partnerships, coordinate garbage collection, increase presence in ESA, document infractions
June 2005	Address CNR crossing (#62)	N/A	in-kind		Initiate discussions with partners

DATE	RECOMMENDATION (description and number)	TOTAL COST (includes annual ESA budget)	FUNDS SECURED (outside annual ESA budget)	FUNDS REQUIRED (outside annual ESA budget)	DESCRIPTION OF ACTIVITY
June 2005	Educating adjacent landowners about WNv (#39, #40)	$500 $250 in-kind/ yr	$250 in-kind (UTRCA)	$500 for pamphlets	Develop pamphlets for mail-out to adjacent landowners and add message to kiosk signs
June 2005- July 2005	Improve South Pond Trail (#56, #57, #63-#65, and #67)	$20,000	$10,000 (Ducks Unlimited)	$10,000 (City of London, Rotary, TD Friends)	Build and install 400 feet of white cedar board walk between North and South Ponds
June 2005- September 2005	Delineate and describe trails in ESA (#56, #57 and #67)	$15,000		$10,000	Develop a trail database to record location and condition of trail, site surveys at mid-week and weekends at key locations to identify users
June 2005 - October 2005	Create access point and Ducks Unlimited Kiosk at South Pond (#48-#50)	$20,000 $200/yr to upgrade annually	$15,000 (Ducks Unlimited)	$5,000 (City of London) $200/yr to upgrade annually	Upgrade entrance with fencing, painting and naturalization, order and install kiosk and develop interpretive sign
July 2005 - September 2005	Remove LHSC fence (#43)	$20,000		$20,000 (City of London)	Work collaboratively to remove fence
October 2005	Correct ESA boundary resulting from mapping errors (#6)	$1,000		$1,000 (City of London)	Digitize boundary of ESA according to boundary guidelines
December 2005	Annual review of Master Plan with implementation network and community (#75-#80, #82, #84-#86)	$4,000/yr		$4,000 (City of London)	Marketing specialist to co-ordinate meetings and staff member to assemble annual review

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APPENDIX A.
WESTMINSTER PONDS / POND MILLS FACT SHEET

Master Plan Update February 2003

Master Plan Update

A Master Plan Update for Westminster Ponds / Pond Mills Environmentally Significant Area has begun. The Upper Thames River Conservation Authority will lead this initiative in partnership with the City of London. Community organizations such as the McIlwraith Field Naturalists will play an important role in determining ways for preserving this environmentally significant area.

Looking north over Saunders Pond (Photo courtesy of London Health Sciences Centre)

The purpose of the Master Plan Update is to provide new direction for the preservation of this significant natural area while recognizing existing management strategies. The update will:

- verify property boundaries
- evaluate and update land acquisition strategies
- identify and confirm sensitive ecological features
- identify areas for restoration
- review and update cultural significance
- develop strategies for protection and interpretation
- determine appropriate access points and identify appropriate recreation uses

Ownership & Management

Most of the Westminster Ponds / Pond Mills ESA is owned by the City of London. Smaller portions are owned by London Health Sciences Centre, Upper Thames River Conservation Authority (UTRCA), and the Western Ontario Fish and Game Protective Association. The publicly-owned property is managed by the UTRCA.

Location & Size

Located in the southern part of London, Westminster Ponds / Pond Mills is the largest Environmentally Significant Area (ESA) in the city. The ESA includes approximately 240 hectares (595 acres).

Environmental Significance

This marsh, swamp, and bog complex is a Provincially Significant Wetland.

The biology of this area has been examined through a variety of studies and inventories.

Findings include:

- 757 species of plants, including 30 that are considered nationally and/or provincially rare
- 232 species of birds
- 20 species of mammals
- 18 species of fish
- 12 species of amphibians
- 7 species of reptiles

Boardwalk construction near Spettigues Pond

Master Plan Update February 2003

History

- Two archeological digs have yielded artifacts from campsites near the Ponds dating back to 2,500 and 1,000 B.C.
- The Atlas of Middlesex County, published in 1878, mentioned that the Ponds are "aids in imparting variety and beauty of the landscape".
- Dr. W.E. Saunders, the prominent naturalist, purchased land adjacent to what is now called Saunders Pond in 1913 and built his cabin in 1920 Dr. Saunders kept extensive notes on his observations and encouraged many people to explore the world of nature at the ponds.

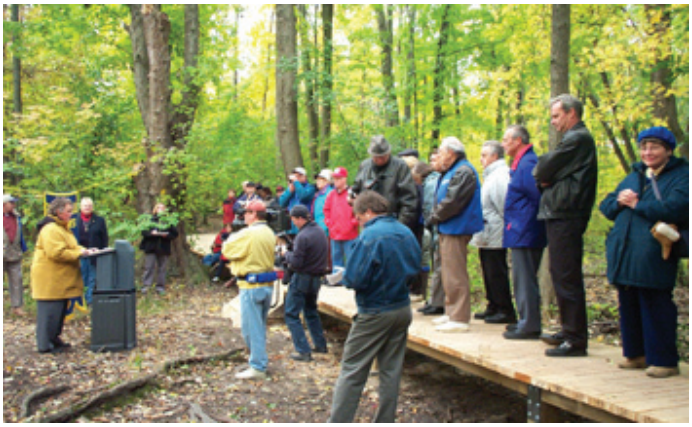
Oak tree

- In 1923, the McIlwraith Ornithological Society established a group to seek protection for this area.
- The ponds became part of the City of London when annexed in 1961.
- In the 1970s, as a result of public pressure, a land acquisition program was established.
- A Master Plan for the site was completed in 1985.
- In 1987, the Ponds were designated as Provincially Significant Wetlands.
- In 1990, the Ponds were designated as an urban Conservation Area.
- The Westminster Ponds Advisory Committee was established in 1998.
- A Master Plan Update process was initiated in 2002.

Community Partners

Organizations involved in the protection and management of Westminster Ponds / Pond Mills ESA:

- City of London
- Upper Thames River Conservation Authority
- Environmental and Ecological Planning Advisory Committee
- Westminster Ponds Advisory Committee
- McIlwraith Field Naturalists of London
- Western Ontario Fish & Game Protective Association
- Thames Valley Trail



Rotary Club Boardwalk presentation

Community Involvement

The Master Plan Update will be developed during the next 18 months. Community meetings will begin in the spring of 2003. If your organization would like a presentation or more information about the Master Plan Update process, please contact:

Steve Sauder
Upper Thames River Conservation Authority
tel. (519) 451-2800 ext. 275
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www.thamesriver.on.ca

APPENDIX B.
LOCAL ADVISORY COMMITTEE AND COMMUNITY ISSUES AND CHALLENGES

Below is a complete list of issues and challenges identified at the May 27, 2003 Westminster Ponds / Pond Mills Community Meeting and Comment Sheet Summary, and at the March 27, 2003 Local Advisory Committee Meeting:

1. Trails

- volume, trail material, proper routing, rest sites, control of new trails, protecting sensitive sites, safety, hazard tree management.
- connection with the bicycle master plan.
- how to address bikes and trail damage.
- must determine the type of trail.
- concern about pounding of clay trails.
- need to find expertise in this area (volume of traffic vs. trail material).
- determine how to keep bikes out of the ESA.
- how to control/stop new trails.
- effort can be made through signs/management.
- need to review proper routing of trails.
- how to include children and biking - is it possible to have an area for children to bike?
- consider adding a short trail from the Wellington Tourist office to Saunders Pond that is wheelchair accessible.
- protecting vegetation, especially near Spettigues Pond.
- consider closing trails.
- design trails to get bikers and walkers through area (bike paths), without sensitive areas being affected.
- erosion needs to be addressed along Henderson Trail at Bradley Ave.
- need rest stops where people can sit (e.g., large rocks, benches).
- trail improvements must protect vegetation.
- Southdale entrance is muddy, with dead trees on the east side of entrance.
- link the Westminster Ponds and the Pond Mills area with trails, if possible.
- allowing skateboards and bikes in the ESA may be inappropriate, the next step may be motorized vehicles.
- if we don't provide paths that are logically placed then people will make their own.
- examine where people already go to determine trail locations.
- ongoing concerns with maintaining trails, etc.
- don't go overboard in maintaining and upgrading trails - it is a natural area first and foremost - keep it safe as a natural area.
- boardwalks are good means of preventing trail degradation, and protecting plant and animal life alongside the trails.

2. Buffer Zones /Bolstering

- naturalization plans are needed for bolstering the ESA.
- need a naturalization plan for adjacent LHSC and SJHC properties.
- consider the new SJHC mental health facility plan within the Master Plan update for the ESA.
- buffer zones need to be maintained at 120 metres - UTRCA should pursue with the City of London.
- regeneration of peripheral areas such as LHSC and SJHC properties.
- broaden to larger context and include all groups and expert opinions.

3. Access

- locations, signs, maps, brochures.
- review access points and evaluate our intentions.
- access from Wellington/Wilkins - is a trail needed?
- enhance map behind visitors' centre, trail brochures with maps.
- access to properties - where and what type of use?
- visitors with disabilities - can the area be accessible to them?
- access to the ESA should be limited to a few well-signed entrances.
- controlling access from the north parking lot of Millbank Villas (179-243 Millbank). The fence at the villas has required ongoing repair due to people accessing the area. At this time we have installed a gate (was lockable upon installation, but was quickly damaged). What direction should be taken regarding this location? Whose responsibility should the fence and its upkeep be?
- an access into Westminster Ponds opposite the Wellington Road/Wilkins intersection. Now that the Neurobehavioural Unit has been built, one cannot legally hike into Westminster Ponds, as there are NO TRESPASSING signs. I'm sure neighbours in the area would be willing to help out with the labour if experts planned the route.

4. Permitted Uses

- create definitions for passive recreation, and criteria for decision-making within the Master Plan update.
- determine if there will be access for kayaks and canoes (i.e., which ponds? are docks provided?).
- ice skating unofficially occurs at Spettigues and North Pond, can this activity be an "official" rink that is formally maintained and managed?
- safety of users is a priority.
- the Westminster Ponds / Ponds Mills Master Plan update should recognize, first and foremost, that the area is a PSW and an ESA. In other words, protection of the wildlife and ecological features should take priority.
- facilitation of human activities should be of secondary importance, and activities such as trail biking, skate boarding and walking dogs off leash should be banned outright. There should be some sort of enforcement agency that could impose fines on offenders.
- canoeing and kayaking should not be permitted on the ponds because bird, reptile and amphibian activities could be disrupted, and vegetation along the edges could be damaged. The ESA is not meant to be a "park" catering to human recreation. Instead, environmental preservation is the main goal.

5. Education

- need interpretive signs.
- need for education about the value of the area in light of WNv.
- City of London map doesn't show all of the ponds and trails.
- improve signage about the ESA to increase awareness and appreciation.
- signs at Ponds to discourage negative activities such as feeding ducks and geese.
- need strong interpretive component at Saunders Pond.
- consider going after Trillium Funding for interpretive projects.
- use as a vehicle to help people understand their own ecological foot print and our global impact.
- signage of interesting features, such as has been undertaken at Sifton Bog, should be considered for the ESA. These signs could be installed next to prominent trees, kettle ponds, unusual vegetation communities, etc. Education is important.

- trail maps could be made available at the entrances to the ESA and a receptacle could be provided for drop-off / return of maps at the end of a week.

6. Animals (wildlife/domestic)

- address bird feeding, feces, loose cats/dogs, Beavers, Raccoons.
- wildlife management such as Beavers in Dayus Creek.
- controlling cats and dogs and providing education where needed.
- Forest City Wildlife Rehabilitation Centre looking for a home - would the Veteran's Pavilion be suitable? Goals include education as well.
- bird feeders by Board of Education building need to be maintained.
- Tree Swallow and Purple Martin boxes around the ponds may help with mosquito control.
- we should not be encouraging predaceous bird species by providing feeders.
- loose dogs catching wildlife are a problem.
- need a dog park at this end of the city.
- consider whether we should encourage feeding of birds/animals.
- the issue of dog feces along trails needs to be addressed.
- raccoon-proof garbage receptacles should be placed along the trails to control litter pollution.
- catching animals and building animal shelters are not a good idea as there could possible be diseases.

Other Issues

Other top issues and challenges identified by the LAC, recorded at the March 27, 2003 Ponds Advisory Committee Meeting:

1. Drainage

- understand drainage into and out of the ponds including runoff, inflow / outflow, clay tile drains, etc.

2. Railway

- need to consider the potential of spills along rail line.
- existing railway crossing needs to be considered as a safety issue.

3.Cultural Features

- cultural significance of the area.
- work in cooperation with LHSC and City of London to develop cultural plan for area around veterans' cottages.
- need to review heritage vegetation considerations (e.g., trees planted by Dr. Saunders).
- need to review entire heritage significance of Dr. Saunders.
- how to link LHSC veteran buildings / passive use area within Master Plan update.

4. ESA Boundaries

- verify ESA boundaries.
- consider the future of the fire tower.
- can the LHSC perimeter fence be taken out and are there other areas that need fencing?
- should include LHSC & SJHC lands within study area (i.e., open space areas).
- the areas identified as green in LHSC development plan need to be included in the Master Plan update.

- can we ensure through the Master Plan update that the Adelaide extension is truly dead?
- will the Dearness property be integrated into the plan?
- need an overpass on Commissioners.
- if Master Plan update recommends expanding area, will that be a goal for the City and its partners?
- subdivisions adjacent to the ESA should be separated from the ESA by high fencing to prevent intrusion by domestic animals, dumping of garden refuse, and other harmful influence from adjacent human habitation.

5. Invasive Species

- concern about Purple Loosestrife.
- if nonnative plant invasions (e.g., Buckthorn, Purple Loosestrife and Garlic Mustard) become a major issue, then regular community-organized eradication strategies could be considered.

6. Litter

- woods at the end of Adelaide and Southdale (trail entrance) - could this area be cleaned up?
- north of Southdale behind Westminster Chapel Church - clean up garbage.
- a reminder that more people mean more pollution and garbage.

7. Management

- enforcement of Policies.
- implementing the Ontario Disabilities Act.
- consider recreation / rehabilitation of the retired landfill site.
- need to ensure the UTRCA has management of the ESA in the long-term.
- consider “On-site keepers” to be custodians and assist with management.

8. Tree Cutting

- hazard tree management - how to protect the environmental integrity without compromising safety.
- orange paint on trees by school board - what does this mean?
- tree cutting should be undertaken only under exceptional circumstances, such as when a boardwalk structure is threatened or after a major windfall. Snags and damaged trees are part of the natural environment, and provide important habitat and food for insects and other wildlife. If necessary, signs should be posted at the entrances to the ESA stating that people enter the ESA “at their own risk” and the danger of falling trees would be a risk, especially in high winds. Common sense should prevail. Would like to see all or most of the Ponds area preserved in natural state, that means not cutting down dead or diseased trees and letting natural process happen.

APPENDIX C.
VEGETATION COMMUNITY DESCRIPTIONS

AQUATIC HABITATS

These habitats are characterized by the presence of water.

Pond
A pond is a small body of standing water found in landscape depressions, often as part of a marsh or swamp, primarily fed by discharging groundwater (Ontario Ministry of Agriculture and Food 2004). Ponds can also be fed by overland flow or by flooding watercourses. The Westminster Ponds / Pond Mills ESA has six major ponds more than 6 metres in depth that are classified as kettle ponds. There are also a number of smaller ponds within the Dayus Creek Valley and in some of the larger forest habitats. Several of the woodland pools are permanent, while others are temporary vernal pools.

The communities in the Westminster Ponds / Pond Mills ESA that are ponds are numbered: 48, 50, 73, 84, 102, 110, 113, 122, 123, 128, 131, 161, 184, 188, 195, 196 and 243 (Map 9). In total, they account for 16.6 % of the total area for the Westminster Ponds / Pond Mills ESA. This accounts for most of the natural standing water within the City of London.

Stream
A stream is a flowing body of water. The main stream in the Westminster Ponds / Pond Mills ESA is Dayus Creek, although there are a few intermittent streams that are only active in the spring.

WETLAND HABITATS

Wetlands are permanently or seasonally flooded areas with high water tables close to or at the surface for most of the growing season. They are either found in depressions away from watercourses and ponds, or are part of the riparian areas for watercourses and ponds. They are characterized by saturated soils that are either organic or dull grey-colored mineral soils and contain water-tolerant plants. There are three types of wetlands found in the Westminster Ponds / Pond Mills ESA:

Marsh wetland
A marsh is a wetland without trees that is covered by nonwoody emergent herbaceous species such as cattails, sedges, reeds and rushes. Marshes characteristically show zonal or mosaic surface patterns of vegetation, consisting of unconsolidated grass and sedge sods in standing, shallow water that is frequently interspersed with channels or pools of open water. Where open water areas occur, a variety of submerged and floating aquatic plants flourish.

Although surface water levels may fluctuate seasonally, 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 there is little peat accumulation. The marsh at the west end of Saunders pond is a couple of hectares and is highly disturbed, owing to the construction of a fence across it. The largest marsh site in the ESA is located in the Dayus Creek Valley.

The communities in the Westminster Ponds / Pond Mills ESA that are marshes are numbered: 8, 22, 29, 45, 52, 79, 81, 87, 99, 104, 137, 139, 140, 152, 160, 168, 176 209, 222, 225, 226, 228, 232, 236, 240, 241 and 242 (Map 9). In total, they account for 5.1 % of the total area for the Westminster Ponds / Pond Mills ESA.

Bog wetland

A bog is a peat-filled wetland that consists of a deep layer of peat moss with a high water table and a surface carpet of mosses, chiefly sphagnum. The bog surface is often raised and is isolated from mineral surface waters. Hence the surface bog waters and peat are strongly acidic and upper peat layers are extremely deficient in mineral nutrients. Although bogs are usually covered with sphagnum, a wide variety of specialized floral species can also grow on them. Bogs can be treed or treeless and frequently have a layer of Ericaceae shrubs (Hilts and Inch 1978).

In Southern Ontario, bogs are associated with glacial kettle ponds, such as the ones which exist in the London area. In the Westminster Ponds / Pond Mills ESA, bog communities are only found along a narrow band surrounding Spettigue Pond. The dominant tree species is Tamarack, while Leatherleaf, Poison Sumac and high bush blueberries are found in the shrub layer. The bog at Spettigue Pond also has plants such as Swamp Loosestrife, Grass Pink, Pitcher Plant, Marsh Cinquefoil, Common Arrowhead, bullhead lilies and Sweet-scented Water Lily.

The only bog community in the Westminster Ponds / Pond Mills ESA is located in a narrow band surrounding Spettigue Pond (Community 126, Map 9). In total, it accounts for 0.5 % of the total area for the Westminster Ponds / Pond Mills ESA.

Swamp wetland

Swamps are wetlands dominated by forest cover characterized by standing to gently flowing waters that occur seasonally or persist for long periods on the surface (Hilts and Inch 1978). Frequently there is an abundance of pools and channels indicating subsurface flow. The substrate is usually waterlogged and consists of mixtures of transported mineral and organic sediments or peat deposited in situ. Swamps can be dominated by deciduous trees, coniferous trees, tall shrubs, mosses or a mixture of all four. In some regions, sphagnum may be abundant.

Mature hardwood swamp wetland

A hardwood swamp consists of deciduous trees (such as maples and Yellow Birch) found in wet areas where the water table is near the surface. The understorey contains numerous shrubs and a wide variety of herbaceous plants. Silver Maple is the most common swamp forest species and often grows in nearly pure stands or on small hummocks in swamp forests, separated by channels of standing water (Small 1978). Red Maple- Yellow Birch associations are also common since they inhabit both dry upland soils and moist soils. The swamp forests at Westminster Ponds are unusual in that they contain some Trembling Aspen, perhaps indicative of an early successional status.

The communities in the Westminster Ponds / Pond Mills ESA that are hardwood swamps are numbered: 13, 14, 18, 20, 21, 34, 37, 38, 49, 53, 72, 78, 80, 89, 95, 106, 125, 130, 132, 144, 150, 162, 171, 203, 215, 218, 233, 234, 235, 239, 246 and 249 (Map 9). In total, they account for 10.9 % of the total area for the Westminster Ponds / Pond Mills ESA.

Mixed swamp wetland

A mixed swamp consists of hardwood (deciduous) and soft wood (coniferous) trees on wet areas where the water table is near the surface.

Community 250 (Map 9) is the only mixed swamp wetland community in the Westminster Ponds / Pond Mills ESA and accounts for 0.6 % of the total area of the Westminster Ponds / Pond Mills ESA.

Thicket swamp (Carr) wetland

Swamp thickets are generally very wet communities containing dense clusters of tall shrubs and bushes such as dogwoods, willows and buckthorns. These clumps of bushes often grow from raised hummocks separated by water-filled channels which are virtually devoid of vegetation (Small 1978). The understorey can contain numerous shrubs and a wide variety of herbaceous plants. The thicket communities surrounding Saunders Pond consist of clusters of Buttonbush and willows separated by wet channels. Swamp thickets contribute to the buildup of soils, which may eventually permit colonization by other forms of vegetation. Thickets are also important to wildlife, particularly songbirds, which occupy these communities in large numbers (Small 1978).

The communities in the Westminster Ponds / Pond Mills ESA that are thicket swamps are numbered: 2, 26, 71, 85, 88, 94, 98, 100, 103, 105, 111, 117, 146, 156, 164, 172, 192, 237, 238, 244, 245, 247 and 248 (Map 9). In total, the thicket swamps account for 5.3 % of the total area for the Westminster Ponds / Pond Mills ESA.

UPLAND HABITATS

Manicured grounds and disturbed sites

Manicured grounds include open areas that are kept mowed for a variety of purposes (e.g., most of the hospital property and along municipal road easements) and areas where the topsoil has been stripped and the vegetation is generally sparse on account of the nutrient deficient soil conditions (e.g., the abandoned gravel pit and landfill sites).

The communities that are manicured grounds in the Westminster Ponds / Pond Mills ESA are numbered: 27, 33, 35, 36, 134 (Map 9). In total, they account for 1.5 % of the total area for the Westminster Ponds / Pond Mills ESA.

Old abandoned agricultural fields and roads

The dominant species in abandoned lands are grasses and weeds, although trees may have been planted through habitat restoration programs. Goldenrods, asters and sweet clover typically occur in these communities.

The communities that are old abandoned agricultural fields in the Westminster Ponds / Pond Mills ESA are numbered: 6, 12, 16, 61, 70, 90, 124, 141, 167, 175, 186, 189, 193, 194 and 230 (Map 9). In total, they account for 9.8 % of the total area for the Westminster Ponds / Pond Mills ESA.

Thicket

Thickets are dominated by scattered woody plants such as buckthorn, Staghorn Sumac, hawthorn and willow up to 6 metres in height.

The communities that are thickets in the Westminster Ponds / Pond Mills ESA are numbered: 7, 10, 15, 19, 23, 30, 40, 42, 46, 55, 60, 62, 63, 64, 69, 74, 93, 97, 116, 120, 129, 135, 142, 145, 148, 149, 154, 155, 163, 165, 169, 170, 180, 183, 191, 197, 201, 202, 216, 231 and 254 (Map 9). In total, they account for 11 % of the total area for the Westminster Ponds / Pond Mills ESA.

Young hardwood forest

Young hardwood forests are deciduous forests (poplar, ash, hawthorns) that have only recently moved beyond the shrub state. Most are found on steep, wooded slopes between the higher tableland and the lowland swamp areas.

The communities that are young hardwoods in the Westminster Ponds / Pond Mills ESA are numbered: 77, 147, 187, 198 (Map 9). In total, they account for 1.1 % of the total area for the Westminster Ponds / Pond Mills ESA.

Plantations

Plantations are areas where rows of trees have been deliberately planted.

The communities that are plantations in the Westminster Ponds / Pond Mills ESA are numbered: 4, 5, 17, 32, 41, 56, 82, 133, 158, 251 and 252 (Map 9). In total, they account for 2.3 % of the total area for the Westminster Ponds / Pond Mills ESA.

Mixed forest

A mixed forest contains both deciduous and coniferous trees.

In the Westminster Ponds / Pond Mills ESA, there is a deciduous forest growing in amongst an old conifer plantation (Community 59, Map 9) and a deciduous forest growing in association with conifer species (Community 25, Map 9). In total, they account for 0.5 % of the total area for the Westminster Ponds / Pond Mills ESA.

Mature hardwood forest

A mature hardwood forest consists of a closed canopy of deciduous forest (primarily American Beech, Sugar Maple, oak) over six metres in height found on dry ridges and low wet areas. Tree species are found in the canopy layer, while shrubs, saplings and herbs are present in the understorey. Sugar Maple - Bitternut Hickory - Hop-hornbeam communities are found on dry clay - loam interfluvial topography and drainage (Small 1978). Sugar Maple - American Beech - Red Oak communities are found on dry clay - loam south-facing slope topography and drainage (Small 1978).

The communities that are mature hardwoods in the Westminster Ponds / Pond Mills ESA are numbered: 1, 9, 11, 24, 28, 31, 39, 43, 44, 47, 51, 54, 57, 58, 65, 66, 67, 68, 75, 76, 83, 86, 91, 92, 96, 101, 107, 108, 109, 112, 114, 115, 118, 119, 121, 127, 136, 138, 143, 151, 153, 157, 159, 166, 173, 174, 177, 178, 179, 181, 182, 185, 199, 200, 204, 205, 206, 207, 208, 210, 211, 212, 213, 214, 217, 219, 220, 223, 224, 227, 229 and 253 (Map 9). In total, they account for 34.7 % of the total area for the Westminster Ponds / Pond Mills ESA. This is the largest area of all habitat types represented.

Table C1. Specific community descriptions (REFER TO MAPS 8 AND 9).

Polygon ID	ELC	DESCRIPTION
1	FOD	Basswood, ash, Sugar Maple and hickory deciduous forest.
2	SWT2-2	Willow mineral thicket swamp with Eastern Cottonwood.
3	SAF1-1	Water lily floating-leaved shallow aquatic.
4	CUP1	Red Maple deciduous plantation.
5	CUP1	Ash, maple, Black-locust and Green Ash deciduous plantation.
6	CUM1	Goldenrod and aster mineral cultural meadow.
7	CUT1	Grey Dogwood, buckthorn and ash mineral cultural thicket with scattered ash, White Elm and Scots Pine.
8	MAS2-1	Cattail mineral shallow marsh.
9	FOD7	Ash and Black Walnut moist lowland deciduous forest.
10	CUT1	Glossy Buckthorn, European Buckthorn and dogwood mineral cultural thicket.

11	FOD7	Silver Maple, poplar and ash moist lowland deciduous forest.
12	CUM1	Goldenrod and aster mineral cultural meadow.
13	SWD4	Willow, Green Ash, Eastern Cottonwood and Silver Maple mineral deciduous swamp with buckthorn and Green Ash understorey.
14	SWD3	Soft maple mineral deciduous swamp.
15	CUT1	Grey Dogwood and European Buckthorn mineral cultural thicket with scattered ash and White Elm.
16	CUM1	Goldenrod and aster mineral cultural meadow.
17	CUP3	Norway Spruce, White Spruce and Scots Pine windbreak
18	SWD3	Maple mineral deciduous swamp.
19	CUT1-4	Grey Dogwood mineral cultural thicket with scattered ash, White Elm and European Buckthorn. Grass and goldenrod understorey.
20	SWD3	Soft maple mineral deciduous swamp.
21	SWD3	Maple mineral deciduous swamp.
22	MAS2-1	Cattail mineral shallow marsh.
23	CUT1	Grey Dogwood and European Buckthorn mineral cultural thicket with scattered ash and White Elm.
24	FOD7-2	Ash lowland deciduous forest.
25	FOM7-2	Ash, poplar and cedar mixed forest.
26	SWT2	Glossy Buckthorn mineral thicket swamp.
27	n/a	Manicured grounds
28	FOD7	Black Walnut and willow fresh-moist lowland deciduous forest.
29	MAS2-1	Cattail mineral shallow marsh.
30	CUT1	Staghorn Sumac and dogwood mineral cultural thicket.
31	FOD7	Black Walnut moist lowland deciduous forest.
32	CUP1	Soft maple and ash deciduous plantation.
33	n/a	Manicured grounds.
34	SWD3	Maple mineral deciduous swamp.
35	n/a	Manicured grounds.
36	n/a	Manicured grounds
37	SWD3-2	Silver Maple mineral deciduous swamp with Green Ash. Glossy Buckthorn and Green Ash understorey.
38	SWD3	Soft maple mineral deciduous swamp.
39	FOD9	Red Oak moist deciduous forest with an understorey of Green Ash and European Buckthorn.
40	CUT1	Buckthorn and Grey Dogwood mineral cultural thicket with scattered Green Ash.
41	CUP3-2	White Pine conifer plantation with Green Ash, Black Walnut, Eastern Cottonwood, White Elm and cedar mixed in. Understorey of European Buckthorn and Green Ash.
42	CUT1	Grey Dogwood, European Buckthorn and hawthorn mineral cultural thicket with scattered Scots Pine and Green Ash.
43	FOD7-2	Ash and Silver Maple lowland deciduous forest with Red and White Oak. Understorey consists of ash, European Buckthorn and Chokecherry.
44	FOD9-3	Bur Oak and Green Ash moist deciduous forest with an understorey of buckthorn and Green Ash.

45	MAS2	Purple Loosestrife and cattail mineral shallow marsh.
46	CUT1-4	Grey Dogwood mineral cultural thicket with scattered Black Walnut and ash. Grass and goldenrod understorey.
47	FOD7	Ash and Black Walnut moist lowland deciduous forest with buckthorn, Chokecherry and Green Ash understorey.
48	n/a	Open water
49	SWD6	Soft maple organic deciduous swamp with ash and Buttonbush.
50	n/a	Open water
51	FOD6	Sugar Maple deciduous forest with buckthorn understorey.
52	MAS2-1	Cattail mineral shallow marsh
53	SWD6-2	Sliver Maple organic deciduous swamp with a Glossy Buckthorn understorey.
54	FOD5-8	Sugar Maple and ash deciduous forest with European Buckthorn and Chokecherry understorey.
55	CUT1	Grey Dogwood and Staghorn Sumac mineral cultural thicket withscattered hawthorn, Glossy Buckthorn and ash. Grass understorey.
56	CUP3	Red, White and Scots Pine conifer plantation with Green Ash and White Elm. Understorey of European Buckthorn, hawthorn, cedar and dogwood.
57	FOD7	Green Ash, Black Walnut, Basswood and White Elm lowland deciduous forest with Red Pine. European Buckthorn, hawthorn and Green Ash understorey.
58	FOD7-2	Green Ash lowland deciduous forest with buckthorn, hawthorn and Chokecherry understorey.
59	FOM	Green Ash, Silver Maple and Trembling Aspen in amongst a plantation of Black Walnut, White Pine and other conifers. Understorey of buckthorn.
60	CUT1-4	Grey Dogwood mineral cultural thicket with scattered ash,White Elm and European Buckthorn. Grass and goldenrod understorey.
61	CUM1	Mineral cultural meadow.
62	CUT1-4	Grey Dogwood mineral cultural thicket with scattered ash, White Elm and European Buckthorn. Grass and goldenrod understorey.
63	CUT1	Grey Dogwood, buckthorn and hawthorn mineral cultural thicket with scattered Red and Scots Pine, White and Norway Spruce, cedar and ash.
64	CUT1	Grey Dogwood, Wild Red Raspberry, Black-locust, Wild Crab Apple and hawthorn mineral cultural thicket with scattered Black-locust and ash.
65	FOD7	Ash, soft maple and Black Walnut moist lowland deciduous forest.
66	FOD5-5	Sugar Maple, hickory deciduous forest with Hop-hornbeam Understorey consists of Sugar Maple and Chokecherry.
67	FOD7-2	Green Ash moist lowland deciduous forest.
68	FOD7-2	Ash moist lowland deciduous forest with tall European Buckthorn.

69	CUT1	Hawthorn and European Buckthorn mineral cultural thicket with an understorey of Grey Dogwood, ash and European Buckthorn.
70	CUM 1	Staghorn Sumac with scattered Yellow Birch, Sugar Maple, ash and Trembling Aspen planted
71	SWT2-2	Willow mineral thicket swamp with Buttonbush and Purple Loosestrife.
72	SWD	Willow and soft maple mineral deciduous swamp.
73	n/a	Open water
74	CUT1	European Buckthorn, hawthorn and Grey Dogwood mineral cultural thicket with ash and poplar.
75	FOD8	Eastern Cottonwood lowland deciduous forest with buckthorn understorey
76	FOD7-4	Black Walnut moist lowland deciduous forest with some ash. Scattered Grey Dogwood understorey.
77	CUW1	Buckthorn and hawthorn mineral cultural woodland with ash understorey.
78	SWD	Soft maple, ash and willow mineral deciduous swamp.
79	MAS2-1	Cattail mineral shallow marsh.
80	SWD	Willow, soft maple and Black Walnut deciduous swamp.
81	MAS2-1	Cattail mineral shallow marsh.
82	CUP3-3	Scots Pine conifer plantation.
83	FOD7	Soft maple and ash moist lowland deciduous forest.
84	n/a	Open water
85	SWT2-9	Grey Dogwood and Glossy Buckthorn mineral thicket swamp with scattered Silver Maple and willow.
86	FOD5	Sugar Maple, oak and American Beech deciduous forest with Chokecherry and Sugar Maple understorey.
87	MAS2-1	Cattail mineral shallow marsh.
88	SWT2-2	Willow mineral thicket swamp.
89	SWD3	Soft maple mineral deciduous swamp.
90	CUM1	Goldenrod and aster mineral cultural meadow.
91	FOD7	Moist lowland deciduous forest with Silver Maple, Eastern Cottonwood and Green Ash. European Buckthorn understorey.
92	FOD7	Ash and Black Walnut moist lowland deciduous forest.
93	CUT1	Buckthorn, Staghorn Sumac, Wild Crab Apple, dogwood and Chokecherry mineral cultural thicket with scattered Eastern Cottonwood and willow.
94	SWT2	Glossy Buckthorn mineral thicket swamp with scattered soft maple and ash.
95	SWD	Soft maple and ash mineral deciduous swamp.
96	FOD	Poplar, Black Cherry, hickory and Basswood deciduous forest.
97	CUT1	Dogwood with hawthorn and buckthorn mineral cultural thicket with scattered White Elm and ash.
98	SWT2	Buckthorn mineral thicket swamp with ash, willow, White Elm, Manitoba and soft maple.
99	MAS2-1	Cattail mineral shallow marsh.
100	SWT2-2	Willow mineral thicket swamp with Buttonbush and Purple Loosestrife.

101	FOD5-2	Sugar Maple and American Beech deciduous forest.
102	n/a	Open water
103	SWT2	Willow, dogwood and Buttonbush mineral thicket swamp with scattered ash.
104	MAS2-1	Cattail mineral shallow marsh.
105	SWT2-2	Willow mineral thicket swamp with Buttonbush and Purple Loosestrife.
106	SWD4-1	Black Willow mineral deciduous swamp with Silver Maple. Buckthorn understorey with Grey Dogwood and Green Ash.
107	FOD7-4	Black Walnut moist lowland deciduous forest.
108	FOD7-2	Green Ash moist lowland deciduous forest with hawthorn and buckthorn understorey.
109	FOD5	Sugar Maple, Red Oak and American Beech deciduous forest with Black Cherry and Basswood.
110	FOD8-1	Moist Eastern Cottonwood deciduous forest with buckthorn understorey
111	SWT2	Dogwood and Glossy Buckthorn mineral thicket swamp with ash, soft maple and White Elm.
112	FOD5-2	Sugar Maple, American Beech and ash deciduous forest.
113	n/a	Open water
114	FOD5-3	Fresh Sugar Maple, Red and White Oak deciduous forest.
115	FOD5-8	Sugar Maple and ash deciduous forest with Hop-hornbeam, Black Cherry and American Beech.
116	CUT1	Grey Dogwood, buckthorn and hawthorn mineral cultural thicket with scattered Green Ash and White Elm.
117	SWT3	Scattered soft maple with Winterberry, Glossy Buckthorn, dogwood, and Poison Sumac. Groundcover primarily beggarticks Ostrich Fern, Larger Blue Flag Iris and Bulb-bearing Water Hemlock.
118	FOD7-3	Willow lowland deciduous forest with Black Walnut, White Elm and Black Cherry. Understorey is hawthorn, European Buckthorn and Grey Dogwood.
119	FOD4-2	Ash and Basswood deciduous forest with Hop-hornbeam. European Buckthorn and Chokecherry understorey.
120	CUT1	Buckthorn, hawthorn, Wild Crab Apple and Grey Dogwood mineral cultural thicket with scattered ash, Black Cherry and White Elm.
121	FOD7-2	Moist lowland deciduous forest of ash with buckthorn understorey
122	n/a	Open water
123	n/a	Open water
124	CUM 1	Ash, Highbush Cranberry, serviceberry, Staghorn Sumac
125	SWD3	Soft maple mineral deciduous swamp.
126	BOT2	Tamarack treed kettle bog.
127	FOD5	Open Sugar Maple deciduous forest with European Buckthorn, hawthorn and Chokecherry understorey.

128	n/a	Open water
129	CUT1	Wild Crab Apple, European Buckthorn, hawthorn and Grey Dogwood mineral cultural thicket with scattered Black Walnut and Manitoba maple.
130	SWD	Black Ash, Yellow Birch and soft maple organic deciduous swamp.
131	n/a	Open water
132	SWD4	White Elm, soft maple and willow mineral deciduous swamp.
133	CUP1	Black-locust deciduous plantation.
134	n/a	Manicured grounds
135	CUT1	Wild Crab Apple, hawthorn, buckthorn and Grey Dogwood mineral cultural thicket with scattered ash, Black Cherry, Sugar Maple and White Elm.
136	FOD5-8	Sugar Maple and ash deciduous forest with hickory, Hop-hornbeam and Witch Hazel. European Buckthorn and Chokecherry understorey
137	MAS2	Mineral shallow marsh.
138	FOD6-1	Sugar Maple and Green Ash lowland deciduous forest. Hawthorn and buckthorn understorey.
139	MAS2	Mineral shallow marsh
140	MAS2-1	Cattail mineral shallow march.
141	CUM1	Goldenrod, Canada Thistle and Teasel mineral cultural meadow.
142	CUT1	Hawthorn and European Buckthorn mineral cultural thicket with scattered Sugar Maple, Red Oak and Black Cherry.
143	FOD8	Moist poplar deciduous forest with Hickory, Sugar Maple and Black Cherry.
144	SWD	Open Red maple, Crack Willow, Yellow Birch and Black Ash organic deciduous swamp. Understorey consists of Glossy Buckthorn, Poison Sumac, blueberry, Winterberry, Elderberry and spirea.
145	CUT1	Hawthorn and Grey Dogwood mineral cultural thicket with scattered White Elm.
146	SWT2	Glossy Buckthorn and Silky Dogwood mineral swamp thicket with scattered Black Walnut.
147	CUW1	Mineral willow cultural woodland with Black-locust, Siberian Elm and Manitoba Maple. Wild Crab Apple and buckthorn with Highbush Cranberry, honeysuckle, raspberry and Staghorn Sumac understorey.
148	CUT1	Hawthorn, Wild Crab Apple and Grey Dogwood mineral cultural thicket with scattered Eastern Cottonwood.
149	CUT1	European Buckthorn and hawthorn mineral cultural thicket with scattered ash.
150	SWD6-2	Silver Maple organic deciduous swamp. Understorey consists of Glossy Buckthorn, White Elm, Silver Maple, Buttonbush and Winterberry.
151	FOD5-2	Sugar Maple and American Beech deciduous forest with Green Ash understorey
152	MAS2	Mineral shallow marsh
153	FOD2	Red and White Oak, Sugar Maple, and Shagbark Hickory deciduous forest with Black Cherry, Hop-hornbeam, American Beech, Basswood and ash.

154	CUT1	Buckthorn, hawthorn and Grey Dogwood mineral cultural thicket with scattered ash, Wild Crab Apple and Black Cherry.
155	CUT1-4	Grey Dogwood mineral cultural thicket with goldenrod.
156	SWT2	Riverbank Grape, Highbush Cranberry, Glossy Buckthorn, Red-osier Dogwood and honeysuckle mineral swamp thicket with scattered willow, Black Walnut and White Elm.
157	FOD5-3	Sugar Maple and Red Oak deciduous forest with Hop-hornbeam, American Beech, Black Cherry and Bitternut Hickory. European Buckthorn, hawthorn and Chokecherry understorey.
158	CUP2	White Pine plantation with Sugar Maple, Black Cherry, ash and hawthorn mixed in.
159	FOD5	Sugar Maple deciduous forest with Basswood, Red Oak and Hop-hornbeam. European Buckthorn and Chokecherry understorey.
160	MAS2-1	Cattail mineral shallow marsh.
161	n/a	Open water
162	SWD4	Black Willow and Eastern Cottonwood mineral deciduous swamp with Glossy Buckthorn and Silky Dogwood understorey.
163	CUT1	European Buckthorn and hawthorn mineral cultural thicket with scattered ash.
164	SWT2	Glossy Buckthorn and Silky Dogwood mineral swamp thicket with scattered Black Walnut.
165	CUT1	Hawthorn, Wild Crab Apple and Grey Dogwood mineral cultural thicket with scattered Eastern Cottonwood.
166	FOD5-5	Sugar Maple and Bitternut Hickory deciduous forest with Green Ash, Hop-hornbeam and Shagbark Hickory. Understorey of European Buckthorn and Sugar Maple.
167	CUM1	Mineral cultural meadow
168	MAS2	Mineral shallow marsh
169	CUT1	Hawthorn, buckthorn, Staghorn Sumac, Grey Dogwood and honeysuckle mineral cultural thicket with scattered White Elm.
170	CUT1	European Buckthorn and Green Ash mineral cultural thicket with scattered ash.
171	SWD4-1	Willow and Silver Maple mineral deciduous swamp. Understorey is Silky Dogwood and Glossy Buckthorn.
172	SWT2-9	Grey Dogwood, Glossy Buckthorn and Riverbank Grape mineral swamp thicket with scattered Manitoba Maple.
173	FOD4-2	Ash, Red Oak and Trembling Aspen deciduous forest with Hop-hornbeam, Bitternut Hickory and Sugar Maple. Hawthorn, European Buckthorn and Green Ash understorey.
174	FOD5-8	Sugar Maple and ash deciduous forest. Understorey is European Buckthorn, hawthorn, Chokecherry and Grey Dogwood.

175	CUM1	Mineral cultural meadow with scattered Grey Dogwood, Glossy Buckthorn, Eastern Cottonwood and Manitoba Maple.
176	MAS2-1	Cattail mineral shallow marsh with scattered Silky Dogwood and willows.
177	FOD	Ash, Bitternut Hickory and Sugar Maple deciduous forest with poplar, American Beech, Basswood, Black Cherry, Hop-hornbeam, Red Oak, hawthorn and Wild Crab Apple.
178	FOD5	Sugar Maple, American Beech and ash deciduous forest with Hop-hornbeam. Sugar Maple and Chokecherry understorey.
179	FOD7-2	Green Ash lowland deciduous forest with hawthorn and European Buckthorn understorey.
180	CUT1	Buckthorn, hawthorn and Grey Dogwood mineral cultural thicket with scattered White Elm, Green Ash and Sugar Maple.
181	FOD5	Sugar Maple deciduous forest with hawthorn, European Buckthorn, Wild Crab Apple and Chokecherry understorey.
182	FOD5-3	Sugar Maple and Red Oak deciduous forest with European Buckthorn and Chokecherry understorey.
183	CUT1	Wild Crab Apple, hawthorn, buckthorn and Grey Dogwood mineral cultural thicket with scattered ash, Black Cherry, Sugar Maple and White Elm.
184	n/a	Open water
185	FOD6-1	Sugar Maple and Green Ash lowland deciduous forest with hawthorn and European Buckthorn understorey.
186	CUM1	Mineral cultural meadow with scattered Grey Dogwood and Glossy Buckthorn
187	CUW1	Eastern Cottonwood and Manitoba Maple mineral cultural woodland. European Buckthorn, Grey Dogwood understorey with grass and goldenrod.
188	n/a	Open water
189	CUM1	Mineral cultural meadow with scattered Grey Dogwood, Glossy Buckthorn, Eastern Cottonwood and Manitoba Maple.
190	CUP1-4	Trembling Aspen, Black-locust, Manitoba Maple, Eastern Cottonwood, willow
191	CUT1	Hawthorn, European Buckthorn, Green Ash and Grey Dogwood mineral cultural thicket with scattered Eastern Cottonwood..
192	SWT2-2	Willow mineral thicket swamp.
193	CUM1	Goldenrod, Common Burdock, fleabane, milkweed and sow thistle mineral cultural meadow.
194	CUM1	Goldenrod and aster mineral cultural meadow with scattered poplar, Black-locust and Siberian Elm.
195	n/a	Open water
196	n/a	Open water
197	CUT1	Hawthorn, buckthorn,
198	CUW1	Eastern Cottonwood and Manitoba Maple mineral cultural woodland. European Buckthorn, Grey Dogwood understorey with grass and goldenrod.
199	FOD4	Ash, Red Oak and Black Walnut deciduous forest with Chokecherry and ash understorey.

200	CUW1	Wild Crab Apple mineral cultural woodland with scattered Black Walnut and ash.
201	CUT1	Grey Dogwood, buckthorn and ash mineral cultural thicket with scattered ash, White Elm and Scots Pine.
202	CUT1-4	Grey Dogwood and European Buckthorn mineral cultural thicket with Green Ash, Wild Crab Apple and Canada Plum.
203	SWD4-1	Willow and poplar lowland
204	FOD6-4	Sugar Maple, American Beech and White Elm transition community with ash regeneration
205	FOD5-2	High quality stand of Sugar Maple, American Beech, ash, Bitternut Hickory, Black Cherry, Hop-hornbeam
206	FOD5-5	Sugar Maple, Bitternut Hickory, Basswood, Shagbark Hickory
207	FOD9	Bitternut Hickory, Sugar Maple
208	FOD7	White Elm, Red Maple, hawthorn sp.
209	MAM2	Cattail, rushes, sedges, grasses
210	FOD2-3	Bitternut Hickory, Shagbark Hickory
211	FOD3-1	Trembling Aspen, White Elm
212	FOD7	White Elm, Red Maple
213	FOD7	White Elm, Red Maple, hawthorn sp.
214	FOD3-1	Trembling Aspen, White Elm
215	SWD3	Silver Maple, Red Maple
216	CUS1-1	Hawthorn sp.
217	FOD5-2	Sugar Maple, American Beech
218	SWD3	Silver Maple, Red Maple
219	FOD7	White Elm, Red Maple
220	FOD9	Bitternut Hickory, Sugar Maple
222	MAM2	Cattail, rushes, sedges, grasses
223	FOD5-2	American Beech, Sugar Maple, Black Cherry, Bitternut Hickory, Shagbark Hickory
224	FOD5-2	American Beech, Sugar Maple, Black Cherry, Bitternut Hickory, Shagbark Hickory
225	MAM2	Cattail, rushes, sedges, grasses
226	MAM2	Cattail, rushes, sedges, grasses
227	FOD9	Bitternut Hickory, Sugar Maple
228	MAM2	Cattail, rushes, sedges, grasses
229	FOD3-1	Trembling Aspen, White Elm
230	CUM1-1	Meadow
231	CUT1-4	dogwood, willow
232	MAM2	Cattail, rushes, sedges, grasses
233	SWD3	Silver Maple, Red Maple
234	SWD3	Silver Maple, Red Maple
235	SWD3	Silver Maple, Red Maple
236	MAM2	Cattail, rushes, sedges, grasses
237	SWT2	Willow, dogwood
238	SWT2	Willow, dogwood
239	SWD3	Red Maple, poplar, ash
240	MAM2	Cattail, rushes, sedges, grasses
241	MAM2	Cattail, rushes, sedges, grasses
242	MAM2	Cattail, rushes, sedges, grasses
243	n/a	Open water
244	SWT2	Willow, dogwood

245	SWT2	Willow, dogwood
246	SWD3	Red Maple, poplar, ash
247	SWT2	Willow, dogwood
248	SWT2	Willow, dogwood
249	SWD3	Red Maple, poplar, ash
250	SWM4	Ash, Yellow Birch, maple, dogwood, cedar, Eastern Hemlock
251	CUP1	Norway Maple, Siberian Elm, Manitoba Maple, Common Lilac
252	CUP1	Silver Maple, Siberian Elm, grass
253	FOD7-3	Silver Maple, willow
254	CUT1-1	Norway Maple, hawthorn, Staghorn Sumac, willow

APPENDIX D.
LIST OF REPTILES, AMPHIBIANS, FISH AND INSECT SPECIES RECORDED IN THE WESTMINSTER PONDS/POND MILLS ESA

Table D1. List of reptile and amphibian species found in the ESA since 1984.

COMMON NAME	SCIENTIFIC NAME
Genus Ambystoma	*Ambystoma sp.*
American Toad	*Bufo americanus*
Blanding's Turtle* (region. sig)	*Emydoidea blandingii*
Blue Spotted Salamander	*Ambystoma laterale*
Bullfrog	*Rana catesbeiana*
Butler's Garter Snake * (prov. sig)	*Thamnophis butleri*
Chorus Frog	*Pseudcris triseriata*
Eastern Garter Snake	*Thamnophis sirtalis*
Eastern Massasauga	*Sistrurus catenatus catenatus*
Eastern Milk Snake	*Lampropeltis triangulum*
Eastern Newt	*Notophthalmus viridescens*
Green Frog	*Rana clamitans*
Grey Tree Frog	*Hyla versicolor*
Jefferson Salamander * (prov. sig)	*Ambystoma jeffersonianum*
Midland Painted Turtle	*Emydoidea blandingii marginata*
Northern Brown Snake	*Storeria dekayi dekayi*
Northern Leopard Frog	*Rana pipiens*
Painted Turtle	*Chrysemys picta*
Red-backed Salamander	*Plethodon cinereus*
Snapping Turtle	*Chelydra serpentina serpentina*
Spring Peeper	*Pseudcris crucifer*
Wood Frog	*Rana sylvatica*
Yellow Spotted Salamander	*Ambystoma maculatum*

Table D2. Fish species found in the ESA ponds with the most recent date listed.

FISH SPECIES	SOUTH	NORTH	SAUNDERS	SPETTIGUE	TUMBLESON	THOMPSON
Pumpkinseed	2003	1984	pre-1984	pre-1984	2003	2001 (west of CNR)
Black Crappie	2003				2003	
Yellow Perch	2003	1984	1994	pre-1984	2003	
Green Sunfish	1984					
Rock Bass	2003	pre-1984				
Largemouth Bass	2003	1984	pre-1984	pre-1984	2003	
Smallmouth Bass	pre-1984	pre-1984	pre-1984	pre-1984		
Iowa Darter	pre-1984		pre-1984	pre-1984		2001 (west and north east of CNR)
Fantail Darter	pre-1984	pre-1984				
Johnny Darter	pre-1984	pre-1984				
Northern Pike	pre-1984	pre-1984	pre-1984	pre-1984		
Goldfish		pre-1984				
Brown Bullhead			pre-1984	pre-1984		
Brook Stickleback						2001 (west and north east of CNR)
Golden Shiner						2001 (west and north east of CNR)
Central Mudminnow						2001 (west and north east of CNR)
Common Carp	2003				2003	
Bluegill	2003	pre-1984	pre-1984	pre-1984	2003	
White Sucker	2003				2003	
Darter sp.*			1995			
Bass sp.*			1994			
Sunfish sp.*		1984				

* Note: these individual specimens were not able to be identified to species level or may have been hybrids.

Table D3. List of insect species recorded in the ESA (Wake and Wake 1999, 2000).

COMMON NAME	SCIENTIFIC NAME
BUTTERFLY	
American Lady	*Vanessa virginiensis*
Black Swallowtail	*Papilio polyxenes*
Cabbage White	*Pieris rapae*
Clouded Sulphur	*Colias philodice*
Common Ringlet	*Coenonympha tullia*
Common Sooty Wing	*Pholisora catullus*
Common Wood Nymph	*Cercyonis pegala*
Compton Tortoiseshell	*Nymphalis vau-album*
Eastern Comma	*Polygonia comma*
European Skipper	*Thymelicus lineola*
Hobomok Skipper	*Poanes hobomok*
Little Wood Satyr	*Magisto cymela*
Long Dash	*Polites mystic*
Meadowhawk sp.	*Sympetrum sp.*
Monarch	*Danaus plexippus*
Mourning Cloak	*Nymphalis antiopa*
Northern Broken Dash	*Wallengrenia egeremet*
Northern Cloudy Wing	*Thorybes pylades*
Northern Crescent	*Phyciodes selenis*
Orange Sulphur	*Colias eurytheme*
Pearl Crescent	*Phyciodes tharos*
Peck's Skipper	*Polites coras*
Question Mark	*Polygonia interrogationis*
Red Admiral	*Vanessa atalanta rubria*
Silver-spotted Skipper	*Hesperia comma*
Spring Azure	*Celastrina argiolus*
Tiger Swallowtail	*Papilio glaucus*
Viceroy	*Limenitis archippus*
Yellow-legged Meadowhawk	*Sympetrum vicinum*

COMMON NAME	SCIENTIFIC NAME
DRAGON / DAMSELFLIES	
Black Saddlebags	*Tramea lacerata*
Common Green Darner	*Anax junius*
Dot-tailed Whiteface	*Leucorrhinia intacta*
Ebony Jewelwing	*Calopteryx maculata*
Twelve-spotted Skimmer	*Libellula pulchella*
White-tailed Skimmer	*Libellula lydia*
Widow Skimmer	*Libellula luctuosa*
Yellow-legged Meadowfly	*Sympetrum vicinum*
GRASSHOPPERS / CRICKETS	
Band-winged Grasshopper	*Trimerotropis infantilis*
Black-winged Locust	*Robinia pseudoacacia*

APPENDIX E.
HISTORICAL WATER QUALITY INFORMATION

Information from the Ontario Water Resources Commission (1970):

In 1970, the Ontario Water Resources Commission determined that all ponds in the Westminster Ponds / Pond Mills ESA had relatively good aeration as a result of the periodic flushing of the ponds by the man-made drainage system. In a natural system, kettle ponds typically have no surface flow and gradually fill in with organic material. The decomposition of this organic matter eventually depletes the oxygen in the aquatic system.

Spettigue Pond was in the best condition of the ponds, having a relatively low concentration of nutrients, low biological oxygen demand and low coli form counts. Saunders Pond, on the other hand, had a higher than normal level of chlorides, which may have been a result of the sand and salt mixture stored southwest of the pond by the City of London from 1961 to 1974. Given that Tumbleson Pond receives the overflow from Saunders Pond through an underground drain pipe, it also had a high chloride content in 1970. Both Saunders and Tumbleson Pond also had faecal coli forms that indicated contamination from domestic sewage.

Information from the Ministry of the Environment (Staal 1979):

In 1978, the Ministry of the Environment determined that Tumbleson Pond, Saunders Pond and the Mill Ponds could be toxic to aquatic fish at times, possessing concentrations of ammonia and hydrogen sulfide / sulfate that exceed acceptable levels. Phosphorous and nitrogen concentrations were high, and oxygen was absent from the deeper waters in the summer. Reasons for this deterioration in water quality from 1970 to 1978 are not understood. Spettigue Pond was less degraded than either Tumbleson Pond and Saunders Pond, with oxygen levels low but not absent from the hypoliminion during summer stratification.

Information from MacLaren Engineers, Planners and Scientists Inc. (1981):

In 1981, MacLaren Engineers, Planners and Scientists Inc. determined that all ponds had soft bottoms of considerable depth sitting above hard clay till of low permeability. All the ponds stratify in the summer (warm water lying above cooler water), and inversely stratify in the winter (colder ice and water at the top and warmer but more dense water at the bottom). Mixing of the layers occurs in the spring and autumn. The ponds have high dissolved oxygen values in the upper layers in the summer and throughout the layers in the spring and autumn. High dissolved oxygen provides suitable conditions for plant growth (mainly phytoplankton), which forms the base of the food chain. It also limits the clarity of water in the ponds to average values of about three metres. However, deeper layers in the summer tend to be depleted of oxygen because of the lack of photo synthetic activity and the presence of sediments on the pond bottom that exert oxygen demands as bacteria oxidize organic deposits. This lack of oxygen in the pond bottom makes the habitat unsuitable for many species, including cold water fish. As well, it can release toxic substances such as ammonia and sulfide during mixing. Benthic samples indicated that very few organisms occur on the bottom deposits, which is consistent with the observed anaerobic conditions.

MacLaren Engineers, Planners and Scientists Inc. (1981) found that all ponds are fairly uniform with a slightly alkaline pH, indicating well-buffered surface waters. Spettigue Pond was relatively soft to moderately hard (low concentration of calcium

and magnesium ions), indicating limited interaction of precipitation with soils and / or capture of dissolved minerals by vegetation and peat before runoff reached the pond. The other ponds were moderately hard to hard. As well, there was a much lower chloride concentration in Spettigue Pond compared to the other ponds, probably because it is not affected by the roadway runoff that typically contains salt. All other ponds had higher concentrations of chloride, with the Westminster Ponds containing less dissolved road salt than the ponds at Pond Mills. Both Saunders and Tumbleson Ponds still had raised chloride levels from the remnant salt pile that was located near the western shoreline of Saunders Pond, although the concentrations were much lower since the removal of the salt pile in the 1970s. On the other hand, the ponds at Pond Mills experienced a doubling of chloride since the 1970s. This was most likely a result of surface drainage around Highbury Avenue, a theory which is supported by the fact that there was a four-fold increase in sodium and chloride in the main tributary to North Pond downstream of Highbury Avenue. The sodium in road salt is believed to stimulate blooms of blue-green algae.

According to the model predictions of trophic conditions by MacLaren Engineers, Planners and Scientists Inc. (1981), North Pond and Tumbleson Pond are eutrophic, South Pond and Saunders Pond are marginally eutrophic and Spettigue Pond is mesotrophic to marginally oligotrophic. However, total phosphorous in the epilimnion of all ponds was high enough to increase plankton growth and cause eutrophication. Normally, phosphorous is a nutrient of plankton growth which is generally in short supply.

Comparisons of the 1981 data with the historical Ontario Water Resources Commission (1970) and the Ministry of the Environment (1979) data suggest that pond water quality has not changed dramatically, although there has been some increase in the level of eutrophication. Dissolved organic carbon, which is an indicator of water purity, was uniform for all ponds and at different times. Sulfate, dissolved from soil and rock, was also consistent between ponds. With the exception of phosphorus, water quality in the ponds in 1981 met the water quality objectives of the MOE, including objectives for surface and recreational water activities such as swimming. However, it should be noted that these trends are somewhat inconclusive, since the time interval of one year for data gathering is not sufficient to detect long-term trends in water quality.

APPENDIX F.
APPROPRIATE SPECIES FOR PLANTING IN THE WESTMINSTER PONDS / POND MILLS ESA

The selection of plants for rehabilitation, restoration and maintenance of ESAs should be based on use of plant species native to Middlesex County and derived from local plant populations. Local plant species are better adapted to existing local conditions, such as climate, exposure, soil, moisture availability, etc. Monocultures should be avoided. Instead, the intermixing of shrubs and trees should be encouraged.

The following is a list of native species that are suitable for planting in the Westminster Ponds / Pond Mills ESA. These species meet the Guide to Plant Selection for Environmentally Significant Areas (City of London 1994a) or are found within the Westminster Ponds / Pond Mills ESA. Species with an asterisk (*) may be suitable for experimental planting in the landfill.

COMMON NAME (TREES)	**SCIENTIFIC NAME**	**SHADE TOLERANCE**
American Beech	*Fagus grandifolia*	Very Tolerant
Blue-beech	*Carpinus caroliniana*	Very Tolerant
Sugar Maple	*Acer saccharum*	Very Tolerant
American Basswood	*Tilia americana*	Tolerant
Hop-hornbeam	*Ostrya virginiana*	Tolerant
Red / Green Ash	*Fraxinus pennsylvanica*	Tolerant
Eastern White Cedar	*Thuja occidentalis*	Tolerant
Red Maple	*Acer rubrum*	Tolerant
Silver Maple	*Acer saccharinum*	Tolerant
Slippery Elm	*Ulmus rubra*	Tolerant
White Elm	*Ulmus americana*	Intermediate
Bitternut Hickory	*Carya cordiformis*	Intermediate
Bur Oak	*Quercus macrocarpa*	Intermediate
Common Hackberry	*Celtis occidentalis*	Intermediate
Northern Red Oak	*Quercus rubra*	Intermediate
Shagbark Hickory	*Carya ovata*	Intermediate
White Oak	*Quercus alba*	Intermediate
Yellow Birch	*Betula alleghaniensis*	Intermediate
Black Cherry	*Prunus serotina*	Intolerant
Black Walnut	*Juglans nigra*	Intolerant
Butternut	*Juglans cinerea*	Intolerant
White Ash	*Fraxinus americana*	Intolerant
Balsam Poplar	*Populus balsamifera*	Very Intolerant
Large-tooth Aspen	*Populus grandidentata*	Very Intolerant
Eastern Cottonwood	*Populus deltoides*	Very Intolerant
Trembling (Quaking) Aspen*	*Populus tremuloides*	Very Intolerant

COMMON NAME (SHRUBS)	SCIENTIFIC NAME
Eastern Red Cedar	*Juniperus virginiana*
Bebb's Willow	*Salix bebbiana*
Pussy Willow	*Salix discolor*
Sandbar Willow	*Salix exigua*
Shining Willow	*Salix lucida*
Black Willow	*Salix nigra*
Slender Willow	*Salix petiolaris*
Hazelnut	*Corylus americana*
Beaked Hazel	*Corylus cornuta*
Wild Black Currant	*Ribes americanum*
Prickly Gooseberry	*Ribes cynosbati*
Swamp Gooseberry	*Ribes hirtellum*
Witch Hazel	*Hamamelis virginiana*
Smooth Juneberry	*Amelanchier laevis*
Compact Hawthorn*	*Crataegus compacta*
Cockspur Hawthorn*	*Crataegus crus-galli*
Variable Hawthorn*	*Crataegus macrosperma*
Dotted Hawthorn*	*Crataegus punctata*
Canada Plum	*Prunus nigra*
Pin Cherry	*Prunus pensylvanica*
Chokecherry	*Prunus virginiana*
Smooth Wild Rose*	*Rosa blanda*
Juneberry*	*Amelanchier arborea*
Common Blackberry	*Rubus allegheniensis*
Wild Red Raspberry*	*Rubus idaeus ssp. Melanolasius*
Black Raspberry	*Rubus occidentalis*
Staghorn Sumac*	*Rhus typhina*
Bladdernut	*Staphylea trifolia*
Virginia Creeper	*Parthenocissus quinquefolia*
Summer Grape	*Vitis aestivalis*
Riverbank Grape	*Vitis riparia*
Alternate-leaved Dogwood	*Cornus alternifolia*
Silky Dogwood	*Cornus amomum*
Eastern Flowering Dogwood	*Cornus florida*
Grey Dogwood*	*Cornus foemina*
Red-osier Dogwood	*Cornus stolonifera*
Buttonbush	*Cephalanthus occidentalis*
Bush Honeysuckle	*Diervilla lonicera*
Fly Honeysuckle	*Lonicera canadensis*
Elderberry	*Sambucus canadensis*
Red-berried Elderberry	*Sambucus racemosa*
Maple-leaved Viburnum	*Viburnum acerifolium*
Wild-raisin	*Viburnum cassinoides*
Nannyberry	*Viburnum lentago*
Downy Arrow-wood	*Viburnum rafinesquianum*
Highbush Cranberry	*Viburnum trilobum*

COMMON NAME (GRASSES)	SCIENTIFIC NAME
Sand Dropseed	*Sporobolus cryptandrus*
Virginia Wild Rye	*Elymus virginicus*
Big Bluestem	*Andropogon gerardii*

COMMON NAME (WILDFLOWERS)	SCIENTIFIC NAME	COEFFICIENT OF WETNESS*
Swamp Milkweed	*Asclepias incarnata*	-5
Purple-stemmed Aster	*Aster puniceus*	-5
Nodding Beggarticks	*Bidens cernua*	-5
Turtlehead	*Chelone glabra*	-5
Spotted Joe-Pye Weed	*Eupatorium maculatum*	-5
Boneset	*Eupatorium perfoliatum*	-4
Great Blue Lobelia	*Lobelia siphilitica*	-4
Panicled Aster	*Aster lanceolatus*	-3
New England Aster	*Aster novae-angliae*	-3
Flat-topped White Aster	*Aster umbellatus*	-3
Sticktight	*Bidens frondosa*	-3
Swamp Beggarticks	*Bidens tripartita*	-3
Tall Beggarticks	*Bidens vulgata*	-3
Spotted Touch-me-not	*Impatiens capensis*	-3
Calico Aster	*Aster lateriflorus*	-2
Columbine	*Aquilegia canadensis*	1
Wild Strawberry	*Fragaria virginiana*	1
Beard-tongue	*Penstemon digitalis*	1
Soft-hairy Aster	*Aster pilosus*	2
Round-headed Bush Clover	*Lespedeza capitata*	3
Wild Bergamot	*Monarda fistulosa*	3
Mayapple	*Podophyllum peltatum*	3
Black-eyed Susan	*Rudbeckia hirta*	3
Heath Aster	*Aster ericoides*	4
Heart-leaved Aster	*Aster cordifolius*	5
Large-leaved Aster	*Aster macrophyllus*	5
Arrow-leaved Aster	*Aster sagittifolius*	5
Gray Goldenrod	*Solidago nemoralis*	5

***Coefficient of Wetness:**

-5:	Obligate wetland species (>99% probability of occurring in wetland)
-4 to -2:	Facultative wetland species (67-99% probability of occurring in wetland; occasionally found in non-wetland)
-1 to 1:	Facultative species (equally likely to occur in wetland and non-wetland)
2 to 4:	Facultative upland species (1-33% probability of occurring in wetland; usually found in non-wetland)
5:	Obligate upland species (<1% probability of occurring in wetland)

SPECIES SELECTION FOR LANDFILL (refer to Appendix G)

Woody species differ in their ability to adapt to landfill soil. Since most hardwood trees have deep tap roots which limit their ability to grow on landfill sites with shallow soil caps, at least 90 cm of soil must be in place to develop a good cover of woody plants. Species also need to be drought tolerant, given the limited amount of moisture-holding soil and the mounded topography of abandoned landfill sites, which tend to shed water. Shrubs are probably better suited to landfill conditions as they have shallower roots and require less moisture than trees.

If trees are to be used, choose smaller stock (30-60 cm) over larger stock, slow growers over rapid growers, shallow and extensive root systems over deep tap root systems and balled and bur lapped root stock over bare root stock (Gilman et al. 1981). Although conifers have shallower roots than deciduous trees, it is best to plant species that occur naturally in the immediate area. The Westminster Ponds / Pond Mills ESA is predominantly a deciduous forest. Conifers do not occur naturally in great numbers here. As well, deciduous trees such as poplars take up a lot of water through their root system and can be used to reduce the amount of leachate.

Grasses and wildflowers may be best adapted to conditions on the landfill since they prefer sites with full sun, low nutrients, low moisture and can grow on heavy or light soils. Grasslands and meadows are important habitats for wildlife and are in relatively short supply in the London area. However, their deep root systems may make them unsuitable to landfill situations where there is less than two metres of soil. When planting grasses and wildflowers in the landfill, the seeds should be hand spread and raked into the soil (Gilman et al. 1983). Mulch and tack should only be used to hold the seed in place in sloping areas where embedding is impossible or to conserve moisture. Micro terracing is recommended before seeding and mulching for steep sloping ground.

SPECIES SELECTION FOR MEADOWS

Meadows are beneficial for a number of reasons:

- once established, they are a low maintenance alternative
- they can be established along watercourses, in areas of low production and on erodible or retired lands
- benefits wildlife such as butterflies, bees and birds
- erosion control along stream banks or steep slopes
- help to restore prairie grasslands that were once a significant part of our landscape
- aesthetically pleasing

To establish a wildflower and/or native grass meadow, site preparation should be started a year in advance. Prepare the site by burning or mowing the area and removing the clippings. Allow the vegetation to regrow to a height of 20 cm and prepare a weed-free site by spraying a herbicide in the late summer and again the following spring. Broadcast seed in late May or early June following the second herbicide application and use a roller to ensure good seed to soil contact. Fertilizing is not required. Choose warm-season grasses or prairie grasses to restore the meadow if the goal is to provide cover for wildlife, and cool-season grasses to provide cover for early season nesting birds (Ontario Ministry of Agriculture and Food 2004). Warm season grasses take several years to establish, but in time will be more competitive than cool-season grasses. Wildflowers can also be planted or will seed in more readily with warm season grass stands.

Once germinated, natural wildflower and grass meadows are maintained by periodic (yearly) fires to help control nonnative species. However, mowing or hand weeding is an option for small areas if burning is not practical. Note that it may take up to three years to see desired results.

APPENDIX G.
LANDFILL NATURALIZATION OPTIONS

Consult the Pollution Control Technician or the Project Manager for Solid Waste. Refer to Appendix H for a list of appropriate species for planting in ESAs and in the landfill.

Option One. Do nothing

Avoid all planting efforts until methane levels diminish and the chances of success are greater. Do not cut the grass, especially during nesting season, to protect ground nesting birds that may be using the site.

Option Two. Naturalize small, but hospitable plots

Small areas of the site that appear hospitable to plant growth at the present time can be planted with native species (refer to Appendix H). Experimentation and consultation are needed to determine the best species for the site. Plots of different species should be planted and monitored over a few years. The establishment of clumps or nodes of native vegetation may speed up succession on the rest of the site by providing shade, compost (leaf litter) and seeds. Those species that thrive should then be planted more extensively on the landfill site.

Select areas with at least 60-90 cm soil depth, where grasses or other plants are well established and where methane levels are lowest (Gilman et al. 1983). Test the soil for nutrient content (e.g., pH, nitrogen, potassium, phosphorus), and bulk density to determine its suitability for plant growth. Import or amend the soil with fertilizer, lime or organic matter within the top 15 cm if needed. It may be necessary to kill existing nonnative plants before planting, especially if they are thick and vigorously growing. Nonnative grasses are highly competitive and will divert soil moisture from new plantings. If practical and within budget, irrigate plants, especially trees, for the first three years.

Barren areas where plants will not grow because of high landfill gas concentrations may have to be landscaped with wood chips or large stones to prevent erosion and provide a pleasing appearance (Gilman et al. 1983). Do not cut the grass, especially during nesting season, to protect ground nesting birds that may be using the site. Other techniques that may have some merit and should be investigated further include hydroseeding or pit-and-mound techniques.

Option Three. Install gas barriers and top soil in small areas and naturalize

To promote good vegetation growth, landfill gases (primarily carbon dioxide and methane) must be kept away from the root system of trees and shrubs (Gilman et al. 1981). If there are no hospitable areas within the site, install gas barriers and quality soil to small areas of the site to increase the chances of success. The most successful landfill - to - park conversions will incorporate a gas extraction system in the landfill to reduce the volume of gases escaping into the soil cover and inhibiting root growth. The barriers block landfill gases from migrating into the cover soil where vegetation is to be planted.

A variety of barriers are currently available to control gas migration, including a layer of impermeable clay 30-60 cm deep. Synthetic membrane sheeting such as polyvinyl chloride or Hypalon can also be used. Approximately 60 cm of top soil, with loam preferably in the top 20 cm where fine feeder roots are found, is required on top of the barrier prior to planting.

The soil should be seeded with an annual grass and allowed to settle for a few months before planting. Refer to Appendix H for a list of plant species that may be suitable for this site. Do not cut the grass, especially during nesting season, to protect ground nesting birds that may be using the site.

One target area that could be reforested would be along the southern boundary of the landfill site to provide a connection between Communities 177 and 178 (Map 9). Depending on the width of this strip, it could provide additional cover for wildlife and allow for greater ease of wildlife movement between these two zones.

Option Four. Install gas barriers and extra top soil over entire area and naturalize

As above, but apply to the entire site. Do not cut the grass, especially during nesting season to protect ground nesting birds that may be using the site.

APPENDIX H.
OPTIONS FOR THE LHSC FENCE

An inventory of the trees and sensitive herbaceous plant species found along and within two metres of the fence line on the trail side was conducted to assess any damage that might occur in removing the fence, including damage from the equipment needed to remove the fence (Tables H1 - H6). All trees that were 10 cm or greater in diameter were counted. European Buckthorn, Glossy Buckthorn and Tartarian Honeysuckle were not counted at all, regardless of their size, because they are nonnative species.

Table H1. Trees along the fence running east and west

Tree Species	10-24cm	26-36	38-48cm
Trembling Aspen	1		
Eastern Cottonwood	1		1
Ashes	15	3	
Black-locust	1		
Willows		1	
Red Maple	3		
Silver Maple		2	
Total	**21**	**6**	**1**

Table H2. Trees within 60 cm of the fence running east and west

Tree Species	10-24cm	26-36	38-48cm
Ashes	12	1	1
Trembling Aspen	1		
White Elm	1	1	
Hawthorns	1		
Total	**15**	**2**	**1**

Table H3. Trees within two metres of the fence running east and west

Tree Species	10-24cm	26-36
Black-locust	2	
Ashes	14	
White Elm	7	
Hawthorns	2	
Trembling Aspen	1	
Cedars	1	
Willows		1
Silver Maple	5	
White Spruce	2	
Total	**34**	**1**

There are many other shrubs and trees less than 10 cm in diameter (such as Silver Maple, White Elm, ashes, hawthorns, Grey Dogwood and grapes) that will be destroyed by the fence removal. There were no sensitive herbaceous plants growing along the fence. The fence is found along the perimeter of communities 61, 68, 67, 74, 58, 59, 60, 201, 62, 63 and 69 (Map 9).

Table H4. Trees along the fence running north and south

Tree Species	10-24cm	26-36
Willows	1	4
Silver Maple		1
Sugar Maple	3	1
White Elm	1	
Ashes	1	1
Total	**6**	**7**

Table H5. Trees within 60 cm of the fence running north and south

Tree Species	10-24cm	26-36	38-48cm
Junipers	2		
Eastern Cottonwood		1	1
Black-locust		1	
Ashes	1		
Total	**3**	**2**	**1**

Table H6. Trees within two metres of the fence running north and south

Tree Species	10-24cm	26-36	38-48cm
Siberian Elm		1	1
Eastern Cottonwood			1
Willows	1		
Silver Maple	3	1	
Ashes	1	1	
Total	**5**	**3**	**2**

There are many other shrubs and trees less than 10 cm in diameter (such as Siberian Elm, Sliver Maple, ashes, currants, grapes and Virginia Creeper) that will be destroyed by the fence removal. There were also three dead trees that were not counted, a Black Willow lying on the fence and four other willows leaning on the fence. There were no sensitive herbaceous plants growing along the fence. The fence is found along the perimeter of communities 61, 68, 99, 121, 106, 87, and 75 (Map 9).

Six Options for fence removal:

1) Do not remove the fence.
This will act as a barrier to wildlife and human movement, but will not impact the soil or any of the trees adjacent to the fence. As well, the fence protects the historical site of W.E. Saunders cabin, which has been kept clear of vegetation by Dr. Judd. Since this is the only location along the trail that is clear of shrubs and trees, removal of the fence in the area of the cabin may result in damage as people leave the main trail for a view of Saunders Pond.

2) Remove part of the fence in the less sensitive areas and leave the fence in sensitive areas.
This will act as a barrier to human movement in sensitive areas and will protect the soil, wildlife and trees in these areas, while allowing free movement in the less sensitive habitats.

3) Remove the chain link fence but leave the posts in place.
This will allow the movement of wildlife and humans and will not disturb the soil, but will destroy the trees immediately adjacent to the fence (Tables H1 and H4). As well, the remaining posts are not aesthetically pleasing.

4) Remove the chain link fence and cut the posts at their base, leaving the cement in place.
This will minimize soil disturbance and allow the movement of wildlife and humans. However, it will destroy the trees immediately adjacent to the fence (Tables H1 and H4) and may impact the trees within 60 cm of the fence (Tables H2 and H5).

5) Remove the chain link fence and use a winch to remove the posts.
This will allow the movement of wildlife and humans. Although the soil will be disturbed, equipment would not need to get close to the fence and only the trees adjacent and within 60 cm of the fence may be impacted (Tables H1, H2, H4 and H5).

6) Bring in equipment to remove the fence and the posts.
This will allow the movement of wildlife and humans but will disturb the soil. A trail follows the full length of the fence. Therefore, equipment can follow the trail to access the fence. Large equipment will cause compaction, soil disturbance and tree damage to all trees between the trail and the fence (Tables H1 - H6). Although a small bobcat or back hoe will have less of an impact on the site, vegetation will still need to be removed to reach the fence. Large holes where the posts used to be will need to be filled in.

APPENDIX I.
GUIDELINES TO BUILDING A TRAIL NETWORK
(IMC Consulting Group 1996, Rathke and Baughman 2004)

STEP ONE: DETERMINE TRAIL USE

To determine which activities are the most appropriate for the Westminster Ponds / Pond Mills ESA, activities must preserve or enhance the natural features and characteristics of the area for which it was designated. A proposed use should only be incorporated if it can be demonstrated that the overall quality of the area will not be diminished, as this will lead to a gradual degradation of the area. It is also important to determine whether the proposed activity requires the special setting and resources that the site provides, or if it can be carried out elsewhere. Table I1 describes the impacts (physical and social) of different activities and the type of setting preferred for each activity based on research by Dale and Weaver (1974), Weaver and Dale (1978), Keller (1990) and Cessford (1995).

Table I1. The impacts (physical and social) of different land use activities and the type of setting preferred for each activity.

ACTIVITY	PHYSICAL IMPACTS	SOCIAL IMPACTS	RECREATION SETTING
Walking/ Hiking	Footprints develop pockets that create puddles, shortcuts often created	slow speed	natural, year round access
Jogging / Running	Footprints develop pockets that create puddles	medium speed, quiet	no restrictions
Bird watching	Footprints develop pockets that create puddles, shortcuts often created	slow, frequent stops, quiet	natural and quiet, spring and fall, dawn and dusk
X-country skiing	Removal or weakening of tree branches	medium to fast speed	natural, winter
Fishing	Change in fish population or composition of fish community, trampling of shoreline vegetation	stationary, quiet	natural and quiet, permanent water, spring, summer and fall, dawn and dusk
Canoeing	Trampling of shoreline vegetation	medium to fast speed	natural, larger ponds, spring, summer and fall
Skating	Trampling of shoreline vegetation	medium to fast speed	larger ponds, winter
Picnicking	Littering, feeding wildlife	slow speed	semi-natural, warm weather
Tobogganing	None	medium to fast speed	hills, winter
Swimming	Trampling of shoreline vegetation	slow to medium speed, safety issues	clean and shallow water, good substrate, warm weather

ACTIVITY	PHYSICAL IMPACTS	SOCIAL IMPACTS	RECREATION SETTING
Windsurfing	Trampling of shoreline vegetation	fast speed	larger ponds, windy and warm
Trail Biking	Skidding downslope, shearing forces up slope, channelization, riding off trails	medium to fast speed, quiet	natural, rocky terrain, year round
Dumping	Site destruction	unsightly	easy access, year round
Wood cutting	Removal or weakening of trees	unsightly	forested areas, year round
Hunting / Trapping	Creation of new unofficial trails	safety issues, quiet	natural, year round
Dog Running / Dogs off Leash	Disruption or destruction of wildlife	safety issues, medium to fast speed	semi-natural and larger area, year round
Partying	Noise, littering, site destruction	safety issues, loud	isolated areas, year round, evening

Trails should be designed according to intended use, keeping in mind that improving the trail and / or trail networks may increase the number of people using the area. Table I2 describes the effects of different trail design techniques.

Table I2. The effects of different trail design techniques.

TYPE OF TRAIL	RATIONALE
Curves / Bends	Promote atmosphere of remoteness
Closed loop with a single access point	Incorporate more trail length into a smaller area
Internal cutoff trails	Offers different trail lengths
Linear trails	Used to traverse long distances, connect existing trails or access remote areas off the main loop

Table I3 describes the requirements of different trail use activities. Avoid placing curves on downhill slopes or at the base of hills. Aim to build trails such that they are 1/3 level, 1/3 uphill and 1/3 downhill to facilitate drainage and increase user interest.

Table I3. The requirements of different acceptable trail use activities in the Westminster Ponds / Pond Mills ESA.

TRAIL	HIKING	SKIING	CANOEING (only at South Pond)
Layout	loops	loops	easy to portage
Length	0.5 to 24 km	1 to 32 km	very short
Width	1 metre	2.5 to 3 metres	2 metres
Height	2.5 metres	2 to 3 metres above snow depth	3.5 metres
Surface	natural (gravel, wood chips)	vegetate to retain snow and groom trail	stable soils (landings) and sandy approaches
Turn Radius	not critical	31 metres	approx. 4 metres
Grade	0-5% (max. 20%)	0-15% (max. 35%)	0-5% (max. 20%)
Sighting	not critical	not critical	not critical
Facilities	picnics, benches, overlooks, info signs	parking, benches, info signs, shelter	not applicable in ESA

STEP TWO: DETERMINE TRAIL PLACEMENT

Trails should be routed to best take advantage of the diverse natural phenomena in the Westminster Ponds / Pond Mills ESA, while reducing as much damage to the area as possible. Trail degradation occurs regardless of the type of use and is more dependent upon geomorphic processes than the types and amounts of activity (Seney 1990, Wilson and Seney 1994). Steep trails appear to suffer the most damage. Water is the foremost cause of trail problems associated with soil erosion. Although soil properties such as structure, texture, and moisture content play secondary roles in resistance to erosion, there tends to be more damage to wet trails that to dry trails because of the different properties of organic and mineral soils. For poorly drained and highly organic soils, overuse causes structural deformation leading to unconsolidated muddy areas. As well, trails widen in lowland areas when people avoid wet spots. In well drained mineral soils, overuse most often results in compaction and reduced water infiltration capacity, leading to greater occurrence of runoff and erosive processes on slopes. Upland habitats often have exposed tree roots from erosion.

Once a trail deteriorates, there is not much that can be done to restore it. A sense of ownership also makes it difficult to close trails to a particular use that has been established. Resource impacts such as soil erosion, damaged vegetation, polluted water supplies, litter, vandalism and root exposure can lead to feelings of crowding and conflict, even when there is no actual contact among different trail users. Historical, cultural and archaeological resources are also vulnerable to impacts caused by trail use.

The most effective means of minimizing impacts lies in the initial selection of the route. In many cases, the initial construction of the trail itself causes greater impact than subsequent trail use (Keller 1990, Kuss et al. 1990). As well, compaction and erosion impacts are greatest at the early stages of use and slow considerably thereafter (Cole 1982, Cole 1986, Stankey and Manning 1986). Since the rate of degradation gradually decreases after a certain amount of damage has been done, there is little value in limiting the use of trails already established in order to reduce impacts (Cole 1987). Dispersing trail use to relatively unused areas will greatly increase environmental impacts. Instead, trails should be constructed with an emphasis on control of drainage, focussing on where the water is going and how to keep it off the trail. Table I4 describes common problems associated with trail locations.

Table I4. Common problems associated with trail locations.

LOCATION OF TRAIL	ASSOCIATED EFFECTS	SOLUTION
Parallel to contours	Water will flow off trail towards lower side.	No solution needed as this is not degrading the trail. Preferred option
Perpendicular to contours	Water runs down middle of trail, causing channelization at even low gradients	Divert / slow water using obstructions such as water bars or grade dips. Avoid slopes > 10 %
LOCATION OF TRAIL	ASSOCIATED EFFECTS	SOLUTION
Low lying, level terrain	Water pools	Raise tread 7.5 to 15 cm to drain water using gravel, stones, fabric mats, corduroy or board walks.
Adjacent to ponds or other water bodies	Water pools	Raise tread 7.5 to 15 cm to drain water using gravel, stones, fabric mats, corduroy or board walks. Rock and log barriers can be used to prevent shortcutting along edges.

Conditions to avoid in route selection include drainage constraints such as wet, flat or frequently flooded depressions that can't be crossed or are not highlighted for nature appreciation; unstable or fragile soils; steep slopes; dense vegetation requiring excessive clearing or maintenance; vegetation and wildlife habitats that might be adversely affected; cultural or archeological sites that need protection and are not featured; timbered areas subject to blow down, falling limbs or other dangers; man-made hazards; and frequent stream crossings. Avoid routes that traverse sensitive nesting and rearing areas or endangered plant and animal species. Keep trails away from smooth barked trees.

In addition to selecting trail locations in order to minimize the amount of maintenance, trails should be interesting and of value to the users. For natural areas, position the trail to pass through a diversity of wildlife habitats, recognizing that areas between adjoining habitat types (edges) tend to offer the greatest species diversity. Trails in these areas should focus on the food, water and cover the area provides for wildlife. Other conditions that favour route selection include well-drained soils, natural openings and scenic vistas, open timber and light brush, special historical or ecological features, access and view of waterways, seasonal differences in vegetation, safe crossings of roads, railroads and waterways, good access from parking and minimal conflict with existing land uses. Consider habitat improvement measures such as erecting nest boxes or creating artificial snags in woodlands near the trail route to attract desired species. When safety permits, dead standing trees (snags) should be retained as they offer homes and feeding locations for many bird and mammal species.

To decommission a trail, place brush piles, existing fallen trees, shrubs, rocks, or prickly vegetation across the pathway. Signs that say "regeneration area" or "habitat for seasonal wildlife" can also be used to signal why an area is closed. Inappropriate activities can be discouraged using barriers and ditches large enough to be an inconvenience at strategic locations.

STEP THREE: DETERMINE TRAIL MATERIAL

Establishing a trail surface should discourage off-trail wandering into the woodland interior. For most trails, the ideal surface is natural soil (not fill) that is free of stones, stumps and protruding roots. Loam soil with a mixture of sand, silt and clay are erosion resistant and sustain trail traffic on steep slopes better that soil with only sand, silt or clay alone. Single texture soils may be suitable for trail use if gravel sized particles are embedded in the soil. Soils containing high amounts of clay and silt tend to be muddy when wet, or cracked and dusty when dry. They are susceptible to compaction and are highly erodible on steep slopes. Soils composed of sand, which are the largest particle sizes, are extremely unstable and should be avoided.

Other trail surfacing materials should be considered for trails heavily travelled, trails that cross poorly drained spots, or trails on clay soils that may be slippery or easily eroded. Fire-resistant board walks, geo textiles or corduroy may be required on trails built on erodible soils such as sand or clay to protect exposed tree roots. Gravel and rock may be important in local spots of poorly drained or slippery soils, but should only be considered for short trails that will receive heavy public use. Although sawdust, shavings, wood chips and mulch provide a soft surface, reduce soil compaction and increase hiking comfort; they tend to decay quickly in a shaded environment, interfere with water drainage and may wash off slopes that exceed a 5 percent grade. Instead, use trail hardening techniques where appropriate, such as geo-tech fabrics, turf stone, board walks, tread support blocks, or vegetative coverings such as grass and legumes.

STEP FOUR: DETERMINE TRAIL SIGNS

Entrance signs should identify the trail network, trail names, trail marker colours, distances or travel time between junctions, potential hazards, difficulty of the trail (grade, length, tread, etc.), places of interest, and the types of trail uses permitted. Entrance signs can also teach trail ethics including courtesy to other trail users, concern for the environment, who should yield to whom and why, responsibility for resource protection, explanation why the trail is or is not shared, what causes resource impacts and how to minimize them.

Trail signs can be used to direct people out of areas they should not enter, provide direction so that people know the “right” trail and the “incorrect” trail and point out dangerous sections (hazards) or spots of interest along the trail. Avoid the use of negatively worded signs which may challenge vandals or identify potential targets, especially near trail entrances where most vandalism tends to occur. Instead, use educational materials to promote responsible behaviour and explain the reasons for protecting the area. These types of positive signs that state what is allowed are less likely to be vandalized than signs stating what is not allowed. For example, signs that say “regeneration area” can be used to signal that an area is closed.

Interpretive signs and guide posts can be used along well developed trails to provide educational information on vegetation associations and geological phenomena in specific areas. The basic objective of an interpretive program is to help people guide themselves to an understanding of the relationship between the geological, hydrological and biological systems of the area and the impact that humans have had on these interrelated ecosystems. Interpretive signs should blend in with the natural look.

Marking the trail ensures that its route is clear in any season of the year. Markers should be provided where the official trail may not be clear or where trails intersect, thereby preventing trail blazing and the creation of new trails. Markers should be located within 180 metres of each other or within sight from one trail marker to the next. Types of

markers include paint blazes, plastic or metal markers fastened to trees, directional arrows, rock cairns or reflective tape.

Finally, be wary of sign pollution. Other types of communication that can be used to identify the trail network include posters, brochures, newsletters, maps, guidebooks, interpretative walks, presentations, videos, special event days, information to retail outlets, media articles and workshops.

APPENDIX J.
HAZARD TREE REMOVAL SINCE 2001

Table J1. The number of trees removed since 2001 (the year ESAs began to be managed by the UTRCA ESA Team) in all ESAs compared to those removed in the Westminster Ponds / Pond Mills ESA.

YEAR	NUMBER OF TREES REMOVED IN ALL MANAGED ESAs	NUMBER OF TREES REMOVED IN ALL MANAGED ESAs PER 40 KM OF TRAILS	NUMBER OF TREES REMOVED IN WESTMINSTER PONDS / POND MILLS ESA	NUMBER OF TREES REMOVED IN WESTMINSTER PONDS / POND MILLS ESA PER 10 KM OF TRAILS
2001	784	20	283	28
2002	379	9	95	9
2003	228	6	68	7
2004	192	5	78	8
2005	69	2	21	2

APPENDIX K.
LIST OF ACRONYMS

ASC - Advisory Steering Committee
CDC - Centres for Disease Control
CNR - Canadian National Railway
DEM - Digital Elevation Model
EEPAC - Environmental and Ecological Planning Advisory Committee
EFW - Energy From Waste
EIS - Environmental Impact Studies
ELC - Ecological Land Classification
ER - Environmental Review
ESA - Environmentally Significant Area
FON - Federation of Ontario Naturalists
GPS - Global Positioning Satellite
IBP - International Biological Program
LAC - Local Advisory Committee
LACH - London Advisory Committee for Heritage
LHSC - London Health Sciences Centre
MOE - Ministry of the Environment
OMAF - Ontario Ministry of Agriculture and Food
OMB - Ontario Municipal Board
OMNR - Ontario Ministry of Natural Resources
OP - Official Plan
OS - Open Space
PSW - Provincially Significant Wetland
PWQMN - Provincial Water Quality Monitoring Network
RBP - Rapid Bioassessment Protocol
RF - Regional Facilities
SJHC - St. Joseph's Health Care
TVDSB - Thames Valley District School Board
UTRCA - Upper Thames River Conservation Authority
UWO - University of Western Ontario
WCA - Woman's Christian Association
WNv - West Nile virus

APPENDIX L.
LIST OF COMMON AND SCIENTIFIC NAMES FOR PLANTS AND ANIMALS REFERRED TO IN THIS MASTER PLAN

PLANTS

Alternate-leaved Dogwood	*Cornus alternifolia*
American Beech	*Fagus grandifolia*
Basswood	*Tilia americana*
Beaked Hazel	*Corylus cornuta*
Bitternut Hickory	*Carya cordiformis*
bittersweet	*Celastrus sp.*
Black Ash	*Fraxinus nigra*
Black Cherry	*Prunus serotina*
Black-locust	*Robinia pseudoacacia*
Black Maple	*Acer nigrum*
Black Raspberry	*Rubus occidentalis*
Black Walnut	*Juglans nigra*
Black Willow	*Salix nigra*
Bloodroot	*Sanguinaria canadensis*
Bluebead Lily	*Clintonia borealis*
Blue- beech	*Carpinus caroliniana*
Bulb-bearing Water Hemlock	*Cicuta bulbifera*
Bur Oak	*Quercus macrocarpa*
Bush Honeysuckle	*Diervilla lonicera*
Butternut	*Juglans cinerea*
Buttonbush	*Cephalanthus occidentalis*
Canada Plum	*Prunus nigra*
Canada Thistle	*Cirsium arvense*
Chokecherry	*Prunus virginiana*
Common Arrowhead	*Sagittaria latifolia*
Common Buckthorn	*Rhamnus cathartica*
Common Burdock	*Arctium minus*
Common Liliac	*Syringa vulgaris*
Crack Willow	*Salix fragilis*
Eastern Cottonwood	*Populus deltoides*
Eastern Flowering Dogwood	*Cornus florida*
Eastern Hemlock	*Tsuga canadensis*
Eastern White Cedar	*Thuja occidentalis*
Elderberry	*Sambucus canadensis*
European Buckthorn	*Rhamnus cathartica*
Fly Honeysuckle	*Lonicera canadensis*
Garlic Mustard	*Alliaria petiolata*
Gold Thread	*Coptis groenlandica*
Grass Pink	*Calopogon pulchellus*
Green Ash	*Fraxinus pennsylvanica var.subintegerrima*
Grey Dogwood	*Cornus foemina*
Glossy Buckthorn	*Rhamnus frangula*
Hackberry	*Celtis occidentalis*
Hazelnut	*Corylus americana*
Highbush blueberry	*Vaccinium corymbosum*

Highbush Cranberry	*Viburnum trilobum*
Hop-hornbeam	*Ostrya virginiana*
Jack-in-the-pulpit	*Arisaema triphyllum*
Japanese Honeysuckle	*Lonicera japonica*
Kentucky Bluegrass	*Poa pratensis*
Kentucky Coffee-tree	*Gymnocladus dioicus*
Large-tooth Aspen	*Populus grandidentata*
Larger Blue Flag Iris	*Iris versicolor*
Leatherleaf	*Chamaedaphne calyculata*
Manitoba Maple	*Acer negundo*
Marsh Cinquefoil	*Potentilla palustris*
Mayapple	*Podophyllum peltatum*
Ninebark	*Physocarpus opulifolius*
Norway Maple	*Acer platanoides*
Norway Spruce	*Picea abies*
Ostrich Fern	*Matteycia struthiopteris*
Pin Cherry	*Prunus pensylvanica*
Pitcher Plant	*Sarracenia purpurea*
Plume Grass	*Miscanthus sacchariflorus*
Poison Sumac	*Rhus vernix*
Purple Loosestrife	*Lythrum salicaria*
Pussy Willow	*Salix discolor*
Red Ash	*Fraxinus pennsylvanica*
Red Maple	*Acer rubrum*
Red Oak	*Quercus rubra*
Red-osier Dogwood	*Cornus stolonifera*
Red Pine	*Pinus resinosa*
Riverbank Grape	*Vitis riparia*
River Birch	*Betula occidentalis*
Scots Pine	*Pinus sylvestris*
Shagbark Hickory	*Carya ovata*
Siberian Elm	*Ulmus pumila*
Silky Dogwood	*Cornus amomum*
Silver Maple	*Acer saccharinum*
Slippery Elm	*Ulmus rubra*
Staghorn Sumac	*Rhus typhina*
Sugar Maple	*Acer saccharum*
Swamp Loosestrife	*Decodon verticillatus*
Sweet-scented Water Lily	*Nymphaea odonata*
Sycamore	*Platanus occidentalis*
Tamarack	*Larix laricina*
Tartarian Honeysuckle	*Lonicera tatarica*
Teasel	*Dipsacus sylvestris*
Trembling Aspen	*Populus tremuloides*
Virginia Creeper	*Parthenocissus quinquefolia*
White Ash	*Fraxinus americana*
White Elm	*Ulmus americana*
White Oak	*Quercus alba*
White Spruce	*Picea glauca*
Wild Crab Apple	*Malus coronaria*
Wild Red Raspberry	*Rubus idaeus ssp. melanolasius*
Wild Strawberry	*Fragaria virginiana*
Winterberry	*Ilex verticillata*
Witch Hazel	*Hamamelis virginiana*
Yellow Birch	*Betula alleghaniensis*

MAMMALS AND MARSUPIALS

Badger	*Meles meles*
Beaver	*Castor canadensis*
Coyote	*Canis latrans*
Red Fox	*Vulpes vulpes*
Oppossum	*Didelphis virginiana*
Rabbit	*Oryctolagus cuniculus*
Raccoon	*Procyon lotor*
Red Squirrel	*Sciurus vulgaris*
Striped Skunk	*Mephitis mephitis*
White-tailed Deer	*Odocoileus virginianus*
Wolf	*Canis lupus*

BIRDS

American Black Duck	*Anas rubripes*
American Goldfinch	*Carduelis tristis*
American Kestrel	*Falco sparverius*
Bald Eagle	*Haliaeetus leucocephalus*
Least Bittern	*Ixobrychus exilis*
Canada Goose	*Branta canadensis*
Common Loon	*Gavia immer*
Eastern Meadowlark	*Sturnella magna*
Field Sparrow	*Spizella pusilla*
Great Horned Owl	*Bubo virginianus*
Mallard	*Anas platyrhynchos*
Peregrin Falcon	*Falco peregrinus*
Pileated Woodpecker	*Dryocopus pileatus*
Prothonotary Warbler	*Protonotaria citrea*
Purple Martin	*Progne subis*
Red-tailed Hawk	*Buteo jamaicensis*
Ring-necked Pheasants	*Phasianus colchicus*
Ruffed Grouse	*Bonasa umbellus*
Tree Swallow	*Tachycineta bicolor*
Wood Duck	*Aix sponsa*

FISH

bass	
Black Crappie	Pomoxis nigromaculatus
Bluegill	Lepomis macrochirus
Brook Stickleback	Culaea inconstans
Brown Bullhead	Ictalurus nebulosus
Central Mudminnow	Umbra limi
Common Carp	Cyprinus carpio
Fantail Darter	Etheostoma flabellare
Golden Shiner	Notemigonus crysoleucas
Goldfish	Carassius auratus
Green Sunfish	Lepomis cyanellus
Iowa Darter	Etheostoma exile
Johnny Darter	Etheostoma nigrum
Largemouth Bass	Micropterus salmoides

Northern Pike	*Esox lucius*
Pumpkinseed	*Lepomis gibbosus*
Rainbow Trout	*Oncorhynchus mykiss*
Rock Bass	*Ambloplites rupestris*
Smallmouth Bass	*Micropterus dolomieui*
White Sucker	*Catostomus commersoni*
Yellow Perch	*Perca flavescens*

INSECTS AND DISEASES

Beech Bark Disease	*Nectria coccinea*
Emerald Ash Borer	*Agrilus planipennis*
Euonymus Webworm	*Yponomeuta multipunctella*
Gypsy Moth	*Lymantria dispar*
Hickory Bark Beetle	*Scolytus quadrispinosus*
Oystershell Scale	*Lepidosaphes ulmi*

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