Funding toward the development of this Subwatershed Plan for the Friends of the Coves Subwatershed was made possible through a grant from the:

ONTARIO TRILLIUM FOUNDATION

The Friends of the Coves Subwatershed gratefully acknowledges the financial support of the Ontario Trillium Foundation, an agency of the Ministry of Culture, which receives $100 million annually in government funding generated through Ontario’s charity casino initiative.

Prepared by:

Note: See Appendix M for a description of the front cover photo collage.
# Coves Subwatershed Plan London Ontario

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EXECUTIVE SUMMARY

1.0 BACKGROUND

The Coves Subwatershed Plan is a community initiative that has been completed by an environmental consultant team led by Planning & Engineering Initiatives Ltd. (PEIL). It was directed by a steering committee composed of the Board of Directors of the Friends of the Coves Subwatershed Inc. and supported by a technical committee composed of staff of environmental agencies and departments. The Plan is the result of four years of study and approximately 150 days of research, data collection and analysis. Five public open houses were held to solicit input and support for the Plan.

The Coves Subwatershed is located in the upper portion of the Thames River watershed and entirely within the City of London. Primarily focused in the “Old South” neighbourhood, the subwatershed encompasses approximately 710 hectares (Figure A 1.1.1). Close to 15,000 people live in the subwatershed. The feature known as “The Coves” is a series of ponds or oxbow lakes that is a remnant of a former meander of the Thames River. Land use in the subwatershed is entirely urban including residential, commercial and industrial uses.

The Coves area has been recognized as an Environmentally Significant Area (ESA) in City of London land use planning documents. The Coves ESA is a 43 ha site comprised of floodplain and adjacent steep sloped ravines that drain to the Coves ponds.

The Coves Special Policy Area (SPA) is a land use designation that recognizes the flood plain characteristics of the low lying area surrounding the ponds. The floodplain described in the SPA designation includes 83 ha of land surrounding the ponds. The Coves ponds are referred to as the East, West and Centre ponds with the West pond separated in two parts by Springbank Drive.

The Friends of the Coves Subwatershed Inc. is a community group that was formed by area residents who share a common vision for the Coves based on the principle of preserving and protecting the ecosystem. In 2000, the group was incorporated as a not-for-profit organization. Their mission statement provides direction for their activities:

“We believe that the quality of life in our community is enhanced through the protection, rehabilitation and wise stewardship of the Coves Subwatershed”.
The Coves Subwatershed, London

Legend

Watershed Boundary

1. Coves Mobile Home Park
2. Westminster Secondary School
3. Arthur Ford Public School
4. The New PL TV Station
5. Highlands Golf Course
6. Wortley Road Public School
7. Monsigner Feeney R.C. School Board Centre
8. German Canadian Club

Base Mapping* Produced by UTRCA under licence with the Ontario Ministry of Natural Resources © Queens Printer 1994 2002

Coves Subwatershed Boundary
The first major undertaking of the Friends has been to facilitate the completion of this Subwatershed Plan. It will serve to guide resource management and land use decisions within the subwatershed. The Friends of the Coves Subwatershed Inc. were successful in obtaining a Trillium Foundation grant to fund the initiative.

2.0 PLAN GOAL

The goal of the Coves Subwatershed Study is to produce a plan that will:

- Provide comprehensive background information on the abiotic (or physical), biological, and cultural environments (ABC).
- Identify and prioritize environmental issues and concerns.
- Develop objectives for the protection and enhancement of the Coves Ecosystem.
- Develop recommendations for the management of the area that will support and seek to fulfill the subwatershed objectives.

3.0 PLAN DEVELOPMENT

The plan was prepared by considering the constraints and opportunities. Existing constraints were identified from the context of the ecosystem and cultural attributes. These limitations were then offset by the opportunities that exist to protect and improve environmental attributes within the subwatershed. In order to capitalize on said opportunities, an action plan or blueprint was created.

4.0 ACTION PLAN

From the outset it has been the aim of the Coves Subwatershed Plan to make recommendations that support the long term ecological health of the subwatershed area. Conceptual connections of natural areas within and outside the subwatershed (Figure C 2.2.1) are illustrated for future land use considerations. A Coves restoration plan (Figure D 2.8.1) is presented to guide specific actions including stewardship activities within the ESA boundaries. The recommendations provide guidance to agencies, governments and “Friends” when implementing steps to enhance the ecological integrity of the Coves Subwatershed.

Section E of the report contains a summary of general recommendations, together with a detailed “Action Plan” (Table E 1.1) that provides specific recommendations, assigns responsibilities, and identifies expectations for implementation of the subwatershed plan. The six general recommendations are:

1. The Subwatershed Plan should be adopted as a reference document by the City of London, UTRCA and other agencies to inform future work within the subwatershed.
Pond Restoration

West Pond
- Carp Removal
- Sediment Management
- Candidate Wetland Enhancement Area (Meadow marsh)
- Riparian Buffer

Centre Pond
- Sedimentation Management
- Riparian Buffer

East Pond
- Riparian Buffer

All Ponds
- Benthic Monitoring
- Water Quality Monitoring
## GROUNDWATER

### Rationale

The basic groundwater functions of recharging, transmitting, filtering, natural groundwater storage and discharge play an essential role in maintaining a healthy ecosystem. Generally, groundwater is replenished all along its flow path but is most susceptible to contamination in recharge areas, which are the main areas where groundwater is replenished. Groundwater discharge areas replenish surface water systems by providing base flow.

The Coves Subwatershed Plan identified low permeability in the soils found in the tableland areas. These areas are not likely to contribute in a significant way to groundwater recharge. Furthermore, the heavily urbanized environment within the subwatershed inhibits surface water infiltration and therefore significantly decreases recharge potential.

Some groundwater discharge areas have been identified anecdotally within the Coves. There is evidence of a shallow water table, particularly within the Coves feature.

Generally, there is a need to better understand the interaction between surface activities and groundwater within the Coves subwatershed, particularly within the Coves feature.

Wells represent a direct connection between surface activities and groundwater and may act as a conduit for contamination. Existing wells and septic systems found in the upper part of the Subwatershed, in the vicinity of the Coves, may pose threats to groundwater quality.

### Middlesex - Elgin Groundwater Study (January 2004)

The study will assess groundwater resources in the context of regional groundwater flow systems, and develop strategies to protect groundwater resources as a safe supply of potable water. Funding for the study is shared between the Ministry of the Environment and the various municipal partners. The groundwater study has three main components:

- **Regional aquifer characterization** involves developing an understanding of the aquifers throughout the study area and the processes that control how groundwater moves through them.
- **Municipal water wellhead protection entails mapping all the areas that contribute to water to the municipal wells in Dorchester, Thordnar, Birr, Maitrise, Komoka/Killworth, Delaware, the City of London, and Elgin County**
- **Development of a groundwater protection and management strategy** that will address both regional groundwater protection as well as local wellhead protection measures.

The study used data from wells sites throughout Middlesex and Elgin County and included well sites within the Coves Subwatershed and other areas within the City of London.

### Ontario Low Water Response

Operates at Upper Thames River Watershed scale but relates to a general water conservation ethic. The Low Water Response Plan, formulated by the Ontario Government, Conservation Authorities and Municipalities, deals with low water management issues. Water Response Teams (WRT) are formed on a watershed basis and are comprised of local water users and managers. The plan is intended to mitigate the effects of drought through short-term low water response and long-term management strategies that address both water supply and demand. These include public education, conservation, and the development of appropriate land use policies and efficient water management infrastructure.

### Potential Infiltration for the Cove Subwatershed

A GIS mapping exercise completed by the UTRCA combines soil and slope data to determine the high, medium and low potential for surface water infiltration. The application may have limited utility in a heavily urbanized subwatershed such as the Coves however; it can be used as a tool for further work.

### Recharge and Discharge

- **The Middlesex - Elgin Groundwater Study completed an aquifer characterization and mapping to identify recharge and discharge areas. Once this mapping is complete, the information can be used to examine groundwater conditions in the Coves. Because the scale of the Middlesex-Elgin Groundwater Study will be coarse relative to the scale of the Coves Subwatershed, the Groundwater Study may serve as an ideal starting point for identifying future, more detailed work that could be undertaken within the Coves. Review and examine the Middlesex-Elgin Groundwater Study to identify possibilities for future work at a smaller scale i.e. Coves Subwatershed scale. (H)**
- **Record and map the location of groundwater seep indicators such as the presence of watercress or localized areas of low water temperature. Although these are rough field indicators, the information will be useful in identifying localized areas of groundwater discharge.**
- **Combine land use mapping with groundwater mapping to identify specific areas that are sensitive to groundwater contamination.**
- **Develop and distribute information packages or fact sheets for landowners about groundwater recharge, discharge areas and well protection. MOE and OMAF may have fact sheets available for this purpose. (H)**

### Wells and Water Sources

- **Confirm and map the location of private wells within the Coves Subwatershed. Consider including sand points and shallow wells in this survey. Shallow wells and sand points locations are not recorded by MOE and may provide additional useful information with respect to water use and sources. Develop a program to identify abandoned or poorly constructed wells and points. (H)**
- **Develop an outreach program for local landowners with wells. Encourage the proper maintenance of wells that are still in use and support decommissioning of abandoned wells according to MOE standards. Pursue funding opportunities with other local and regional groundwater initiatives and the City of London and explore the potential for well decommissioning subsidies. (H)**
- **Produce an information pamphlet or fact sheet on “10 Ways to Conserve Water” that provides best management practices related to the general conservation of water sources. This will tie into the Water Response Team efforts. Pamphlets could be distributed as inserts to PUC bills. (H)**
- **Support/Sponsor a larger scale educational program such as a Groundwater Festival to build an understanding of groundwater protection in the community and foster a sense of stewardship.**

### Intended Outcome / Products

- **Groundwater vulnerability mapping for the subwatershed, indicating groundwater recharge and discharge zones and groundwater sensitivity based on land use.**
- **Database for active and inactive wells, septic tanks and beds for residences within the Coves.**
- **Increased awareness among residents about the connection between groundwater quality and surface water quality, recharge and discharge zones and wells.**
- **Increased awareness of residents about wellhead protection strategies and best management practices to implement on their own property.**
- **Develop public presentations and or display material as communication tools to community and school groups.**
- **Increased awareness of residents about low water response and the protection of water sources through conservation practices.**

### Potential Partners

- **City of London**
- **Middlesex - London Health Unit**
- **Ontario Ministry of Agriculture and Food**
- **Ministry of the Environment Upper Thames River Conservation Authority**
Table E 1.1 Coves Subwatershed Action Plan

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**Rationale**
The aquatic ecosystem in the Coves is generally degraded. Poor water quality, extreme sedimentation, unstable stream channel morphology and degraded fish habitat are a result of intense urbanization of the majority of the subwatershed.

Natural sedimentation processes in the Coves have been accelerated by artificial inputs of sediment from urban surface water runoff. Urban surface water runoff that contains pollutants such as road sand and salt, hydrocarbons (gasoline and oil), pesticides and other "urban" chemicals is directed to the north part of the subwatershed via storm sewers and enters the Coves ponds untreated. The impact of other contaminants from landfill and industrial locations (Valspar) is not known but will be monitored.

Poor aquatic habitat and a degraded aquatic community result mainly from sediment loading and high water temperatures. Carp dominate the West Cove pond while the East Cove pond contains a more diverse and stable fish community. Fish population tolerant of poor conditions, such as carp, maintain poor conditions by continuing to stir up sediments and preventing aquatic vegetation from becoming established.

**Edward Street Area Storm Extension and Outfall Structure (2003)**
The purpose of this Municipal Class Environmental Assessment was to prepare a preliminary design of the new trunk sewer for the Edward Street Area and the outlet to the Coves Area. The Edward Street EA carries on from the "Old South Sanitary and Storm Sewer Remediation Study (August 2000)" which recommended several improvements to relieve flooding and sewer capacity problems in the Edward Street Drainage Area.

The preferred design of the storm sewer system consists of the construction of a new trunk sewer along Bathurst Street and Elmwood Avenue. The outlet for the sewer extends adjacent to the main ravine to the Coves at the end of Elmwood Avenue and then along the channel adjacent to the Canadian Club.

The EA includes environmental commitments that include restoration of the ravine area with native plantings and incorporating natural channel design concepts into the final design of the sewer outlet.

**The Coves Drainage and Remediation Master Plan (2003)**
This project will include investigations, assessments and analyses conducted to complete a full characterization of the natural environment of the Coves subwatershed. This project differs from the Coves Subwatershed Study in that it provides a technical characterization based on intensive hydrologic and flood modelling for the entire subwatershed, flood protection strategies for specific areas, assessment of slope stability and the condition of the ravine areas, water and sediment quality within the Coves ponds and erosion assessment and monitoring.

The Master Plan will develop a set of strategies to guide the City of London in their effort to address problems related to flooding, erosion, water quality and the natural environment. Significant consultation occurred between the Subwatershed Study and the Master Plan projects to ensure that data was shared and resources were not duplicated.

The timing of this study was ideal because it provided a means to undertake more detailed technical analyses that were beyond the scope of the Subwatershed Study

**Springbank Drive Widening Project**
The purpose of this Municipal Class Environmental Assessment was to produce a final design for the widening of Springbank Drive from Horton Street to B kershire Drive in the north end of the Coves Subwatershed. The design will include delivering treated stormwater to the East and West Cove ponds in an effort to enhance water movement through the ponds.

**Surface and Storm Water Quality**
- The most significant long term improvements to water quality will be achieved through the elimination of untreated stormwater entering the Coves pond area. Through municipal capital works projects, opportunities should continue to be identified to improve the design and function of storm sewers and outlets to the Coves. (H)
- Because the surface water conveyed by storm sewers transports contaminants and sediment to the Coves ponds. UTRCA has implemented rain barrel programs in future municipal capital works projects, particularly storm sewer and outlet projects.
- A reduction in the quantity of sediment entering the Coves ponds is a must.
- Awareness of local residents about the impacts of their own activities on water quality in the Coves (household chemical, lawn care, oil, gasoline discharges etc.)
- Creation of a Conservation Master Plan for the Coves ESA. This Master Plan would need to actively involve all landowners who share ownership of the ESA. Publicly owned land would also be included in the Master Plan when these lands are secured.

**Sedimentation**
- Work with the City of London, MNR and UTRCA to assess the feasibility of dredging the West and Centre Cove ponds. Dredging may be a possible remediation technique to remove at least a portion of the excessive sediment that has been delivered to the Centre and West Cove ponds. The feasibility assessment would give FOTC, the City and agencies an opportunity to discuss whether or not the concept is worth pursuing.
- Create a list of field-verified erosion hot spots and work with private landowners to develop a plan for implementation of erosion remediation and erosion control measures. An "erosion awareness" program could be established whereby landowners have an opportunity to have an engineer assess erosion problems on their property. This program would connect landowners with the expertise (City of London, UTRCA staff) that can assist them in addressing erosion issues on their property. (H)
### Table E 1.1 Coves Subwatershed Action Plan

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| Ecosystem Recovery Plan | The Plan is being prepared on a Watershed-scale and includes two aspects; a Recovery Strategy to be developed by a recovery team that identifies recovery goals, objectives and approaches; and an Action Plan that specifies actions to achieve objectives. Within the watershed, activities would include raising awareness about the diversity of species, involving the community in species recovery, and monitoring for changes in species populations. Some of the specific objectives of the Ecosystem Recovery Plan include:  
  - Developing effective recovery strategies that address the principle threats to aquatic Species at Risk in the watershed using the best available scientific information; and  
  - Improving public consultation and awareness in order to foster responsible public and private actions that benefit aquatic habitats in general. |                             |                             |                   |
| Sedimentation (Continued) | Compile a list of Best Management Practices and create a fact sheet for erosion prevention for landowners to implement good land use practices on their own land. UTRCA or OMAF may have existing fact sheets to use as a foundation. |                             |                             |                   |
| **Fish and Fish Habitat** | Rehabilitation of the West Cove pond must include consideration of removing the carp population. Implement a carp removal program for the West Cove Pond. Work with MNR, Thames River Anglers and UTRCA to develop a “carp derby” (or other strategy) to remove carp from the pond. (H)  
  - Benthic invertebrates are an ideal indicator of surface water quality and ecosystem health. Examine the feasibility of implementing a consistent benthic sampling program. Look for partnerships between FOTC, UTRCA, school groups and private landowners to implement sampling program. Use results from benthic and surface water monitoring programs to continue to monitor water quality and ecosystem health. (H)  
  - Encourage landowners around the Coves ponds to maintain vegetative buffers and enhance existing riparian vegetation to stabilize stream banks, filter runoff and provide shade and cover. This is especially critical along shorelines such as the trailer park where vertical walls have been constructed into the ponds. |                             |                             |                   |
| **Stream Channel Morphology** | Identify opportunities to employ natural channel design techniques during municipal or capital works projects in the Coves. Capital projects that involve work in and around the Coves ponds should incorporate natural channel design principles and strategies to the extent possible.  
  - Perform a fluvial geomorphologic assessment and stream reconnaissance to identify opportunities for stream restoration, natural channel design and bioengineering. Efforts to restore the stream channel could be integrated into projects for erosion control, flood control and fish habitat enhancement. |                             |                             |                   |
| **Species at Risk** | Support the implementation of the Upper Thames River Conservation Authority Species at Risk Recovery Plan by promoting the awareness and protection of rare species by integrating findings into watershed report cards, posting information on UTRCA website and through community meetings and newsletters.  
  - Coordinate with the UTRCA to bring the Species at Risk education program to schools within the Coves Subwatershed. |                             |                             |                   |
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<td>Natural Heritage</td>
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<td>An increased level of awareness, understanding and protection for the Coves ESA. Increased land stewardship by landowners within and adjacent to the ESA as evidenced by reduced encroachment and dumping, improved slope management and increased native vegetative cover in and around the ESA.</td>
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**TERRESTRIAL ECOSYSTEM**

- **Carolinian Canada Big Picture**
  - The project aims to design a long-term natural heritage vision for Canada’s southernmost ecological region. Using a geographic information system (GIS) environment, the project identifies existing natural cores, corridors and outlying natural areas, as well as potential connecting links. Corridors and other areas with potential for restoration or rehabilitation are selected. The digital data set will be updated and made available to conservation practitioners and municipal planners as new information becomes available.

- **The Big Picture** identifies natural cores and corridors at a large scale throughout the Thames River Watershed and beyond. The Coves Subwatershed Plan should consider this larger scale strategy in designing and implementing smaller scale linkage and corridor enhancement projects.

- **Natural Heritage**
  - Amend the ESA boundary and designation criteria to include updated information about the features within the Coves. The “meander scrolls” located within the orchard area are an important artistic of the geomorphic processes that created the Coves. The area north of Erie Avenue (former ravine) contains vegetation and topography consistent with the ESA criteria which should be considered. Noteworthy is the former relic meander/channel located northwest of the West Cove pond between Forest Hill and Wildwood Streets as a remnant to the meander.
  - Finalize the refined Coves ESA boundary mapping with City of London and support the adoption of the new boundary into the City of London Official Plan. (H)
  - Create an ESA awareness program through signage in the Coves. Presently this is constrained by the lack of public property in the Coves however, as land is transferred into public ownership through municipal projects, land acquisition etc, there will be opportunities to install signs recognizing the ESA. (H)
  - Protect the ESA feature from encroachment and other activities that may be inconsistent with the criteria that led to the ESA designation (vegetation, geomorphological features). This may be achieved through a Coves awareness program or similar educational program that incorporates a best management practices component/package for landowners adjacent to the Coves ESA. (H)
  - Assess current uses of open space/mowed turf and identify candidate areas for naturalization, tree planting and other stewardship activities. Develop naturalization programs aimed at increasing forest or tree cover as well as restoring other native vegetation communities (meadow/wildflowers) within the Coves Subwatershed. Tree planting projects should give priority to planting along existing forest or treed areas. Potential areas include: the Coves orchard, Euston Park, school yards, nursing homes and any other larger open space / park area. Any planting programs on public park lands will be evaluated as to long-term park management objectives.
  - The open meadow habitat located on the Chata Holdings site should be protected and managed as such to ensure the protection of the black walnut forest habitat. Similarly, the auto lot property adjacent to the West Cove and Springbank Drive should be managed to protect the rare Hackberry forest habitat.

- **Amendment of ravine areas within the Coves ESA through partnering amongst City of London, UTRCA, FOTC and local schools to undertake planting and restoration associated with other future municipal storm sewer outlet projects.**

- **Creation of a series of trail or green space linkages and corridors throughout the subwatershed, particularly from the Thames River to the Dingman Creek Subwatershed.**

- **Creation of a Conservation Master Plan for the Coves ESA. This Master Plan would need to actively involve all landowners who share ownership of the ESA. Publicly owned land would also be included in the Master Plan when these lands are secured.**

- **Rationale**
  - The Coves Subwatershed is a heavily urbanized area. The only wooded areas that remain are associated with the Highlands Golf Course and the Coves Environmentally Significant Area. The Coves ESA comprises the floodplain, steep slopes and Silver Creek and related ravines that drain land from the south into the Coves ponds.

- The ESA designation is based on the “distinctive landforms displayed in the series of oxbow ponds, the presence of forest area sensitive species, the hydrologic characteristics, the broad diversity of species and the linkage function the area provides to the Thames River corridor”.

- Forest cover within the ESA is considered "edge" habitat because of the lack of forest "interior". Interior is typically defined as area within the forest that is a minimum of 100m from the forest edge. A very small pocket of forest interior may exist in the Silver Creek ravine portion of the ESA.

- When looking for opportunities to naturalize or restore native vegetation, priority should be given to areas adjacent to existing woodlands or open spaces that coincide with potential corridor and linkage opportunities.

- The ravine areas in Coves ESA have experienced increased erosion and destabilization as a result of poor land and stormwater management practices.

- Ecological literature suggests that forest cover targets should be 30% to sustain biodiversity. This is an unrealistic target given the urban nature of the subwatershed. For the Coves Subwatershed, any increase in forest or tree cover will be seen as an improvement. Therefore, no specific targets were established other than the use of existing and absent native species in the key areas provided on Figure D 2.8.1. Specific management criteria will be provided for the rare habitat locations.

<table>
<thead>
<tr>
<th>Key Watershed Component</th>
<th>Related Current Initiatives</th>
<th>Recommendation or Action</th>
<th>Intended Outcome / Products</th>
<th>Potential Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERRESTRIAL ECOSYSTEM (CONTINUED)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Corridors and Linkages</td>
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<tr>
<td>• Identify and pursue opportunities to create or enhance green corridors and linkages throughout the Coves subwatershed. Large open spaces such as Euston Park represent key elements to building corridors across the Coves Subwatershed.</td>
<td></td>
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<tr>
<td>Corridors and Linkages (Continued)</td>
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<td></td>
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<tr>
<td>• Retain natural elements and integrate the Coves as part of a larger natural corridor that includes Dingman Creek, Dorchester Swamp, Komoka Park and the Thames River. Key properties include the orchard, Chata / Tippel properties, Euston Park and Highland Woods.</td>
<td></td>
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<tr>
<td>• Work with the City of London to plan and develop hard surface and soft surface trails throughout the subwatershed. Trail systems will form an integral part of constructing linkages from the Thames River through the Coves Subwatershed and into the Dingman Creek Subwatershed. The trail system will also allow foot traffic in less sensitive areas of the ESA. Boardwalks and stairway creation may be necessary where slopes are severe.</td>
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<tr>
<td>Wetlands</td>
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<tr>
<td>• Develop a project to examine the possibility of establishing native wetland vegetation in the vicinity of the Centre and West Coves ponds. Assemble appropriate agencies (MNR, DFO, UTRCA, City of London and Ducks Unlimited) to explore the feasibility and potential benefits of enhancing wetland vegetation communities in this area. An impact assessment, including potential impacts to hydrology, water conveyance, geomorphology etc. would be the next step in understanding and weighing potential positive and negative impacts.</td>
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<tr>
<td>Slope Stability and Erosion</td>
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<tr>
<td>• Erosion monitoring stations established during the Coves Drainage and Remediation Master Plan should continue to be monitored and evaluated. This could be achieved through a partnership among the City of London, UTRCA, FOTC and private landowners.</td>
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<tr>
<td>• Identify opportunities in future municipal projects (storm sewer and outlet improvements) to incorporate ravine remediation and restoration combined with planting of native species.</td>
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<tr>
<td>• Create a list of field-verified erosion hot spots and work with private landowners to develop a plan for implementation of erosion remediation and erosion control measures. An “erosion awareness” program could be established whereby landowners have an opportunity to have an engineer assess erosion problems on their property. This program would connect landowners with the expertise (City of London, UTRCA staff) that can assist them in addressing erosion issues on their property.</td>
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<tr>
<td>• Compile a list of Best Management Practices (e.g., pesticide use on your lawn, proper disposal of lawn clippings and yard waste) and create a fact sheet for erosion prevention for landowners to implement good land use practices on their own land. UTRCA or OMAF may have existing fact sheets to use as a foundation.</td>
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<tr>
<td>• Develop an educational package for landowners and the community to foster an improved understanding of the balance between land use, soil erosion and stream dynamics. It will be important to acknowledge the difference between human-induced and natural erosion processes and the importance of natural erosion to stream morphology and overall stream health.</td>
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<tr>
<td>Contamination</td>
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<tr>
<td>• Create a “hot spot” database that will hold information on areas of concern in the Coves Subwatershed. The existing landfill information that was gathered as part of the Subwatershed Study could become part of this database. Anecdotal and confirmed evidence of land contamination could also be organized in this database. The database format will aid in managing this information and communicating concern to appropriate personnel at the Ministry of the Environment and City of London. (H)</td>
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<tr>
<td>Key Watershed Component</td>
<td>Related Current Initiatives</td>
<td>Recommendation or Action</td>
<td>Intended Outcome / Products</td>
<td>Potential Partners</td>
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<tr>
<td>CULTURAL HERITAGE</td>
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<tr>
<td>Historical</td>
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<tr>
<td>Cultural Programs</td>
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<tr>
<td>Community Education</td>
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<tr>
<td>Land Use Designation / Future Use</td>
<td></td>
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<tr>
<td>Edward Street Area Storm Extension and Outfall Structure (2003)</td>
<td>This study will afford an opportunity to check the possibility that remains of the prehistoric Iroquoian village at Edward Street and Tecumseh Avenue still survive within residential lots in the area of that intersection.</td>
<td>Implement the recommendations of The Archaeological Component of the Coves Subwatershed Study. City of London, Middlesex County, Ontario (D.R. Poulton and Associates Inc. 2003). These include:</td>
<td>- A Coves library resource centre in Landon Library. - Implementation of various community education programs. - Development a distribution of various Best Management Practices packages to target groups within the Coves. - An increased awareness and appreciation of the Coves area (ravines, ponds, ESA) demonstrated by reduced dumping, improved land stewardship, increased membership in FOTC etc.</td>
<td>Trillium Foundation TD Friends of the Environment Mcllwraith Field Naturalists Environment Canada Ministry of Natural Resources Habitat Stewardship program Upper Thames River Conservation Authority OMAF MOE London Chapter of the Ontario Archaeological Society London Historical Society Thames Valley District School Board London Catholic School Board.</td>
</tr>
<tr>
<td>Springbank Drive Widening Project</td>
<td>The archaeological assessment of the proposed Springbank Road widening will afford the opportunity to check for possible archaeological remains relating to the discovery of a prehistoric projectile point in September 1939 at Springbank Drive and the West coves.</td>
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<tr>
<td>City of London Archaeological Master Plan Update</td>
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<tr>
<td>Conservation of the archaeological resources of the Coves subwatershed.</td>
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<tr>
<td>Coves Land Use Designation / Future Use</td>
<td>The older established neighbourhoods in the Subwatershed have a potential for archaeological remains. Any severances or other development applications affecting those neighbourhoods should be evaluated on an individual basis and archaeological assessment should be required where appropriate as a condition of approval.</td>
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<tr>
<td>Coves Floodplain</td>
<td>The Coves floodplain includes extensive areas of undeveloped land and areas with a high degree of potential for well preserved archaeological sites. Any future change in land use may trigger a requirement for archaeological assessment.</td>
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<tr>
<td>Coves Interpretive Sign</td>
<td>Coves interpretive sign’ along the Thames River trail at Greenway Park. The purpose of this sign would be to bring attention and awareness to the Coves area, explain cultural significance, provide information on the geomorphic processes that formed the Coves ponds etc.</td>
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<tr>
<td>Establish and maintain a central repository of all Coves resources. This might be best suited to Landon Library located within the subwatershed. This repository would include the Subwatershed Plan and all reference material used to complete the Subwatershed Study, including historical maps, documents etc.</td>
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<tr>
<td>Highlight historical Significance of the Coves area through awareness programs such as the proposed Landon Library Coves Corner. Initiate similar programs with the City of London Heritage Planner.</td>
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<tr>
<td>Develop and install a ‘Coves interpretive sign’ along the Thames River trail at Greenway Park. The purpose of this sign would be to bring attention and awareness to the Coves area, explain cultural significance, provide information on the geomorphic processes that formed the Coves ponds etc.</td>
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</tbody>
</table>
**Table E.1.1 Coves Subwatershed Action Plan**

<table>
<thead>
<tr>
<th>Key Watershed Component</th>
<th>Related Current Initiatives</th>
<th>Recommendation or Action</th>
<th>Intended Outcome / Products</th>
<th>Potential Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CULTURAL HERITAGE (CONTINUED)</strong></td>
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</tbody>
</table>

**Cultural Programs**
- Develop and support culturally-based programs that raise the profile of the Coves. The Coves Art Exhibit is a good example of how art, culture and environmental awareness can be combined in a creative way. Continue to generate ways of achieving environmental awareness in cultural programs.

**Community Education**
- Various Best Management Practice packages have been proposed through recommendations and actions associated with groundwater, aquatic ecosystem, and terrestrial ecosystem components (previous sections of this table). A summary of the potential themes for Best Management Practices is presented below: *(H)*
  - Surface runoff management – rain barrels, reducing impervious surfaces around the house/property
  - Land stewardship targeted in and around the ESA includes slope/hazard management and erosion remediation
  - A guide to planting native species around the home
  - Septic systems and well management and decommissioning

- School programs have been suggested in previous sections. Many school programs already exist and are undertaken through the environmental education facilities of the school boards by UTRCA and other agencies. There may be an opportunity to develop additional programs, specific to the Coves, with local schools. Some of programs that are currently delivered by UTRCA include: *(H)*
  - Species at Risk
  - Tree Planting
  - Fish and Fish Habitat
  - Water Quality and Benthic Sampling

- Research environmental education programs developed by other agencies and organizations and develop a strategy to implement these programs to local schools. Programs include Yellow Fish Road, Feeder Watch, Amphibian surveys etc. Look for programs developed by Environment Canada or other grassroots environmental organizations.
- Continue with Coves Clean-Up Day. *(H)*
- Seek support and sponsorship of local Coves businesses for the development and delivery of educational programs to local schools. Often it is a lack of funding on the part of the school that limits the number of outside programs and opportunities a school can pursue. Friends of the Coves is well positioned to seek monetary support to bring specific educational programs to local schools. Costs will vary with programs. Existing programs with local agencies such as the UTRCA, Stewardship Council etc., are a good starting point for this work. *(H)*

**Land Use Designation / Future Use**
- Confirmation of the boundaries of the ESA is needed to ensure consistent application of programs and feature protection. *(H)*
- Consistent zoning designation (OS4 or OS5) of the Coves ESA features is needed to reflect ESA criteria and protection. *(H)*
- The vistas and natural views from the lowlands within the ESA and from the top of slopes looking into the ESA need to be protected and considered in any applicable land use change proposals. *(H)*
- The future use of the lands within the Coves ESA should be considered with respect to ESA and SPA criteria with any property redevelopment plans. *(H)*
2. This Plan should be adopted by the FOTCSI, UTRCA and the City of London as a resource to guide implementation to achieve Plan objectives, enhance and protect the subwatershed.

3. Protect the Coves ESA and other terrestrial features through land acquisition, education programs, land stewardship and best management practices, and terrestrial rehabilitation and enhancement initiatives. These initiatives will be guided by specific recommendations and the Coves Rehabilitation Plan (Figure D 2.8.1).

4. Improve the aquatic ecosystem by addressing significant stressors and impacts. Reduce artificially high sediment inputs and improve stormwater quality through redevelopment / redesign and upgrades to existing subwatershed service infrastructure. Reduce continued aquatic ecosystem degradation caused by exotic species.

5. Establish a monitoring framework that includes participation and responsibilities by City of London, UTRCA and other agencies with the possibility of utilizing community based monitoring programs (e.g. feeder watch, frog watch).

6. Retain natural elements and develop corridors and linkages through enhancement of green / open space and pedestrian bike trails. Land acquisition in the Coves ESA and public ownership and access is a component of this recommendation. Focus on identified anchors / nodes such as the Thames River, Coves ESA, Euston Park, Highland Woods and beyond the boundary of the subwatershed.

These actions are grouped into: groundwater, aquatic ecosystem, terrestrial ecosystem and cultural heritage. Specific tasks are suggested under these headings in addition to a list of related current initiatives, recommendations or actions, intended outcomes and potential partners. A broad prioritization mechanism is presented to provide direction when financial and resource decisions are being made.

5.0 SUMMARY

In the late 1990’s, residents of the community surrounding the Coves coalesced around a vision for the subwatershed. Soon thereafter, they formed an environmental, non-profit organization and secured Ontario Trillium Foundation funding to establish a “Plan”. Through the process of subwatershed planning, they assessed the ecological processes, summarized the constraints and opportunities and developed a “directive” for rehabilitation of the subwatershed. This plan provides a blueprint for improvements to the Coves subwatershed environment and the quality of life for area residents.
## Coves Subwatershed Quick Reference

<table>
<thead>
<tr>
<th><strong>Human Population</strong></th>
<th>Approximately 15,000</th>
<th>Where to find more information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Historical Growth</strong></td>
<td>Prior to 1961, only 20% of the subwatershed area was located within the City of London with the remaining 80% in Westminster Township.</td>
<td>Section A 1.1</td>
</tr>
<tr>
<td><strong>Local Neighbourhoods</strong></td>
<td>Approximately 5 (Old South, Wortley Village, Manor &amp; Highland Park, Kensal Park, Southcrest</td>
<td>Section B 6.4</td>
</tr>
<tr>
<td><strong>Subwatershed Area</strong></td>
<td>710 hectares (1,754 acres)</td>
<td>Section A 1.1</td>
</tr>
<tr>
<td><strong># of Subcatchments</strong></td>
<td>13 (labeled A1 to A13 on associated maps)</td>
<td>Figure A 1.2.1</td>
</tr>
<tr>
<td><strong>Subwatershed Elevation Relief</strong></td>
<td>74 metres (242 ft) from a high of 304 m at the New PL TV station to 230 metres at the Cove outlet to the Thames River</td>
<td>Figure A. 1.1.1</td>
</tr>
<tr>
<td><strong>Subwatershed Dimensions</strong></td>
<td>3.5 km north – south by 3 km east – west (or 2.2 by 1.9 miles)</td>
<td>Figure A 1.1.1</td>
</tr>
<tr>
<td><strong>Number of Coves Ponds</strong></td>
<td>3 (East Cove, Centre Cove and West Cove which is separated in two by Springbank Drive)</td>
<td>Figure A 1.1.1</td>
</tr>
<tr>
<td><strong>Thames River Flood Elevation</strong></td>
<td>235.6 metres</td>
<td>Section B 2.1.3</td>
</tr>
<tr>
<td><strong>Coves Flood Elevation</strong></td>
<td>232.12 metres</td>
<td>Section B 2.1.3</td>
</tr>
<tr>
<td><strong>Flood Prone Locations</strong></td>
<td>Brookdale / McAlpine area, SW part of trailer park, German Canadian Club</td>
<td>Section B 6.2.4</td>
</tr>
<tr>
<td><strong>% Vegetation Cover</strong></td>
<td>17.7% of subwatershed has “natural vegetation” (including the golf course)</td>
<td>Section B 3.3</td>
</tr>
<tr>
<td><strong>% Forest Cover</strong></td>
<td>4.3% of subwatershed (and 24.2% of the natural vegetation assessed). No interior forest.</td>
<td>Section B 4.3</td>
</tr>
<tr>
<td><strong>% Wetlands</strong></td>
<td>0.1% of subwatershed (and 0.7% of the natural vegetation assessed), no interior forest.</td>
<td>Section B 4.2</td>
</tr>
<tr>
<td><strong>% Impermeable</strong></td>
<td>50%</td>
<td>Section B 2.3</td>
</tr>
<tr>
<td><strong>% Parks and Open Space</strong></td>
<td>15%</td>
<td>Section C 1.0</td>
</tr>
<tr>
<td><strong>Vegetation Communities</strong></td>
<td>8 community types (cultural, forest, hedgerow, lawn, golf course, meadow, open water, marsh)</td>
<td>Figures B 3.3.1 to B 3.3.7</td>
</tr>
</tbody>
</table>
## Coves Subwatershed Quick Reference

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
<th>Where to find more information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rare Vegetation Communities</td>
<td>Hackberry and Black Walnut Deciduous Forests</td>
<td>Section B 3.3</td>
</tr>
<tr>
<td>Mammals Species</td>
<td>13</td>
<td>Section B 3.3.3</td>
</tr>
<tr>
<td>Birds Species</td>
<td>90 from original 1989 survey (49 re-confirmed in 2002/03)</td>
<td>Section B 3.3.3</td>
</tr>
<tr>
<td>Herptofauna</td>
<td>7 amphibians and 5 reptiles</td>
<td>Section B 3.3.3</td>
</tr>
<tr>
<td># of Water Wells in Subwatershed</td>
<td>31</td>
<td>Figure B 2.3.2</td>
</tr>
<tr>
<td>Groundwater Elevation - Tablelands</td>
<td>250 metres</td>
<td>Section B 2.3.3</td>
</tr>
<tr>
<td>Groundwater Elevation – Location Near Cove Ponds</td>
<td>230 metres (which approximates the Thames River surface elevation)</td>
<td>Section B 2.3.3</td>
</tr>
<tr>
<td># of Land Fill Areas</td>
<td>15 in total – none operational (4 produce methane gas, 3 inert materials, 8 natural methane producing areas formerly wetlands)</td>
<td>Table B 6.1</td>
</tr>
<tr>
<td># of Golf Courses</td>
<td>1 (Highland Golf Course being an 18 hole course).</td>
<td>Figure A 1.1.1</td>
</tr>
<tr>
<td># of Parks</td>
<td>13</td>
<td>Figure B 3.3.1</td>
</tr>
<tr>
<td>Area of Land Covered by ESA</td>
<td>43 ha of environmental designation</td>
<td>Figure C 2.1.1</td>
</tr>
<tr>
<td># of Properties in ESA</td>
<td>74</td>
<td>Figure C 2.1.1</td>
</tr>
<tr>
<td>Area of Land Covered by SPA</td>
<td>83 ha of flood plain lands</td>
<td>Section B 6.2.4</td>
</tr>
<tr>
<td># of Houses in the SPA</td>
<td>101 single family, 17 two family homes, 129 mobile homes = 247</td>
<td>Section B 6.2.4</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

The author would like to acknowledge the direction and tireless efforts of the Board of Directors of the Friends of the Coves Subwatershed Inc. who made this project possible through their vision and commitment to the environmental health of the Cove Subwatershed. They are: Allan Ralph (President), Thom McClanaghan (Vice President), Ian Cousins (Secretary), Mike Watson (Treasurer), Gary Kay, Nan McIntyre and Eric Sheppard. They truly embody the meaning of the quote by Margaret Mead:

“Never believe that a few caring people can’t change the world. For, indeed, that’s all who ever have.”

The following individuals all played an important role in the creation of this Plan:

Sheila Simpson, Ontario Trillium Foundation, London Office

Subconsultants who contributed to information gathering:
David Stephenson, Natural Resource Solutions Inc., Waterloo
Technical staff of PEIL, Kitchener
and the complimentary projects being undertaken by the City of London and managed by:
Brian Huston, Dillon Consulting, London
Rob Hughes, Stantec Consulting Ltd., London

Technical Advisory Committee members including:
Hal Schraeder, Scott Abernathy, and Bill Armstrong (MOE),
Dan Schaefer (MNR / Middlesex Stewardship),
Brian Turcotte and Bonnie Bergsma (City of London Planning Dept.),
Jim Cushing (McIlwraith Field Naturalists),
Karl Grabowski and John Lucas (City of London Environment and Engineering Services Dept.), and
Mark Snowsell, Tara Tchir, and Rick Goldt (Upper Thames River CA)

A special thank you to Gillian Thompson, Subwatershed Specialist with Upper Thames River CA who contributed numerous suggestions and ideas to improve the plan.

Finally, thank you to Allan Ralph, President of the Friends of the Coves Subwatershed, who steered the project and kept a firm grip on the tiller throughout the storms that threatened to take us off course. The storms were many and the distractions were substantial. However his perseverance is what ensured the project came to a successful conclusion.

All errors or omissions are the responsibility of the author.

Patrick B. Donnelly, M.Sc., MCIP, RPP
Senior Environmental Planner
Section A
Background
**Section A Cover**

Oblique air photograph of the Coves looking northeast over the orchard and Valspar Industries toward the forks (photograph courtesy of the Ministry of the Environment, London Office) with a inset map from 1793 John Simcoe expedition showing the Coves as an oxbow lake.
SECTION A - BACKGROUND

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A 1.0 INTRODUCTION

A 1.1 Background

The Coves Subwatershed is a portion of the Thames River watershed that rises in the Ellice Swamp area of Perth County and outlets into Lake St. Clair at the community of Lighthouse Point. The entire Thames River watershed (5,825 km^2) contains over ½ million people, is divided into the upper (3,447 km^2) and lower (2,378 km^2) portions and has been designated a Canadian Heritage River. The Coves Subwatershed is located in the upper portion of the watershed and entirely within the City of London. Primarily focused in the “Old South” neighbourhood of the City, the subwatershed encompasses approximately 710 hectares. The area to the east is located within the Traction Creek subwatershed, to the south in the Dingman Creek subwatershed and the area to the west in the adjacent subwatershed that winds through Springbank Park.

The Friends of the Coves Subwatershed Inc. is a community group that was formed by area residents who share a common vision for the Coves based on the principle of preserving and protecting the ecosystem. In 2000, the group was incorporated as a not-for-profit organization. Their mission statement provides direction for their activities:

“We believe that the quality of life in our community is enhanced through the protection, rehabilitation and wise stewardship of the Coves Subwatershed”.

The first major undertaking of the Friends has been to facilitate the completion of a Subwatershed Plan that will serve to guide resource management and land use decisions within the subwatershed. The Friends of the Coves Subwatershed Inc. were successful in obtaining a Trillium Foundation grant to fund the initiative. The Subwatershed Plan has been completed by a team of consultants managed by Planning & Engineering Initiatives Ltd. (PEIL) and will be endorsed by both the Upper Thames River Conservation Authority (UTRCA) and the City of London (City). The Plan is the result of a four year study that followed the Terms of Reference (Appendix A).

The Coves Subwatershed has a number of environmental features including the Coves ponds, a former meander of the Thames River, a number of ravines and former creeks that outlet to the Coves ponds, and natural habitat located along the banks of the Coves ponds and in the associated ravines. One of the ravines is in the upper portion of the subwatershed near Highland Woods and drains the
1. Coves Mobile Home Park
2. Westminster Secondary School
3. Arthur Ford Public School
4. The New PL TV Station
5. Highlands Golf Course
6. Wortley Road Public School
7. Monsignor Feeney R.C. School
8. German Canadian Club

The Coves Subwatershed, London

Legend

Watershed Boundary

Figure: A 1.1.1

Coves Subwatershed Boundary

Resources © Queens Printer 1994-2002

Base Mapping® Produced by UTRCA under licence with the Ontario Ministry of Natural Resources & Queens Printer 1994-2002

379 Queen Street South, Kitchener, Ontario, N2G 1W6
Tel: (519) 745-6455 Fax: (519) 746-7647
e-mail: kitchener@peil.net
www.peil.net
Coves Subwatershed Plan  London Ontario

Highland Golf Course located on the watershed divide with the Dingman Creek subwatershed.

The Coves area has been recognized as an Environmentally Significant Area (ESA) by the City of London in their land use planning documents. This designation reflects a 43 ha site that includes... “the distinctive landforms displayed by the series of oxbow ponds, the presence of forest area sensitive species, the hydrologic characteristics, the broad diversity of species and the linkage function the area provides to the Thames River corridor” (Appendix B). The Coves ESA comprises floodplain, steep slopes and Silver Creek and related ravine that drain land from the south (the upper subwatershed) into the Coves ponds. The ESA is further described in Section B 6.2.5 and the complete ESA criteria are contained in Appendix B. Other ESA features identified within the City of London include Sifton Bog, Westminster Ponds, Medway Valley, Kilally Woods and Meadowlilly Woods.

The Coves Special Policy Area (SPA) is a land use designation that recognizes the floodplain characteristics of the low lying area surrounding the ponds. The floodplain described in the SPA designation includes 83 ha of land surrounding the ponds. The SPA is further explained in relation to land use in Section B 6.2.4 and contained in Appendix C. The Coves ponds are referred to as the East, West and Centre ponds with the West pond separated in two parts by Springbank Drive (see Figure A 1.2.1).

A 1.2 Goal of the Study

The goal of the Coves Subwatershed Study, as per the Study Terms of Reference (Appendix A), is to produce a plan that will:

- Provide comprehensive background information on the abiotic or physical, biological, and cultural environments (ABC).
- Identify and prioritize environmental issues and concerns.
- Develop objectives for the protection and enhancement of the Coves Ecosytem.
- Develop recommendations for the management of the area that will support and seek to fulfill the subwatershed objectives.

The intent of creating this subwatershed plan is to provide direction for a horizon that may be 10 to 20 years with the expectation that the plan will be updated as needed.

A 1.3 Study Team

The Coves Subwatershed Study has been completed by a Study Team that consisted of a partnership of consultants and agencies. Table A 1.3.1 details the Study Team and responsibilities.
Table A 1.3.1 Study Team

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>Patrick Donnelly, Senior Environmental Planner, PEIL</td>
<td></td>
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<td>Technical Assistance</td>
<td>Ed Gazendam, Principal, Manager</td>
<td>Water &amp; Environmental Resources, PEIL</td>
</tr>
<tr>
<td></td>
<td>Andy Kroess, Water Resources Engineer, PEIL</td>
<td></td>
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<tr>
<td></td>
<td>Andrew Schiedel, Aquatic Biologist, PEIL</td>
<td></td>
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<tr>
<td></td>
<td>Zhiping She, GIS &amp; Photogrammetric Specialist</td>
<td></td>
</tr>
<tr>
<td>Subconsultants</td>
<td>David Stephenson, Senior Biologist</td>
<td>Natural Resources Solutions Inc., Waterloo</td>
</tr>
<tr>
<td>Key Contact Staff</td>
<td>Gillian Thompson, Subwatershed Specialist</td>
<td>Upper Thames River Conservation Authority</td>
</tr>
<tr>
<td></td>
<td>Brian Turcotte, Planner</td>
<td>Planning &amp; Development Department, City of London</td>
</tr>
</tbody>
</table>

**A 1.4 Report Structure**

This report has been organized into 6 distinct sections, in part reflecting the chronological progress of the study and in part the presentation of information in a logical format.

**Section A** of the report discusses the organization of the study itself, provides a background on the history of the Coves subwatershed, discusses the planning context of the subwatershed area, the objectives and goal of the study, and summarizes the public input into the process.

**Section B** presents a characterization of the subwatershed based on investigations that were undertaken by the study team and by others involved in complimentary projects. The ABC approach is used to describe the abiotic or physical, biotic and cultural components of the subwatershed. The complimentary projects were City initiatives that were initiated for various reasons not directly related to the subwatershed (e.g., road widening, storm sewer replacements, master drainage studies). These studies are listed in Section A 5.0, Issues and Objectives.

**Section C** integrates the subwatershed components into the natural systems that exist within the study area.

**Section D** analyses the various opportunities and constraints that are present in the subwatershed and discusses a series of management alternative tools.

**Section E** provides the details of an Implementation Plan and a list of Action Items to provide direction for
implementation. Requirements for future studies are presented.

Various appendices support the Subwatershed Plan including a summary page referred to as the Coves Subwatershed “Quick Facts” section.

**All air photography** unless indicated otherwise, used as a base for Maps and Figures in this study are ortho-rectified images that were flown in April 2000 and obtained under license from the City of London.

### A 1.5 Subwatershed Planning

Subwatershed planning uses watersheds and subwatersheds as the biophysical basis for planning and management. It is the preferred resource management approach to analyzing ecosystems. Subwatershed planning considers the complexity, biodiversity, and inter-connections within natural systems taking into account the dynamic nature and finite capacities of ecosystems. It has environmental, social and economic benefits. Subwatershed planning ensures linkages are made between resource management and land use planning and practices. Humans are part of the ecosystem and cause the most significant changes to ecosystems, both positive and negative. People, therefore provide both constraints and opportunities to improved subwatershed health.

As described in Watershed Planning Initiative - Final Report (Ministry of the Environment, 1997), the objective of subwatershed planning is to provide decision-makers with a broad understanding of ecosystem function and status, and to develop recommendations for appropriate resource management in the subwatershed. This will allow relevant ecosystem considerations to be integrated into land use planning decisions and allow for better-informed resource use decisions to be made. Equally if not more important is the role that subwatershed planning has in educating residents as to their impacts on the subwatershed and their respective roles in wise stewardship.

Subwatershed planning informs land use planning and policy by identifying environmental, social and economic objectives to provide for informed decision-making. Key to subwatershed planning is the balanced approach to considering these three objectives. Subwatershed planning is an iterative process and forms part of the process known as Adaptive Environmental Management (Figure A 1.5.1).

![Figure A 1.5.1 Adaptive Environmental Management](image-url)
Subwatershed Planning (MOE & MNR, 1993) states that subwatershed planning is undertaken for reasons of:

- Environmental protection and pollution prevention.
- Improved land use planning.
- Infrastructure guidance.
- Streamlined approvals.
- Financial savings.
- Public involvement.
- Credibility of participating agencies.
- Enhanced economic viability.

The Subwatershed Planning (MOE & MNR, 1993) document also notes that subwatershed plans will:

- Identify the location, area, present status, significance and sensitivity of the existing natural environment within the subwatershed.
- Establish goals and objectives for managing the subwatershed.
- Identify environmentally sensitive or hazard lands, and recommend, with reason, appropriate environmental management practices.
- Identify lands where development may be permitted, provided it is designed to ensure that ecological functions are protected and maintained.
- Provide directions for the screening and selection of best management practices for the subwatershed.
- Address cumulative impacts for changes to the subwatershed on the natural environment.
- Integrate disciplines, policies, mandates, and requirements of all agencies and interests.
- Provide direction, consistency and uniformity of conditions of approval.
- Promote public participation.
- Establish an implementation strategy or Action Plan.
- Outline requirements for monitoring programs and information updates.
- Provide technical information for the completion of further environmental investigations.

The Government of Ontario has issued the Provincial Policy Statement (1997), which requires municipalities (upper and lower tier) to provide proper planning and environmental considerations. Legislation, such as the Planning Act, the Conservation Authorities Act, and the Environmental Assessment Act are used to implement these policies.

Section 2 of the Provincial Policy Statement provides specific policies dealing with natural heritage features and areas including wetlands, aquatic and terrestrial habitat, as well as water quality and quantity. Natural features diversity and the natural connections between them should be maintained, and improved where possible. Effective subwatershed planning will satisfy these policies.

The Provincial Policy Statement (PPS) contains other specific policies regarding Mineral Resources, Cultural Heritage and Archeological Resources that may also pertain to the Study Area. Policies specific to land use and development as well as public health and safety are included in the PPS document. Their implications are most commonly included in City Official Plan documents and subsequent land use planning processes.
The City of London recognized the importance of subwatershed planning in 1995 when a City-wide subwatershed planning initiative occurred in response to “Vision 96”, a coordinated effort to manage a new City boundary with lands annexed from adjacent municipalities. The effort included the preparation of a new City Official Plan. Ten subwatershed studies were initiated at that time focused on the Medway, Dingman, Kettle, Pottersburg, Mud, Sharon Upper Dodd’s, and Stoney Creeks and the Stanton and Crumlin Drains. The Coves Subwatershed was not included in that process because the process focused on newly annexed lands (e.g., “greenfield development”) rather than existing urbanized areas.

This City’s Official Plan includes Policy 15.2.1 Subwatershed Planning Studies that states that:

“The City of London Subwatershed Planning Studies provides background for the content and implementation of the Natural Heritage policies. These Planning Studies include the watersheds of all of the major tributaries entering the Thames River within the City as well as the upper reaches of the Kettle Creek Watershed which flows to Lake Erie. The Sub-Watershed Planning Studies apply an ecosystem planning approach to the identification of: lands to be protected or conserved; criteria to be applied in the planning and design of development to protect ecological functions; management practices to mitigate impacts from existing land uses; and programs to promote education, awareness and stewardship. These Planning Studies provide a generalized view of direction that will be refined through more area specific assessment including area planning studies and environmental impact studies.”

A 1.6 Study Process

An interdisciplinary Study Team conducted the Coves Subwatershed Study in three phases, as described below (also see Table A 1.3.1).

Phase 1: Project Initiation

Step 1: Background Information

- Collection and review of existing physiographic, hydrologic, hydrogeologic, natural features and land use information.
- Synthesis, interpretation and integration of existing information.
- Production of a base plan map for the subwatershed, which is current and correct.
- Preliminary description of the ecosystem functions and linkages.

Note: much of the preparatory work for the study commenced in 1999 when the subwatershed study concept was first discussed by community members, City staff and UTRCA staff.

Step 2: Issues, Goals and Objectives

- Refinement of issues and problem statements. Refinement and prioritizing of goals and objectives.
- Identification of knowledge gaps.
- Familiarization of the Steering Committee with existing database and subwatershed characteristics.
- Field monitoring initiated where possible.
Revised work plan based on information gathered to date. Initial contact with landowners, special interest groups and directly affected parties.

- Public meeting.

**Phase 2: Analysis**

**Step 3: Characterization of the Subwatershed**

- Commencement of base line data gathering and the review, inventory, and analysis of existing information addressing abiotic or physical components (hydrology, fluvial geomorphology, hydrogeology, soil conditions and slope stability), biotic components (terrestrial and aquatic species) and cultural components (City boundary evolution, community identification, parks and recreation use, existing trail systems).

- Understanding the relationship between the biophysical aspects of the subwatershed and the existing and potential land use.

- Identification of opportunities and constraints.

**Step 4: Integration**

- Integrate subwatershed components into a natural heritage system context.

- Investigate and develop various management strategies, which include practices and measures to meet subwatershed objectives and targets.

**Step 5: Alternatives and Recommended Plan**


- Public meetings to receive input.

**Step 6: Monitoring Plans and ACTION Plans**

- Preparation of an ACTION Plan and long term Monitoring Plan with specific time frames and responsible parties.

**Step 3: Study Finalization**

**Step 7: Final Plan/Presentation to Council**

- Production of the final Coves Subwatershed Plan, including an Executive Summary, the Monitoring Plan and Action Plan.

- Presentation to City of London Council at a public meeting for endorsement as a guideline document as described in the City Official Plan.

**A 1.7 History of the Coves Subwatershed**

As with much of Southwestern Ontario, the area of the Coves Subwatershed was part of the traditional territories inhabited by First Nations (primarily Iroquoian) peoples. European contact in the subwatershed was first documented by Lieutenant John Graves Simcoe in his excursion up the Thames River in 1793. His exploration party included Major Edward Littlehales and Augustus Jones who provided notes and sketches that describe and illustrate the Coves meander of the River Thames downstream from the forks where the City of London would eventually be built.

The Cove meander is clearly shown in 1793 on the Simcoe map which illustrates the new site of the community of London at the Forks of the Thames River. This map (see Figure A 1.7.1) shows the meander of the Thames forming an island that was subsequently bordered by the Coves ponds. This
The Site of London.

Remarks. The River at these Fords is two Chains broad about two feet deep where Rapid, and about four feet and a half where still water. The water rises in the Spring of the Year from Six to Seven feet. The Plains are high and dry, with narrow flats existing the Rivers. The greatest body of water runs through the newly formed passage at the neck of the Island, which seems formerly to have been a peninsula. On the Island, the land is level and low, in the Spring it is overflowed.

Compiled Field Notes of Mr. A. Jones by Lewis Grant D.P.S.- Scale Twenty Chains to One Inch.

Coves Subwatershed Study
London, Ontario

Coves Historic Map
Circa 1800

Remarks taken from Major Edward Littlehale's Diary during the visit by John Simeon.

Scale: NTS
Date: June 2003

PEIL
D. R. Peile & Associates Inc.

Project No.: K1284
Figure: A 1.7.1
map illustrates the fluvial geomorphological process of “avulsion” or the event when a river meander becomes cut-off and forms a separate “oxbow” channel. Cartographic detail on the map suggest the event took place in the previous year or two before John Simcoe’s trip up the Thames River (1790 or 1791). This date is useful when analyzing the sedimentation rate that has occurred in the Coves since this event. The natural processes at work in oxbow channels are dominated by sedimentation due to the change in river flow patterns.

As the City of London grew and expanded to the south and west away from the Forks of the Thames River, lands within the Coves subwatershed eventually were included in the City boundary. The last boundary expansion occurred in 1961 to include the entire subwatershed. Before that time, the centerline of the west and south ponds formed the City’s westerly boundary (further discussed in Section B 6.2). An 1879 survey of Kensal Park (Figure A 1.7.2) identifies the East and West Branch Cove and the relic meander slopes extending from the West Cove. Note: Springbank Drive is shown as Kensal Avenue on this survey.

The historic land use within the subwatershed prior to 1961 was dominated by agricultural with residential development limited to the area surrounding Pipeline Road (now Springbank Drive) at the north end of the subwatershed. Industrial development within the subwatershed began in the 1960’s and continued until 2001 when Valspar Ltd Industries closed the paint factory operation operating in the centre of the Coves ESA. A series of four historic air photos depict the Coves in 1945, 1950, 1955 and 1988 (see Figure A 1.7.3).

The present subwatershed boundary is based on urban stormwater drainage and summarized in a report by Delcan Ltd. completed in 1991. Historically, the subwatershed boundary may have been considerably different and may have encompassed a much larger area prior to urban development (see Section B 2.1 - Hydrology for more discussion on this issue).

A 2.0 EXISTING POLICY FRAMEWORK

The subwatershed plan will have regard for existing policies that include, but are not limited to:

- Land use policies
- Water resources.
- Fish habitat.
- Natural hazard.
- Natural heritage.
- Cultural heritage.

These are discussed in the following section (or appendix).

The City of London Official Plan (Policy 15.2.1, Subwatershed Planning Studies) identifies the need for subwatershed planning. The formulation and development of the Coves Subwatershed Plan has been based on the interest by the community and on the support by the City and Upper Thames River Conservation Authority. The plan reflects the priority of managing the Coves ESA recognizing the connection to and importance of managing the entire subwatershed. The Plan implements the existing
planning and environmental policy framework for the natural environment from the Official Plan. The groups that have contributed to the subwatershed plan include the City of London, the Upper Thames River Conservation Authority (UTRCA), Ontario Ministries of Natural Resources, Environment, Culture, McIlwaith Field Naturalists, Ducks Unlimited, Evergreen Foundation, Trillium Foundation, local community groups such as Old South Community, Manor Highland Park and Springbank Drive. Many more will be involved in implementation.

**A 2.1 City of London Official Plan (Official Plan Amendment #88)**

The City of London Official Plan (OP) was adopted by City Council in 1989. Official Plan Amendment #88, being the environmental policies of the plan was subsequently approved in December, 1999.

The Coves Subwatershed Study area contains numerous examples of mixed urban land use and settlement patterns (see Figure A 2.1.1). The commercial corridor (HS, RSC) along Commissioners Road West and Wharncliffe Road South is contrasted by the low (R1 – R3), medium (R4 – R8) and high (R9 – R10) density residential designations located adjacent. Greenspace is limited in the subwatershed. These areas occur adjacent to isolated open space and park areas primarily associated with the Coves ponds, Silver Creek ravine, Euston Park and Highland Golf Course (0S1 – 0S5).

Other relevant sections regarding the natural environment system within the Official Plan include the following sections:

15.3 Natural Heritage Areas Designated as Open Space
15.4 Components of the Natural Heritage System
15.5 Environmental Impact Studies and Subject Lands Status Reports
15.6 Floodplain Lands
15.7 One Hundred Year Erosion Limit and Fill Line Area
15.8 Contaminated Lands

Of specific interest to this study is Section 15.3.8. Conservation Master Plans and Section 15.4.1.1 Identification of Environmentally Significant Areas (ESA). Conservation Master Plans are prepared for ESA lands and other natural heritage areas to function as a guideline document for the purposes of defining the boundaries and providing direction on the management of these areas. The list of ESA sites includes The Coves (item xvi) that is described as the following:

“The Coves area, which is situated in central London south and west of the confluence of the north and south branches of the Thames River, contains a series of oxbow ponds and forms part of the Thames River Corridor.” (Appendix B)

This Plan will provide background data to the development of a Conservation Master Plan for The Coves ESA when public lands are obtained in the area. In the interim, this Plan may serve as a guidance document to City and Agency staff.

**A 2.2 City of London Zoning By-law**

The City of London Zoning By-law Z-1-94236, as amended, was approved by City Council and effective July 1, 1993. The Study Area is located within Maps
Coves Subwatershed Study
London, Ontario

Historic Air Photo Series of The Coves
(1945 - 1988)

Info Source: Air photos obtained from the Serge Sauer map room library, UWO except 1988 photo obtained from the City of London
99 to 103 and 119 to 122 in the City of London Zoning By-law. Figure A 2.1.1 is a consolidated version of these maps as provided by the City of London Office Consolidation November 2001.

A 2.3 Watercourse & Water Resource Policy Issues

A 2.3.1 Background

Various Federal, Provincial, regional and Municipal agencies are involved in planning approvals and have a broad framework of legislation governing land development, natural heritage and hazard, water resource and environmental issues in the Province of Ontario. Figure A 2.3.1 details some of the legislation in effect that controls activities within or proximate to stream systems. It is not meant to suggest that this is all-encompassing but rather just the few pieces of legislation that are most commonly encountered. Further investigation, specific to the application, should be conducted at the Area Plan and Plan of Subdivision stages of the planning process. Three specific policies are discussed in further detail in the following two subsections.

A 2.3.2 Fish Habitat Policy

The principal legislation governing fish habitat is the Fisheries Act. This federal legislation states no person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat (Section 35(2)) without authorization by the Department of Fisheries and Oceans. As well, no person shall deposit or permit the deposit of any deleterious substance into water frequented by fish (Section 36(3)).

The Department of Fisheries and Oceans (1986) Policy for the Management of Fish Habitat has the objective of creating a net gain of habitat for Canada’s Fisheries resources. The goals of the policy are:

1. Maintain the current productive capacity of fish habitats supporting Canada’s fisheries resources, such that fish suitable for human consumption may be produced.
2. Rehabilitate the productive capacity of fish habitats in selected areas where economic or social benefits can be achieved through the fisheries resource.
3. Improve and create fish habitats in selected areas where the production of fisheries resources can be increased for the social or economic benefit of Canadians.

The guiding principle of Goal 1 is the no net loss principle which requires that if the productive capacity of a fish habitat is reduced, then a compensating increase in fish production must be made to occur. The hierarchy of preferences for applying this principle is as follows:

1. Maintain, without disruption, the natural productive capacity of habitats through re-design or mitigation.
2. If the former proves impossible or impractical, then compensation by either creating new habitat, or by increasing the productive capacity of existing habitat will be considered.

It should be noted that compensation may not be acceptable in some cases where the habitats in question are deemed especially important or
sensitive. It should also be noted that an Authorization under the Fisheries Act triggers the Canadian Environmental Assessment Act, so that screening under this Act becomes necessary. Activities that alter fish habitat will be subject to Fisheries Act approval.

A 2.3.3 Natural Heritage System Policy

The Ministry of Natural Resources has prepared guideline documents to assist in the implementation of Provincial Policy Statements related to natural heritage features. The definition of Provincially Significant means that approval agencies “shall be consistent” (recent text amendment – 2004) with the provisions of Section 2.3 of the Provincial Policy Statement (1997) which states:

“2.3.1 Natural heritage features and areas will be protected from incompatible development.

A 2.3.4 Water Resource Policy

Approval agencies must ‘have regard for’ the provisions of Section 2.4 of the Provincial Policy Statement (1997) which state:

“2.4 Water Quality & Quantity

2.4.1 The quality and quantity of groundwater and surface water and the function of sensitive groundwater recharge / discharge areas, aquifers and headwaters will be protected or enhanced.”

The result of this study must provide insight into the stated functions of groundwater recharge/discharge areas. These results also comply with Regional and City land use policies.

A 2.3.5 Natural Hazard Policy

The Ministry of Natural Resources has produced manuals that provide guidance in applying natural hazard policy. These hazards include steep slopes, floodplains, organic soils and erosion prone areas. The City and the UTRCA share responsibility for implementing natural hazard policy through official plans, zoning by-laws and permitting under Section 38 of the Conservation Authorities Act. Other approval agencies must also “have regard” for provisions of Section 3 of the Provincial Policy Statement (1997) Public Health & Safety which state:

3.1 Natural Hazards

3.1.1 Development will generally be directed to areas outside of:

a. hazardous lands adjacent to river and stream systems which are impacted by flooding and/or erosion hazards

3.1.2 Development and site alteration will not be permitted within:

- A floodway (except in those exceptional situations where a Special Policy Area (such as the Coves Special Policy Area) has been approved).

3.1.3 Except as provided in policy 3.1.2, development and site alteration may be permitted in hazardous lands and hazardous
Legislation Affecting Channel Design*

**FEDERAL FISHERIES ACT**
- Administered by CA/MNR
- DFO & DOE (ground water)

**LAKES & RIVERS IMPROVEMENT ACT**
- Administered by MNR

**PLANNING ACT**
- Land Use
- Flood Plain Planning
- Wetlands

**ENVIRONMENTAL PROTECTION ACT**
- Provincial Water Quality Objectives
- Administered by MOEE

**ENVIRONMENTAL ASSESSMENT ACT**
- Class EA’s & Site Specific
- Administered by MOEE

**ONTARIO WATER RESOURCES ACT**
- Administered by MOEE
  - water pollution (ground water/surface & storm water)
  - Regional Sewer Use bylaw

**CONSERVATION AUTHORITIES ACT**
- Fill, construction & alteration to waterways regulations
- Administered locally by Municipalities

**DRAINAGE ACT**
- Administered by OMAF
  - Site specific, when adopted under municipal by-laws

**LOCAL IMPROVEMENT ACT**
- Administered locally by Municipalities

**FEDERAL NAVIGABLE WATERS**
- For specific reaches of certain water resources
  - Administered by Transport Canada

**PUBLIC LANDS ACT**
- Administered by MNR

---

* Amended from Metropolitan Toronto & Region Conservation Authority "Valley & Stream Corridor Management Program" Draft April 1993.
** Arrows indicate extent of application of the legislation across the valley.

---

Coves Subwatershed Study
London, Ontario

Water Resource Legislation

Scale: NTS
Date: March 2004
Project No.: K1284
Figure A 2.3.1
sites, provided that all of the following can be achieved:

a. The hazards can be safely addressed, and the development and site alteration is carried out in accordance with established standards and procedures;

b. New hazards are not created and existing hazards are not aggravated;

c. No adverse environmental impacts will result;

d. Vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion, and other emergencies; and

e. The development does not include institutional uses or emergency services or the disposal, manufacture, treatment or storage of hazardous substances."

As a result, this plan will further support the Coves Area SPA regarding the Regulatory floodline and provide recommendations concerning steep slopes and appropriate management setbacks. These recommendations also reflect City land use planning policy.

A.2.4 Cultural Heritage Policies

The City of London has proposed policy implemented through the Official Plan that protects cultural heritage landscapes. This is consistent with the Provincial Policy Statement that specifies that “significant built heritage resources and cultural heritage landscapes will be preserved”. The definition of such a landscape is not exhaustive however some direction is given by the provincial policy which suggests that a cultural landscape is, “a defined geographical area of heritage significance which has been modified by human activities. Such an area is valued by a community, and is of significance to the understanding of the history of a people or place.”

Although not the focus of the report, the architectural heritage and history of the evolution of the City of London and its’ residents is a component of the archeological research by D.R. Poulton & Assoc, (Poulton. 2003). His analysis and description of the Coves being a hub of early London life supports the premise of a cultural heritage landscape. The potential exists for these policies to apply on a voluntary basis to areas of the subwatershed surrounding the Coves ponds based on historical buildings and structures and on the historic neighbourhoods and enclaves of the area.

Numerous examples of historic land use of the area are shown on the 1922 air photo mosaic prepared as part of this subwatershed study. A full wall size map was prepared for and contained in the Archeological Investigation and a Component to this study (Poulton, 2003) and a small scale version is contained in this report. The mosaic (see Figure A 2.4.1) shows ice houses located along the Coves to store winter ice blocks cut from the Coves for use in the warmer seasons. The Cove Rifle Range can be seen in the centre of the Coves constructed over the undulating topography of meander scrolls, or ridges created by the slow accumulation and removal of sediments during the time when the Thames River flowed through this channel. The Jefferey Estate lawns and tennis courts can be seen on the East Cove slope and on the flats north of Cove Road. The Jefferey family
was one of the founders of the London Life Insurance Company, a prominent London business.

This concept of a Cultural Heritage Landscape has been applied to the public lands associated with Springbank Park / Thames Valley Golf Course / Reservoir Hill as an example. This example may assist the Friends of the Coves Subwatershed in investigating the applicability to the Coves Subwatershed. This topic is referenced as an area for further research (see Section B).

A 3.0 PUBLIC PARTICIPATION

Public participation is integral to the Subwatershed planning process. The Coves Subwatershed Study included a full complement of public contact points to ensure that the study results and management alternatives were properly discussed and disseminated. The following key public contact points are noted and the corresponding advertisements, newsletters and press articles are presented in Appendix D.


2. The first Public Open House was held April 10, 1999 at the German Canadian Club, Cove Road. Notice of the meeting was published in local papers and flyers were sent to over 100 individuals, land owners and interested public. Approximately 40 people attended the Open House where the study process was described and input into issue identification was sought.

3. The second Public Open House was held on Earth Day, 2001 at Manor Highland Park School. At this meeting, issues were identified by the public (approximately 40 participants) in break-out sessions to be addressed in the subsequent subwatershed study. A Coves tour was then lead by a representative from the McIlwaith Field Naturalists.

4. The third Public Open House was held in conjunction with the Friends Annual General Meeting on February, 2002 at Manor & Highland Park School. The framework for the subwatershed study was outlined and questions answered.

5. The fourth Public Open House was held November 19, 2003 at London Civic Gardens to reveal draft recommendations from the Plan. Questions and answers were provided regarding this Plan and the complimentary projects also on-going in the subwatershed.

6. The fifth and last Public Open House was held on June 13, 2004 to provide the public with the report and answer questions.

To assist in the dissemination of information to stakeholders, notices of the Public Meetings and Community Workshops were also published on the Friends of the Coves Subwatershed, UTRCA and PEIL newsletters. Background material that was presented at each of the open houses was also available to community groups through the Board of Directors. In addition, preliminary data was made available through PEIL after the 1st Public Workshop so that the public was able to review information as it was being produced. Eventually the entire draft and
Legend to Historical Features

- Cove Railway Bridge (1854 - Present)
- Great Western Railway (Now CNR) (1854 - Present)
- Southampton Bridge (1891 - 1925)
- Elmhurst Residence of John Wilson (1837 - Ca. 1935)
- McArthur House & Orchard (Ca. 1850 - Present)
- Euston Park Area
- Traction Line Electric Railway (1902 - 1918)
- Manor Park Public School (1921 - Present)
- shore farm site (1600 - 1650)
- Mount Kent Site (1550 - 1600)
- Edward & Tecumseh Site
- Ojibwa Contact Site
- East Indian Cornfields Site (18th Century)
- Euston Park Area
- Watershed Boundary
- Subwatershed Boundary

Note: 1922 Aerial photo mosaic is geometrically corrected and georeferenced

Source: Serge Sauer Map Room Library, UWO

Figure A 2.4.1
Coves Subwatershed Area 1922
final document was placed on the Friends of the Coves Subwatershed, PEIL and UTRCA website. Notices of all meetings were also placed in local papers and, if applicable, in the Old South Advocate (local newspaper).

A 4.0 ISSUES AND OBJECTIVES

As a result of preparatory work for the project in 1999 and 2000, considerable public consultation took place to determine the issues and objectives relevant to the study. This included public meetings, consultation with stakeholders, agencies and Friends of the Coves Board Members. The following particular issues were raised and identified as issues to be addressed in the plan:

a. **Coves ESA**: Status and future plans for the management of the area. Ownership and management strategies of the lands.
b. **Erosion Control Structures**: Impact on Fish Habitat, current state of repair, soft protection options, long-term recommendations.
c. **Flood Gate**: current state of repair, operation protocols.
d. **Fish Habitat**: Status, potential, and management objectives (as per the Upper Thames River Conservation Authority).
e. **Coves ESA**: Confirmation of boundaries, buffers from development, and status of the designation.
f. **Natural Habitat Corridor**: Elements of a Natural Habitat Corridor will be investigated between the Thames River and Dingman Creek consistent with Official Plan Policies.
g. **Vegetation**: vegetation management strategies and stewardship initiatives.
h. **Trail System**: Potential linkages (within and beyond the subwatershed) and interconnection of natural areas.

As a result, the plan will need to address:

1. The objectives of the Coves Subwatershed Study (Section 1.2) that were developed to achieve the overriding goal of the entire study.
2. General objectives laid out in provincial documents with respect to subwatershed study.
3. The issues raised by the public, agencies and the consultant team.

In achieving the above three items, the individual objectives of the Coves Subwatershed Study are:

**OBJECTIVE 1 - AQUATIC RESOURCES**

**Objective 1.1**
To identify aquatic resources, specifically sensitive components of the ecosystem and identify means to protect, maintain or enhance these resources.

**Objective 1.2**
To prepare a strategy for the aquatic component of the Coves ESA.

**Objective 1.3**
To preserve and restore fish habitat.

**Objective 1.4**
Identify constraints and opportunities to achieve these objectives.

**OBJECTIVE 2 – TERRESTRIAL RESOURCES**

**Objective 2.1**
To identify terrestrial resources, specifically sensitive components of the ecosystem and identify
means to protect, maintain or enhance terrestrial resources.

**Objective 2.2**
Confirm, protect and manage The Coves Environmentally Sensitive Area, and potential Significant Natural Corridors (stewardship).

**Objective 2.3**
To confirm the Coves ESA boundary at a more detailed scale.

**Objective 2.4**
To prepare a restoration strategy for the terrestrial component of the Coves ESA.

**Objective 2.5**
To assess and provide recommendations for future management of the open spaces within the subwatershed.

**Objective 2.6**
To determine a preferred Natural Habitat Corridor and the elements of a Natural Habitat Corridor as per the City Policies.

**Objective 2.7**
To determine appropriate vegetation management and naturalization strategies.

**OBJECTIVE 3 - NATURAL HAZARDS**

**Objective 3.1**
To support policies that minimizes the risk to life and property due to flooding and erosion.

**OBJECTIVE 4 - SURFACEWATER RESOURCES**

**Objective 4.1**
To explore the natural hydrologic linkages with the Thames River (fully linked versus status quo).

**Objective 4.2**
To protect and manage surface water quality and quantity

**OBJECTIVE 5 - GROUNDWATER RESOURCES**

**Objective 5.1**
To preserve natural hydrogeologic systems, where feasible.

**Objective 5.2**
To protect and manage the quantity and quality of groundwater resources.

**Objective 5.3**
To determine the implications on water quality and quantity from infiltrated stormwater runoff.

**OBJECTIVE 6 - THE URBAN ENVIRONMENT**

**Objective 6.1**
To support ecosystem-based, land use planning and resource management in the subwatershed.

**Objective 6.2**
To produce an implementation and action plan to guide future re-development and stewardship efforts within the subwatershed.

**Objective 6.3**
To determine and address the implication of re-development opportunities on the Coves ponds and broader subwatershed.

**Objective 6.4**
To determine the current state of repair of erosion control structures and to develop long-term remediation recommendations which would address public safety, maintenance and operation, public use and aesthetics.

**Objective 6.5**
To determine ownership and management strategies of the Coves ESA and related environmental features.

**Objective 6.6**
To inform future municipal Class EA’s for road widenings / servicing in the Coves subwatershed to aid in assessing the potential impacts of these actions from an environmental perspective.

**Objective 6.7**
To determine appropriate stewardship actions, Best Management Practices and promote these in consultation with the UTRCA and the City.

**Objective 6.8**
To recommend a potential trail system with potential linkages (within and beyond the subwatershed) and interconnection of natural areas.
The goal of the Coves Subwatershed Study has been considered throughout the study. The objectives and issues have determined the appropriate course of action during field investigations, in the determination of subwatershed management alternatives and finally, in the selection of Action Plans.

A 5.0 COMPLIMENTARY STUDIES

Considerable time and effort has been spent to ensure that any field investigations and background work have occurred in concert with and complimentary to other City and UTRCA projects that are taking place concurrently within the study area. These studies include, but are not limited to the following:

- Springbank Drive Road Widening - Stantec Consultants for the City (Stantec, 2003).
- Commissioners Road Widening (Wharncliffe to Viscount) – Delcan Consultants for the City (Delcan, n.d.).
- Coves Area Drainage and Remediation Master Plan– Dillon Consultants for the City (Dillon, 2003).
- Edward Street Storm Sewer Class EA - Dillon Consultants for the City (Dillon, 2003).
- Springbank Drive – Greenside Ave Re-alignment – City Wastewater Division.

The following Section contains the characterization of the subwatershed based on background studies related to this project and others which have been completed in order to allow the Study Team to address the above noted objectives and issues.
Section B
Characterization of the Subwatershed
Section B Cover
Looking north across “the Commons” toward the London Roman Catholic School Board Office named after Monsigner Feeney (formerly the Normal School).
SECTION B – CHARACTERIZATION OF THE WATERSHED

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B 1.0 INTRODUCTION

This Plan investigates the attributes of the subwatershed using the “ABC” (Abiotic, Biotic, and Cultural) approach to compiling and presenting subwatershed information.

B 2.0 ABIOTIC ATTRIBUTES

B 2.1 Hydrology

B 2.1.1 Introduction

The Coves Subwatershed is an urban subwatershed. Therefore, the hydrology of the area has been significantly altered from what existed prior to the development of roads and residential communities. The natural hydrologic cycle (see Figure B 2.1.1) provides a portion of water to infiltrate to the groundwater. In urban conditions, this portion is intercepted by impermeable surfaces (roof tops, pavement) and routed into storm drains. As illustrated in Figure A 1.2.1, the study area is divided into 13 catchments labeled A1 to A13 where all the land within each subcatchment drains to a single outlet and eventually to the Coves ponds. In the Coves Subwatershed these buried pipes often match the locations of where the former natural drainage system of creeks and watercourses existed (see Figure B 2.1.2). In either case, all water flows downhill and terminates in the Coves ponds and eventually flow to the Thames River. Stormwater management systems have the tendency of increasing flow velocity and delivery time to the outlet (the Coves), increasing erosion where the water comes in contact with soil (near the outlets) and increasing the temperature and sediment content. Without the filtering action of water infiltrating through vegetation and soil, the water also commonly contains increased amounts of pollutants such as road salt and lawn pesticides. This evolution is common in most urban environments where surfacewater was viewed to interfere with the orderly development of urban communities.

An evolution of stormwater management and watercourses over the past 50 years is summarized in Figure B 2.3.1. This approach is consistent with the Coves Subwatershed that in the early 1950s and 1960s a number of historic creeks were piped below ground as part of the stormwater management system of the subwatershed. It is estimated that eight historic watercourses formerly provided surface water flow to the Coves as described by Poulton (2003). These creeks are described below and their history is included as partial explanation of the present hydrology of the subwatershed given current conditions and practices. It also provides a historic perspective that explains some of the slope instability issues being faced by local landowners near these former channels and steep slopes.

B 2.1.2 Historical Evolution

Thames River and Coves Meander

Based on the historic map from John Simcoe, it is estimated that the meander of the Thames River cut-off or “avulsed” in the late 1780s. This event formed the oxbow that has evolved over the past 224 years into the three Cove ponds present today. The area in the centre of the meander and that area to the east and north near the Thames River contain low-lying lands that are flood prone. This is despite the flood proofing actions taken to create the Thames River dyke along Greenway Road and to install a one-way
flood gate at the outlet of the Coves into the Thames River. These flood proofing measures are discussed further regarding the floodplain conditions in Section B 2.1.3.

As described in Poulton (2003), a series of events in the late 19th and early 20th Century further sealed the fate of the Coves meander. This evolution is reflected in the name of the meander switching from “The Cove”, a single water body separated from the Thames River to “The Coves” in later years as the meander started to be separated into a series of ponds by natural sedimentation and human filling. As late as 1973, the 1:25,000 scale National Topographic Service mapping still referred to this former oxbow of the Thames River as “The Cove”.

In 1854 the Great Western Railway (now CNR) constructed the Cove Railway Bridge over the Thames River. The south embankments for this bridge assisted in further isolating the Cove meander from the Thames River. Then in 1940 the City created the Greenfield Landfill Site at the northern end of the East Pond that effectively cut off the flow of water from the Thames River into the Coves. In the 1950s, the East Cove south of Cove Road was filled in to create the parking lot and tennis courts beside the German Canadian Club. These human interventions contributed to the separation of the oxbow into ponds and added to the natural sedimentation processes that are described in Section B 2.2 regarding fluvial geomorphology.

**London South Creek** (or currently referred to as the Edward Street Storm Drain)

London South Creek is one of eight historic watercourses described by Poulton (2003) that now flow through storm sewers to outlet into the Coves. Naming these historic creeks was problematic as part of this study in that there is limited historic documentation and multiple local names. Therefore, these creeks are named in this plan using the best information available and references are made other names, if applicable.

The London South Creek name is found on City of London engineering plans from 1954 that illustrate the storm sewer outlet to the East Cove. The catchment for London South Creek is labeled A9 (see Figure B 2.1.2) and is the largest in the subwatershed draining 310 hectares or almost half the entire 710 hectares subwatershed. The course of this creek as well as many of the other historic creeks can be approximated by the stormwater service pattern shown on Figure B 2.1.2. London South Creek is the present location of the largest diameter storm sewer pipe in catchment A9 (1500 to 2100 mm size). The only remaining evidence of this creek on the surface is at 2 locations in the subcatchment. The first is the ravine section of Highland Woods located south of Commissioners Road near Outlet #25 from the stormwater service diagram. The ravine is also clearly shown on Figure B 3.3.3 showing vegetation communities. The second location where the former creek re-appears is at the outlet into the Centre Cove in the ravine opposite the German Canadian Club. This ravine (shown as Outlet #1 on Figure B 2.1.2) is currently the focus of the Edward Street Storm Drain Outlet Class EA (Dillon, 2003).

Historic mapping provides a glimpse of a delta that had formed at the outlet of both London South Creek
Coves Subwatershed Study
London, Ontario
Hydrologic Cycle

Figure B 2.1.1

Scale: NTS
Date: June 2004
Project No.: K1284
and Silver Creek (Historic Mapping Resources #1, 2, 3 and 6 – see Appendix E). These delta features have interrupted surface water flow through the Coves meander and have assisted in the formation of the three Cove ponds (East, West and Centre).

**Silver Creek**, also known as Spring Creek (unknown origin of name) or Bogue Creek (after the Bogue farm through which it flowed).

The origin of this creek can be traced from the pattern of sewer pipes running north through catchments A3 and A4 and reaching the open ravine leading to the Centre Cove (see Figure B 2.1.2). The ravine is commonly referred to as Southcrest Ravine due to the name of the nearby development by the same name. The headwaters of this creek is near where the New PL television station is located on Communications Road.

One longtime resident has speculated that the name of the creek is related to the developing process for movie film at the station prior to the extension of sanitary sewers to the building. At that time the TV station facility would have operated with a leaching bed septic system that would have received the chemicals containing quantities of chromium and silver that would eventually seep into the creek. Both elements are very toxic to aquatic organisms. These contaminants were revealed years later in soil tests required when Union Gas built their facility on Commissioners Road immediately to the north of CFPL. The resident notes that the TV station later discharged chemicals via sanitary sewer pipe to the Greenway Pollution Plant and has now converted entirely to digital technology omitting the need for chemicals (correspondence with Michael Woodward, producer/writer, December 8, 2003).

**Erie Creek** (name derived from the street name located immediately to the south).

This watercourse is located between Erie Avenue and Cove Road. The only evidence of its former existence is from two sources: the existing topographic depression in the area extending east 50 metres from Wharncliffe Road and from an engineers report dated 1957 which documents the plan of action and landowner agreements for filling in the ravine. The creek is also evident from historic mapping described in the associated archeological report to this Subwatershed Plan (Poulton, 2003).

**Other Creek / Ravine Features**

A number of additional creeks and ravines can be seen from historic mapping produced in the Archeologic Component of this Study (Poulton, 2003) and from the 1922 air photo mosaic (see Figure A 2.4.1). A comparison of the 1922 and 2000 photography in specific areas surrounding the Coves shows how the infilling of ravines occurred to create more lands for roads and lot development.

The first of two ravines analysed using this photo comparison technique is located immediately west of Winston Avenue and identified as Outlet # 13 and 14 on Figure B 2.1.2. The air photo comparison of the ravine feature is shown on Figure B 2.1.3. In 1922 the ravine extended south of Langarth Street West however in 2000 the ravine appears to stop north of Briscoe Street some 300 metres to the northwest. UTRCA have received inquiries regarding slope
stability concerns from the owners of properties near this filled ravine (UTRCA email communication, January 17, 2003).

The second ravine is located northwest of the intersection of McKay Avenue and Tecumseh Avenue West and is still evident in topographic depressions immediately south of the Elmwood Nursing Home located on the bank overlooking the Coves. It is identified as Outlet #11 on Figure B 2.1.2. The air photo comparison is shown on Figure B 2.1.4. In 1922 the feature stretches south to Briscoe Street while in 2000 the feature is most obvious north of Tecumseh Avenue some 200 metres to the north. Also evident in Figure B 2.1.4 is the bridge on Wharncliffe Road over London South Creek in 1922. This bridge is known as Roder’s Bridge (E-mail correspondence with Glen Curnoe) and was a joint project of the City, County and Township constructed in 1894. The creek can be seen upstream of Wharncliffe Road in the area now occupied by Duchess Park being a former fill area (discussed in Section B 4.2.3, see Figure B 2.1.5). The creek currently has been enclosed in a storm sewer and outlets behind the former “Ah So Garden Restaurant” (now closed) located in the top right hand corner of the 2000 photo.

Evidence of a further historic creek bed can be seen in the topography of the area near the intersection of Springbank Drive and Orchard Avenue. This feature is prominent in the 1879 survey of Kensal Park (see Figure A 1.7.2) however Orchard Avenue is labeled as Centre Road and Kent Avenue on the 1879 survey and the modern day Springbank Drive is shown as Kensal Avenue on this historic plan. The feature may correspond with Outlet #8 on the Storm Sewer Services map (Figure B 2.1.2) and provide subsurface drainage to this location next to East Cove Pond. Existing topographic detail (see Figure C 3.2.1) also suggests the location of this former feature.

Wetlands

Naturally occurring depressions that collect water play an important role in the hydrology of a watershed. These depressions can contain wetland vegetation that provide a filtering capacity for surface water, store flood water and release it more slowly. They also have the capacity to cool water temperatures as well as providing habitat for wildlife. They generally do not survive in an urbanizing environment like the Coves subwatershed. Therefore, it is not surprising that none exist to be analysed as part of the study. It is noteworthy however that the historic fill areas (discussed in Section B 4.2.3 and shown on Figure B 2.1.5) suggest locations where these natural features formerly existed.

The eight fill sites coloured green and identified as “natural methane gas producing areas” on Figure B 2.1.5 are the wetland features that have been filled and presumably the decomposition of the native vegetation is now producing the methane gas. It is also noteworthy that all but one are located in the upper watershed area. This is where surface water retention would be most beneficial in slowing water runoff to the ravines that outlet into the Coves. In addition to these 8 areas the largest area formerly with wetland attributes was along the southwest side of Euston Park. This area was documented by David Stephenson in his original biologic inventory of 1989 as a cattail marsh (see unit 5 – Figure B 2.1.6) near the ravine at the west end of the Park. This feature
Coves Subwatershed Study
London, Ontario

Infilling of Ravine
(Winston & Tecumseh Avenue Site)
1922
A Wharncliffe / Elmwood Intersection
B MacKay / Tecumseh Intersection
C Future site of Elmwood Nursing Home

2001
A Wharncliffe / Elmwood Intersection
B MacKay / Tecumseh Intersection
C Elmwood Nursing Home

Coves Subwatershed Study
London, Ontario

Infilling of Ravine
(Wharncliffe & Elmwood Avenue Site)

Scale: NTS
Date: March 2004
Project No.: K1284
Figure B 2.1.4
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<th>Site Number</th>
<th>Site Name</th>
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</thead>
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<td>8</td>
<td>Euston Road Natural and Fill Site</td>
</tr>
<tr>
<td>9</td>
<td>Elmwood Avenue Fill Site</td>
</tr>
<tr>
<td>11</td>
<td>Greenside Avenue Fill Site</td>
</tr>
<tr>
<td>12</td>
<td>Cove Road Fill Site</td>
</tr>
<tr>
<td>36</td>
<td>Duchess Avenue Fill Site</td>
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</tr>
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<td>72</td>
<td>Briscoe Street Natural and Fill Site</td>
</tr>
<tr>
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<td>McAlpine Avenue Natural Site</td>
</tr>
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<td>Highland Place Natural Site</td>
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<td>Highland Woods Natural Site</td>
</tr>
<tr>
<td>84</td>
<td>Cliftonvale Avenue Natural Site</td>
</tr>
</tbody>
</table>

Legend

- **Subwatershed Boundary**
- **Subcatchment Boundary**
- **Fill Area-Evidence of Methane Gas (CH4)**
- **Fill Area-No Evidence of Methane Gas (CH4)**
- **Natural Methane Gas Producing Area**
- **Open Water**

Historic Fill Areas

Coves Subwatershed Study
London, Ontario

Date: June 2003
Project No.: K1284
Figure: B 2.1.5
Coves Subwatershed Study
London, Ontario
Vegetation Comparison
(Approximate Boundaries)
1989 - 2002
would have likely provided flow attenuation to the
creek and ravine and slowed the process of ravine
erosion.

B 2.1.3 Existing Conditions

Floodplain Conditions

The floodplain of the Coves area is complex. It is a
combination of flood flows from the Thames River
(235.6 m) and flood elevations from the Coves
subwatershed (232.12 m). The complexity of the
floodplain is compounded by the existence of an old
residential area of the City and is partly the reason for
the establishment of the SPA (discussed in Section
1.1). The situation is further influenced by the
existence of Springbank Dam downstream on the
Thames River and by the existence of a floodgate at
the Coves outlet to the Thames River and the
Thames Flood Dyke. The flood elevations have been
studied and updated through numerous studies by
Most recently, Dillon (2003) has updated the
hydrology model for calculating flood levels for the
Coves given more recent (2000) flooding and
meteorologic data. They also assessed the potential
impacts to flooding that proposed changes to the
stormwater outfalls associated with the Springbank
Road Widening Project could make. Construction of
this project is currently being planned for summer,
2004.

The hydrology and hydraulic summary provided by
Dillon is an excellent resource that this study did not
duplicate. Their results including computer modeling
data and flooding assessments are provided in their
characterization report (Dillon, 2003).

Floodgate and Flood Dyke Features

The Coves area experienced severe flooding in 1937
as a result of backwater into the Coves from the
Thames River. After that time a flood dyke (a broad
based berm) was constructed and a culvert with a
floodgate, or also called flap gate was installed
through the dyke. In 1988 a second culvert (twin 1500
mm culverts with flap gates) was installed and the
dyke was raised to Thames River flood level (235.6
metres).

The floodgate is manually operated during storm
events by the city staff at the Greenway Pollution
Plant. This floodgate permits stormwater from the
West Cove pond into the Thames River but not permit
flows from the Thames to enter the Coves. This
protects the Coves Area during periods of high water
levels in the Thames River.

The flood dyke was originally constructed in 1988.
Other investigations have assessed the relevancy of
constructing further dykes in the Coves area (UTRCA,
1995). This study focused on the northeast residential
area around McAlpine Street but concluded that the
minor increased level of additional protection was not
cost beneficial.

B 2.2 Fluvial Geomorphology

B 2.2.1 Introduction

The study of fluvial geomorphology is the study of
landforms that have been shaped, created and
eroded by the flow of water in rivers. The Coves area
is therefore an interesting feature in that it has
evolved from a bend, or “meander” of the Thames
River (pre 1790s) to an oxbow after the cut-off or
“avulsion”, of the meander (post 1790s) and eventually to the gradual filling by sediments that are transported to the river meander by smaller creeks. This sediment cannot be moved downstream due to decreased river flow that does not have the power to transport the sediments through the Cove ponds. These processes are natural phenomena however exaggerated when the actions of human development change the subwatershed hydrology. These changes are exaggerated by the installation of storm sewers, filling of wetlands and channels (including parts of the river meander) and the reduction of forest cover and increased impervious nature of the land surface due to road / sidewalk paving and house construction.

B 2.2.2 Historical Evolution

Thames River and Coves Meander

The process of meander abandonment and oxbow lake creation is illustrated in Figure B 2.2.1. This process is a slow and gradual one that occurs as a result of the channel scouring certain areas (undercut banks) and depositing sediments at other areas (point bars). When these meanders form oxbow lakes, the term “avulsion” is used to describe the cut-off event which can be a sudden occurrence usually associated with the flooded stage of a river when the forces related to flow depth and velocity are the greatest.

When these features are used to form property boundaries, complications exist when the river has moved and the associated property line has either increased or decreased. This is usually referred to as an ambulatory lot line (Lambden and de Rijcke, 1996) and is common with riparian (or water’s edge) lots. This topic is further discussed in Section B.4.3 – Land Ownership.

The former location of the meander as it worked its way across the Coves area can be seen at two locations.

- In the orchard area of the Valspar property where parallel ridges of approximately 0.5 to 1.0 metre elevation differences exist. These ridges or meander scrolls are noted in the 1922 air photo mosaic (see Figure A 2.4.1).

- In the area north of Springbank Drive between Forest Hills and Wildwood Avenues is a natural depression that is a former meander of the Coves oxbow. This area has remnant valley slopes with elevation differences up to 5 metres. These slopes have been incorporated into the backyards of area lots and appear to have standing water in the spring. The feature is clearly shown on the historic Kensal Park survey of 1879 (see Figure A 1.7.2). The topography and vegetation have been assessed as an area to be included in the ESA designation (see Figure B 3.3.5). Both Sugar Maple deciduous forests and Cultural Thicket vegetation communities exist in this feature.

London South Creek

Air photo and mapping evidence suggests that the London South Creek displayed a meandering pattern as it crossing under Roders Bridge in 1922 at Wharncliffe Road (see Figure B 2.1.4). This pattern is also suggested by the topography of the land in the Duchess Avenue Park area located between Elmwood and Duchess Avenues (see Figure C 3.2.1). The area is also a historic fill area as shown on Figure B 2.1.5. The only present remnants of London South Creek is contained in the ravine at the headwaters near Highland Woods and at the outlet into the Coves pond. The fluvial geomorphologic processes have therefore been channelized and replaced.
The evolution of meanders into an oxbow lake; (a) photo of an actual river in Alaska, (b) development of a river meander and oxbow lake simplified in four stages with many similarities to the Coves.

Coves Subwatershed Study
London, Ontario
Meandering Stream Development

Scale: NTS
Date: March 2004
Project No.: K1284
Figure B 2.2.1
Silver Creek

Similar to previous discussion on London South Creek, this watercourse is still evident on the landscape north of Centre Street where it emerges from Euston Park. In 1922 this creek appears to extend south almost to Commissioners Road and exhibits a meandering pattern most of its’ length (Figure A 2.4.1).

B 2.2.3 Existing Conditions

Geomorphic assessment as part of the Master Drainage and Erosion Master Plan (Dillon, 2003) enabled the characterization of an overall sediment budget, erosion rates, potential erosion thresholds and local geomorphology. Their conclusions were that the rate of infilling of the Coves Ponds has been increasing steadily and dramatically since 1920. These increases are directly attributed to urbanization and the associated decreases in surface water infiltration and surface runoff into storm sewer systems. Rough estimates by the Dillon team using historic air photographs suggest that the Silver Creek delta forming in the area between the Centre and West Pond, is increasing dramatically in northerly migration by 2.6 m/yr (1955 to 1978); by 4.5 m/yr (1978 to 1998); by 37.5 m/yr (1998 to 2000); and finally by 87.5 m/yr (2000 to 2002). Using more detailed on-site monitoring erosion pins albeit for a short period of time (1 year), suggest that both the Silver Creek and London South Creek (also known as Edward Street Outfall) contribute 88 m3/yr of sediment to the Cove system. Fine grained sediments make up the ravine channels and are highly susceptible to erosion.

Also of note was the observation that there has been over 1 metre of fine sediments in the Cove Ponds (greater in the West and Centre than the East Cove Pond) since the channel was abandoned from the Thames River. East Cove pond has seen the lowest rate of accumulation being the only pond that core samples encountered materials characteristic of river deposits (sands and gravels). An assessment made in 2003 of the bottom conditions in the West Cove revealed that fine sediments were 1.5 metres deep and existed below shallow water conditions (only a few centimetres of water depth) in many areas of the pond. This conclusion for the East Cove pond and observation on the West Cove pond is noteworthy for the purpose of rehabilitation options regarding sediment management.

Options regarding rehabilitation for the West Cove will need to follow a feasibility study in order to assess the best available techniques. Cove characteristics such as sediment volume, chemical composition and hydrology will need to be carefully considered. Reference should be made to the “Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario (MOE, 1993).

B 2.3 Groundwater

B 2.3.1 Introduction

Groundwater is an important component of the hydrologic system of any subwatershed. During hot and dry weather events, groundwater discharge as base flow to the watercourse can sustain wildlife populations and ensure riparian habitats are maintained. Unfortunately, in an urban subwatershed such as the Coves, this component plays a minor role due to the construction practices and design
parameters used in past development (refer to Figure B 2.3.1) pertaining to the impact of storm drains on watersheds). Drinking water in cities is not dependant on groundwater wells and therefore, how the groundwater is managed is not given much attention. It is expected that some groundwater discharge zones do occur within the subwatershed however these locations are identified through anecdotal information.

**B 2.3.2 Available Data**

Ministry of the Environment well water records were obtained and a total of 31 were located within the subwatershed. Another 42 wells were located outside the watershed boundary however within 500 metres of the study area. These distributions are mapped over Pleistocene Geology boundaries (see Figure B 2.3.2). The data was used for general observations only and the geologic stratigraphy was not interpreted. This is a topic for further study and investigation (see Table E. 1.1 – Groundwater).

However, preliminary research by the UTRCA using GIS methodology for the Coves region has suggested that the potential infiltration areas are highest in three areas of the subwatershed: a) in the northwest area of the subwatershed between Forest Hill and Chelsea Avenues, b) in the northeast area of the subwatershed surrounding Wharncliffe and Springbank Drive, and c) in the middle portion of the subwatershed at the east end of Euston Park. These areas have been highlighted based on quaternary geology data and analysis methodologies used in other groundwater studies. More groundwater analysis is needed to verify these findings.

The water table was located at depths approximately 3 metres below surface west of Wharncliffe Road on Elmwood Street (Golders Associates, 1974). This is estimated to be representative of the entire table land area of the subwatershed.

During the course of the study, locations of groundwater discharge were discussed which were generally located in the upper subwatershed. Examples are:

- Arthur Ford Public School conducted a school naturalization project in the 1970s that encountered discharge zones. They installed a catchbasin in order to manage the abundant groundwater (personal communication with Thomas McClенaghan – former school principal and FOTCSI Vice Chair).

- During the course of discussions regarding the widening of Commissioners Road from Viscount to Wharncliffe Road there were a number of locations discussed where groundwater seepage occurred (personal communication with Stephen Brook, Project Manager - Delcan). This is consistent with the complex geology of the area as evidenced by Commissioners Road formerly being called Brick Street due to the number of “Brickery” or brick manufacturing operations along this route.

In the lower area adjacent to the Cove Ponds there are two examples of where water table was suspected or found:

- Areas of the property on the east side of the East Pond exhibit wetland conditions that may indicate some groundwater seepage from the base of the valley slope. This is also consistent with the 1879 Kensal Park survey (Figure A 1.7.2) that illustrates a surface channel outlet near this area of McAlpine Street.
Coves Subwatershed Study
London, Ontario

Alternative Approaches for the Long-Term Environmental Health of Stream Corridors (a chronology)

Scale: NTS
Date: March 2004
Project No.: K1284
Figure B 2.3.1
Coves Subwatershed Study
London, Ontario

Legend

- Subwatershed Boundary
- Subwatershed Label
- Wells inside SHS (21)
- Wells within 500m of SHS (40)
- Wells within 100m of SHS
- Open Space

5 Ede Lake Marsh
11 Clay and Clayey Silt Loam/Luvisolic Deposits
1a Gravel and Gravelly Sand Valley Deposits
8 Swamp and Sedge
6 Modern Alluvium

Water Well Records & Geology

Source: Hydrologic Geology of the St. Thomas Area (1994)
Water Information: Vitality of the Environment

Scale: 1:13,250
Date: June 2003
Project No.: K1284
Figure: B 2.3.2
During the summer of 2002 the German Canadian Club erected light standards for the soccer pitch that required excavation and dewatering procedures. According to UTRCA staff and local reports, the water pumps operated 24 hours a day for 4 days before the 1.5 metre deep holes were dry enough for cement foundations to set properly.

B 2.3.3 Existing Conditions

Shallow groundwater flow is to the north towards the Cove ponds and locally some flow matches local topography to Silver Creek and its tributaries. Groundwater recharge zones on the tablelands are comprised of low permeability glaciolacustrine deposits. The low permeability soils severely limit the amount of recharge in the subwatershed. Groundwater elevations are estimated to be at 250 metres in the upland plateau area of the subwatershed while the lower portion adjacent to the Cove Ponds is estimated to match the Thames River elevation of 230 metres. The groundwater recharge zone in the subwatershed is highly urbanized, further reducing the amount of water that can infiltrate into the ground to recharge the groundwater table (Dillon, 2003). The potential infiltration areas identified by the cursory investigation of UTRCA (see Figure B 2.4.2) should be corroborated.

B 2.4 Soil Conditions and Slope Stability

B 2.4.1 Soil Conditions

The area of the subwatershed is located on the northern slope of the Ingersoll Moraine. This till feature separates the Coves and the Dingman Subwatershed (Chapman and Putnam, 1984). Soil conditions in the subwatershed are represented on Figure B 2.4.1 and illustrate that the area is covered by 3 main soil descriptions: a) Huron Clay loam in the upper watershed; b) Guelph loam in the middle and lower subwatershed, and c) Bottom lands associated with the floodplain area of the Coves and Thames River. These soils types are consistent with the general description of the Ingersoll Moraine and associated physiographic features.

B 2.4.2 Available Slope Stability Data

Data and mapping that shows slope toe erosion estimates and stable slope dimensions were provided under license by the UTRCA. These mapping resources indicate that the setback criteria for steep slopes along the valley wall of the Coves Ponds contain approximately:

- 13 houses and 7 accessory buildings next to the West Cove west slope.
- 3 buildings next to the Centre Cove south slope.
- 0 buildings next to the East Cove east slope.
- 7 houses and 3 accessory buildings within the long-term erosion limit of the Silver Creek ravine (or Southcrest Ravine).

This data has not been field checked however is considered to be applicable based on local knowledge and inquiries received by UTRCA concerning slope stability concerns of residents.

B 2.4.3 Existing Condition

Golders and Associates concluded that the investigations they conducted for the Coves Drainage and Erosion Master Plan Characterization Report...
(Dillon, 2003) revealed three areas of concern due to the number of old landslide features, toe erosion, fill placed on the slopes, and residential structures located near the top of the slope:

- West Cove slopes.
- Side slopes of the ravine that extend north from Southcrest Drive.
- The ravines that extend east and south from East Cove.

They concluded that the slopes are marginally stable with some unstable sections. These observations are typical of river valley slopes that have been allowed to regress uncontrolled for many years and where adjacent developments have resulted in the placement of materials over the top of the natural slope. (Executive Summary, Dillon, 2003).

One such slope behind a residence on Greenwood Avenue during the course of the subwatershed study had vegetation removed (clear cut) likely to increase the view of the West Cove ponds. Unfortunately, this location is one of the areas of concern where the existing building is within 20 metres of an unstable bank. Vegetation is critical to slopes such as these and removal can trigger instability that may impact more than just the one property. This issue of vegetation management is an important component of any future stewardship initiative.

B 3.0 BIOTIC ATTRIBUTES

B 3.1 Introduction

Biologists from Natural Resource Solutions visited the site on June 21st, July 3rd, July 18th and September 10th, 2002 as well as May 16, 2003. During these visits the following tasks were conducted:

- Vegetation communities were mapped and described using the Ecological Land Classification System (Lee et al 1998).
- All species of vascular flora were recorded.
- Breeding bird surveys were completed during the June and July 3, 2002 site visits. These surveys used the Ontario Breeding Bird Atlas methodology in which two biologists recorded breeding evidence throughout the study area.
- Amphibians call surveys were completed in April and May, 2003.
- Mammal, reptile and amphibian species were recorded during all field surveys.
- During the September 19th and 25th 2002 field surveys aquatic habitat within the ponds as well as Silver Creek were described and electro-fishing was used at nine stations to sample the fish community in these areas.

The following outlines the findings and analysis of the natural features.

B 3.2 Findings

The subject property is mainly composed of habitats associated with the Coves (oxbow ponds) surrounded by steeply sloping banks. As well, the remnant wooded stands in the southern portion of the subwatershed, include the upland woodlands in the vicinity of the Highland Golf Course. Few remnant woodlands are found elsewhere in the subwatershed.
Coves Subwatershed Study
London, Ontario

Soil Types

Source: Soil Survey of County of Middlesex Report 6 (1931)
An exception to this is a remnant channel (relic meander channel) to the northwest of the Coves, where some remnant woodland is found (in most cases highly impacted by landscaping).

Some areas of parkland and open meadows also exist. The slopes of the creeks and Coves are well eroded due to multiple footpaths in the area. Residential lots and buildings back onto the top of bank areas, which has contributed to refuse in the valley.

### B 3.3 Vegetation

The vegetation communities are illustrated on a series of 7 figures:

- **Figure B 3.3.1** The Coves Area.
- **Figure B 3.3.2** Euston park & Silver Creek.
- **Figure B 3.3.3** Highland Woods.
- **Figure B 3.3.4** Highland Golf Course.
- **Figure B 3.3.5** Coves and Euston Park Area.
- **Figure B 3.3.6** Highland Woods & Golf Course Area.
- **Figure B 3.3.7** Subwatershed Overview (including Vegetation Polygon Identification Numbers).

Much of the natural areas present during Dave Stephenson’s inventory in 1989 are still present. One area of significant change is Euston Park. In 1989 the southeastern most section of the Park was a diverse area containing a sedge meadow, a cattail marsh, thickets and old-field habitats. That area is now a subdivision. An approximate comparison of the vegetation extent changes is provided in Figure B 2.1.6. However, care is needed in interpretation since the 2 survey dates use different vegetation classifications and are not geo-referenced.

Although defined differently much of the forest cover and meadow habitats are still present in the Coves. The number of species recorded has remained relatively stable, as has the number of non-native species present. One noticeable change in data from 1989 to 2002 is a lack of ferns. Stephenson recorded seven different species of ferns in 1989 while only 2 species were recorded in 2002.

### B 3.3.1 Vascular Plants

A total of 262 species of vascular plants were found during the site visits. A list of these species is appended to this report in Appendix K.

Approximately 33% of these plants are non-native. This high abundance of non-native species is typical of sites with a history of disturbance and encroaching urbanization.

**Table B 3.1** lists the plants considered regionally significant based on the 1993 flora of southwestern Ontario (Oldham et al 1993) as well as a review by staff of the City of London (Bergsma personal communication, 2003).
B 3.3.2 Vegetation Communities

The vegetation communities on the site were determined based on the Ecological Land Classification System for Southern Ontario (Lee et al 1998). These communities are described below and shown on Figures B 3.3.1 – B 3.3.7

Oak Deciduous Forest (FOD 1-1)

This ecotype occurs along the tops of the banks of the Coves tributaries. It is dominated by red oak with strong associations of American beech and bitternut hickory. The oaks and hickories are large and appear to be in good condition. This area is being encroached by houses on a number of sides and in particular a few property fences extend far into the forest.

Hackberry Deciduous Forest (FOD 4-3)

A small section of forest near Springbank Drive is dominated by mature hackberry trees with other species including Manitoba maple and willows. Hackberry dominated forests usually occur only in the extreme southwestern portions of the province, on for example Pelee Island. Due to the unusual location of this forest it is probably a human influenced community. This would be areas were other tree species have been removed or are unable to survive the steep slope conditions. This habitat type is considered very rare in Ontario (S2).

Sugar Maple Deciduous Forest (FOD5-1)

The majority of the wooded areas in Euston Park, along the Coves, and around the Highland Golf Course are sugar maple dominated forests. The main canopy trees in this area are a mixture of maples and oaks. The under-storey and ground cover vegetation consisted of scattered dogwoods, running strawberry
Vegetation Communities
The Coves Area

- Red Oak Deciduous Forest (FOD 1-1)
- Hackberry Deciduous Forest (FOD 4-3)
- Sugar Maple Deciduous Forest (FOD 5-1)
- Sugar Maple-Beech Deciduous Forest (FOD 5-2)
- Willow Lowland Deciduous Forest (FOD 7-3)
- Black Walnut Lowland Deciduous Forest (FOD 7-4)
- Coniferous Plantation (CUP 3)
- Tree Dominated Hedge (HT)
- Cultural Meadow (CUM)
- Rice Cut - Grass Organic Meadow Marsh (MAM 3-3)
- Orchard
- Lawn
- Cultural Thicket (CUT)
- Open Water

* Indicates Rare Habitat

Legend

Subcatchment Boundary
Red Oak Deciduous Forest (FOD 1-1)
Hackberry Deciduous Forest (FOD 4-3)
Sugar Maple Deciduous Forest (FOD 5-1)
Sugar Maple-Beech Deciduous Forest (FOD 5-2)
Willow Lowland Deciduous Forest (FOD 7-3)
Black Walnut Lowland Deciduous Forest (FOD 7-4)
Coniferous Plantation (CUP 3)
Tree Dominated Hedge (HT)
Cultural Meadow (CUM)
Rice Cut - Grass Organic Meadow Marsh (MAM 3-3)
Orchard
Lawn
Cultural Thicket (CUT)
Open Water

( )* Indicates Rare Habitat

Basemap Source: Planning & Development Department, City of London 2001

Coves Subwatershed Study
London, Ontario

Legend

Subcatchment Boundary
Red Oak Deciduous Forest (FOD 1-1)
Hackberry Deciduous Forest (FOD 4-3)
Sugar Maple Deciduous Forest (FOD 5-1)
Sugar Maple-Beech Deciduous Forest (FOD 5-2)
Willow Lowland Deciduous Forest (FOD 7-3)
Black Walnut Lowland Deciduous Forest (FOD 7-4)
Coniferous Plantation (CUP 3)
Tree Dominated Hedge (HT)
Cultural Meadow (CUM)
Rice Cut - Grass Organic Meadow Marsh (MAM 3-3)
Orchard
Lawn
Cultural Thicket (CUT)
Open Water

( )* Indicates Rare Habitat

Basemap Source: Planning & Development Department, City of London 2001

Vegetation Communities
The Coves Area

Scale: 1 : 5 000
Date: July 2003
Project No.: K1284
Figure: B 3.3.1
Legend
- Subcatchment Boundary
- Red Oak Deciduous Forest (FOD 1-1)
- Sugar Maple Deciduous Forest (FOD 5-1)
- Sugar Maple-Beech Deciduous Forest (FOD 5-2)
- Willow Lowland Deciduous Forest (FOD 7-3)
- Mixed Hedgerow (HM)
- Cultural Meadow (CUM)
- Dry-Moist Old field Meadow (CUM 1-1)
- Rice Cut - Grass Organic Meadow Marsh (MAM 3-3)
- Orchard
- Open Water

Coves Subwatershed Study
London, Ontario
Vegetation Communities
Euston Park and Silver Creek

Scale: 1 : 5 000
Date: July 2003
Project No.: K1284
Figure: B 3.3.2
Legend

- Subcatchment Boundary
- Cultural Thicket (CUT)
- Golf Course
- Sugar Maple-Basswood Deciduous Forest (FOD 5-6)
- Sugar Maple Deciduous Forest (FOD 5-1)
- Silver Maple Mineral Deciduous Swamp (SWD 3-2)

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Basemap Source: Planning & Development Department, City of London 2001

Coves Subwatershed Study
London, Ontario
Vegetation Communities
Highland Woods

Scale: 1 : 5 000
Date: July 2003
Project No.: K1284
Figure: B 3.3.3
Subcatchment Boundary
Cultural Thicket (CUT)
Golf Course
Sugar Maple-Basswood Deciduous Forest (FOD 5-6)
Sugar Maple Deciduous Forest (FOD 5-1)
Silver Maple Mineral Deciduous Swamp (SWD 3-2)

Legend

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Vegetation Communities
Highland and Golf Course Area
Scale: 1:5000 Date: July 2003
Project No.: K1284 Figure: B 3.3.6

Legend
Subcatchment Boundary
Cultural Thicket (CUT)
Golf Course
Sugar Maple-Basswood Deciduous Forest (FOD 5-6)
Sugar Maple Deciduous Forest (FOD 5-1)
Silver Maple Mineral Deciduous Swamp (SWD 3-2)
Subbasin Boundary
Red Oak Deciduous Forest (FOD 1-1)
Hackberry Deciduous Forest (FOD 2-6)
Sugar Maple Deciduous Forest (FOD 3-1)
Sugar Maple-Beech Deciduous Forest (FOD 3-2)
Sugar Maple-Basswood Deciduous Forest (FOD 3-6)
Willow Lowland Deciduous Forest (FOD 7-1)
Black Walnut Lowland Deciduous Forest (FOD 7-6)
Coniferous Plantation (CUP 3)
Tree Dominated Hedgerow (HT)
Mixed Hedgerow (HM)
Cultural Meadow (CUM)
Dry-Moist Old field Meadow (CUM 1-1)
Rice Cut - Grass Organic Meadow Marsh (MAM 3-3)
Rice Cut - Grazed Organic Meadow Marsh (MAM 3-5)
Golf Course
Lawn
Cultural Thicket (CUT)
Open Water
Golf Course
Silver Maple-Mixed Deciduous Swamp (SWD 3-3)
Vegetation Polygon Identification Number
* Indicates Rare Habitat

Legend

Basemap Source: Planning & Development Department, City of London 2001

Vegetation Communities

Scale: 1 : 15 000  Date: July 2003
Project No.: K1284  Figure: B 3.3.7
bush and witch hazel. This sparseness is mainly due to excessive disturbance (footpaths and biking trails). This is a common forest type in southern Ontario.

Sugar Maple – Beech Deciduous Forest (FOD 5-2)

This area opposite Euston Park follows a creek that drains into the coves. The slopes of this valley are mainly sugar maple with beech, basswood and ironwood associates. The ground cover and shrub layer are sparse and there are many walking trails throughout the valley.

Sugar Maple - Basswood Forest (FOD 5-6)

The Highland Golf Course woods are dominated by sugar maple, basswood and white ash. The majority of the area appeared to be wet in the spring with many ferns and poison ivy growing as ground cover. All levels of the forest cover from canopy to ground cover were well represented. This appeared to be a relatively undisturbed area.

Willow Lowland Forest (FOD 7-3)

This is the main ecotype around the base of the coves. Large willows hang over the water surrounded by very little subcanopy or understorey. There is abundant ground cover mainly burdock, water parsnip and marsh pepper.

Black Walnut Lowland Deciduous Forest (FOD 7-4)

Black walnuts dominate an area between Springbank Drive and Cove Road set back from the water. Although black walnut trees are now fairly common in the southern parts of the province, significant forest areas dominated by them are not. The Ecological Land Classification for southern Ontario and the Natural Heritage Information Centre (MNR) recognizes this rarity and classifies these moist forests as provincially rare to uncommon (S2S3).

Silver Maple Mineral Deciduous Swamp (SWD3-2)

This silver maple dominated stand is found southwest of Highland Golf Course, near the southern limit of the Coves Subwatershed. Areas of standing water are found in this area with mixed sedge species.

Cultural Meadow (CUM1)

This ecotype is present in a few areas of the site. In Euston Park it is located near the playing fields. Timothy, daisy fleabane, goldenrods, and wild carrot make up the majority of species. Along the coves from Cove Road out to Springbank Drive is another section of cultural meadow. This area has a number of field species and clumps of willows, sumac, honeysuckle and dogwoods. A very thin strip of cultural meadow is present on the far side of the coves and is mainly grasses with a few scattered shrubs.

Cultural Thicket (CUT)

A number of different types of cultural thickets are associated with the Coves. Behind the condominiums near the Highland Golf Course is a buckthorn-dominated thicket. This area has little ground and shrub cover. A staghorn sumac and grey dogwood cultural thicket is present at the Coves near Springbank Drive. A willow thicket is also present in this area.
**Rice Cut-grass Organic Meadow Marsh (MAM 3-3)**

Lacking much water these sections of the Coves are dominated by rice-cut grass, purple loosestrife and marsh pepper. Most of this area is a monoculture of rice-cut grass with a few purple loosestrife plants intermixed. A few areas have less grass and have a greater number of species including lady’s finger, marsh pepper and some loosestrife.

**Mixed Hedgerow (HM)**

This hedgerow is a mixture of trees and shrubs and is located in Euston Park.

**B 3.3.3 Wildlife**

Lists of all species of wildlife observed in the area and known from adjacent lands are included in Appendix K.

**B 3.3.3.1 Birds**

Surveys for breeding birds were done on June 21st, and July 3rd, 2002, while any sightings and breeding evidence recorded during other site visits was also recorded (for example on May 16, 2003 - early breeding evidence only).

A combined total of 90 species were recorded as breeding in the study area and/or from the Ontario Breeding Bird Atlas. During the 2002 and 2003 field surveys, breeding evidence of 49 bird species was noted. Two species recorded, brown thrasher and savannah sparrow are considered level one conservation priorities in Middlesex County. The savannah sparrow uses open fields and meadows for nesting. The cultural meadows in the coves are suitable breeding habitat for this species. David Stephenson’s study conducted in 1989 in the Coves noted a pied-billed grebe as a resident breeder. This species is also considered a level one conservation priority. None of the other species recorded are considered nationally, provincially or regionally rare.

An analysis of potential interior forest area was performed using 1:2000 air photos of the area. Interior forest is defined variably as forest areas that are 100m or more from a defined woodland edge. There is little of this type of forest in the Coves. The forest areas in Euston Park and north of Emery Street have small amounts of potential interior areas. Few sensitive forest breeding birds were recorded during the field surveys (e.g. wood thrush).

A number of species of water birds including herons and ducks were noted using the Coves for feeding.

**Mammals**

A total of 13 species of mammals were recorded during the site visits. All of the mammals listed are associated with urban environments and survive quite well under these circumstances. None of the species recorded are regionally, provincially or nationally rare.

**Amphibians and Reptiles**

Seven species of amphibians and five species of reptiles were recorded during site visits. The red-eared slider is an exotic species most likely released into the Coves. None of the other species are regionally, provincially or nationally rare.
**B 3.3.4 Wildlife Linkages**

The habitats associated with the Coves create an interconnected network that is linked to habitats along the Thames River. South of the Coves, habitats along Silver Creek also connect to Euston Park. South of Euston Park, however, existing linkages are absent. The urbanization of the subwatershed has left few linkage opportunities and few remnant natural areas with which to connect. To the south into the Dingman Creek subwatershed, remnant habitats are found several kilometers from the wooded areas around Highland Golf Course. To the east, the habitats associated with Westminster Ponds exist but are separated by an intensive urbanized landscape. Some opportunities do exist with the location of Mitches Park to link Highland Woods with Westminster Ponds ESA to the east. This is shown by the external arrow depicting corridor linkages east of Highland Golf Course (see Figure C 2.2.1.)

**B 3.3.5 Aquatic Assessment**

Sampling of the fish community within the Coves and Spring Creek occurred between September 19th and 25th, 2002, under permit from the Aylmer District office of the Ontario Ministry of Natural Resources. Ambient air temperature at the time of sampling was 25 degrees Celsius. Conditions were 20% overcast. Surface water temperature of the ponds ranged between 16.5 degrees Celsius and 25 degrees Celsius. At each station a backpack electro-shocker was used to sample fish.

A total of nine stations were successfully sampled as shown on the attached map. These nine stations cover all aspects of the Coves habitat environment including Spring Creek which flows into the system from the south.

The results of the sampling are summarized in Appendix K. The results of the fish community sampling in the North Western and South Western ponds clearly indicate that non-native Carp (*Cyprinus carpio*) dominate the fish community. The carp is an extremely tolerant species of fish that can thrive in degraded habitat conditions not normally tolerated by more sensitive fish species. The high sediment load in the Coves coupled with elevated summer water temperatures serve to deplete oxygen and results in habitat conditions not favoured by native species typical of oxbows to the Thames River (bass, perch and pike). One largemouth bass was sampled but conditions in the western pond are not favourable to the larger centrarchid species. Juvenile Carp numbering in the hundreds were sampled and/or observed during this rather limited sampling exercise. Adult carp were observed finning in the very shallow areas of the Coves. In addition to being tolerant of the degraded conditions, carp also uproot aquatic vegetation in the shallows, thereby eliminating cover essential to the presence of native species such as bass, perch and pike.

The fish community of the northeast pond suggests that habitat conditions here may be better than in the northwest and southwest ponds. Here, the presence of predator sport fish species such as crappie and perch suggest an improved habitat condition. Interestingly enough sampling in this pond yielded very few carp and no adult carp were observed.
finning. This pond is deeper, has less sedimentation problems and has intact shoreline aquatic vegetation.

The southeast pond yielded similar species to that of the northeast pond, however the dominant species sampled were common carp and goldfish. Crappie and perch were not found in this pond.

Silver Creek was also sampled to define the fish community. Despite receiving untreated stormwater discharge, the creek supported a reasonably diverse community of small fish including creek chub (Semotilus atromaculatus), blacknose dace (Rhinichthys atratulus), and white sucker (Catostomus commersoni). Similar species were also found in the creek running from the southeast pond to the southwest pond.

Creek chub dominated both of these sites.

B 4.0 SUMMARY OF ECOLOGICAL FEATURES AND FUNCTIONS

B 4.1 Plant and Wildlife Species

- The overall study area provides habitats for a high diversity of plant and wildlife species.
- Riparian zones are found associated with the Coves linking to potential corridors along the Thames River. Few linkage opportunities occur in the central and southern portions of the subwatershed (due to urbanization and lack of nearby habitats).

B 4.2 Wetlands

- Areas of wetland are found in the Coves associated with the ponds and periodically inundated floodplain areas, as well as an isolated silver maple swamp near the southern limit of the subwatershed.
- The wetlands within the study area have not been formally evaluated by the Ontario Ministry of Natural Resources (MNR).
- The wetlands provide habitats for a number of plant and wildlife species.
- The wetlands are sensitive to changes in water balance and quality.
- Past land management practices such as road construction and stormwater management have influenced the floodplain wetlands.

B 4.3 Woodlands

- The woodlands provide habitat for a diversity of plant and wildlife species.
- These habitats are sensitive to further habitat fragmentation as well as the disruption of existing stable forest edges.
- In the smaller woodlands, forest interior habitats are less evident.
- The Black Walnut Lowland Deciduous Forest (FOD 7-4) is classified as provincially rare to uncommon (S2-S3).
- The Hackberry Deciduous Forest (FOD 4-3) is considered very rare in Ontario (S2).
- Isolated wooded blocks are found in the southern portion of the subwatershed while the largest wooded blocks associated with the Coves appear to be connected to other local wooded areas by potential habitat linkages.

B 4.4 Open Habitats

- Historic land management resulted in open habitats ranging from moist floodplain meadows to dry upland fields.
- A number of significant plant species are known from these open habitats.
- The open habitats provide valuable habitats adjacent to the pond and wetland habitats.
B 4.5 Aquatic Habitats

- The fish species community is currently limited by a number of factors, especially sediment load and high temperatures.
- Carp dominate the West Cove pond, while the East Cove pond contains a more diverse and stable fish community.
- The connectivity to aquatic habitats in the nearby Thames River is severely limited by a flap valve that prevents free movement of fish.

B 4.6 Habitat Linkages

- A number of potential habitat linkages are found connecting habitats to the Thames River area.
- These corridors provide potential movement of wildlife through the site and also act on a regional scale.
- Wooded slopes and riparian areas are key components of the habitat linkages and also provide habitats for a number of resident species.
- Many of the habitat linkages along the river are fairly narrow.
- The existing linkages include a number of habitat discontinuities and are sensitive to further fragmentation.
- Linkages in the southern portion of the subwatershed are limited by urbanization and lack of habitats to connect to.

B 5.0 REHABILITATION POTENTIAL FOR THE COVES

The Coves is an oxbow system that has been highly modified through urban development and has been impacted by a high sediment load, brought about by the discharge of untreated urban runoff. The most significant impacts to the Coves ecosystem have been the addition of high sediment loads that have reduced available depths for use by native fish, covered important harder substrate and led to an elevation in water temperature. These conditions have favoured the non-native carp which has further degraded habitat conditions by uprooting any aquatic vegetation, thus eliminating important cover and feeding areas for other fish and reducing wetland habitats.

Improvement to aquatic habit conditions in the Coves must begin with the elimination, to the extent possible, of untreated stormwater entering the system. In many cases, this may be extremely difficult as opportunities for retrofitting existing storm conveyance systems may be constrained by the lack of available physical space for facilities as well as prohibitive costs. Even if sedimentation could be eliminated or drastically reduced at source the problem of the existing sediment in the basin would remain. The dredging program required to remove the accumulated sediment would be expensive and constitute a major undertaking for which funding and environmental approvals would need to be secured. An environmental assessment of such dredging work would need to deal with issues such as sediment contamination, how the sediment would be treated and how it would be disposed of. These are all issues that may be addressed as part of the Coves Master Drainage Plan currently being tendered by the City of London.

Although it is unreasonable to expect that the Coves can be returned to it’s “natural state” there are certainly examples throughout the Thames Valley of highly productive aquatic habitat in oxbow areas which could be used as models to define the general
goals towards which a rehabilitation plan could be focused. However the best model may in fact be the eastern pond where the sedimentation has not occurred and deeper habitat with instream vegetation and structure is still present. It is reasonable to expect that, if nothing more than elimination of sediment loading and dredging of sediment were to happen in the central and western ponds that the habitat conditions and fish community would revert back to the conditions seen in the eastern pond. Any rehabilitation would also need to consider the removal of carp from the system, as improvements to the sediment situation alone would not ensure return to a better state.

B 6.0 CULTURAL ATTRIBUTES

B 6.1 History / Archeology

B 6.1.1 Introduction

The archaeological study (Poulton, 2003) involved background research on the known and potential archaeological resources of the subwatershed, and on the history of land use within the study area. This level of assessment is defined as a Stage 1 study in the technical guidelines for archaeological assessment formulated by the Ontario Ministry of Culture, Tourism and Recreation (now Ministry of Culture) (MCTR 1993).

The assessment was conducted under Archaeological Consulting Licence #P053 issued by the Province of Ontario to Christine Dodd of D.R. Poulton & Associates Inc. It was carried out in accordance with the provisions of the Ontario Heritage Act (Government of Ontario 1980) and with the technical guidelines for archaeological assessment formulated by the Ministry.

The records pertaining to this project are currently housed in the corporate offices of D.R. Poulton & Associates. However, the intent is to incorporate the archaeological archive into the overall project archive for the Subwatershed study. That way, it will be available for use by researchers engaged in future studies within the Coves Subwatershed.

B 6.1.2 Pre-European History

The background research yielded a considerable amount of data on the prehistoric and historic settlement of the Subwatershed and vicinity. The results confirm that the limited past archaeological investigations have recorded ten archaeological sites within the study area, and that the area has a potential for other as-yet undiscovered sites. The known sites in the City of London demonstrate that the area containing the subwatershed has been occupied at least intermittently since the first human entered southern Ontario almost 12,000 years ago.

Four of the sites in the inventory have been identified as definite or possible prehistoric Iroquoian villages of the Late Woodland period, ca. 800-1550 A.D. They are the Norton site (AfHh-86), the Edward & Tecumseh site (AfHh-355), the J.P. Hunt Farm site and the McArthur Farm site. An additional prehistoric Iroquoian site, the Wharncliffe Road site, is of unknown type. The information on these Iroquoian sites is limited but it does indicate that the subwatershed served as part of the developmental homeland for a community of several hundred individuals. The evidence further indicates that the Iroquoian occupation of the area spanned the period
from the early to late prehistoric Neutral, ca. 1400-1550 A.D. This was undoubtedly the most populace occupation of the subwatershed prior to the advent of European settlement in the 19th century, and was probably the first year-round occupation of the area.

Two other sites in the inventory are prehistoric sites of unknown age, type and cultural affiliation: the Bogue Farm site; and the Bowman site (AfHh-356). The last native site in the inventory consists of the report of 18th century Ojibwa cornfields, designated the Old Indian Cornfields site (AfHh-357). The remaining two archaeological sites in the inventory are 19th century Euro-Canadian sites. They are the Brick Street Cemetery and the Brick Street Schoolhouse.

B 6.1.3 Post-European History

Most of the surface area of the Subwatershed now consists of residential developments of different ages. They include the Manor and Highland Park Neighbourhood in the central portion of the subwatershed, Southcrest to the west, the Norton Estates subdivision to the southwest, and the western portion of Old South to the east. The Highland Golf Course is located in the southeast corner of the subwatershed. The evolution of development within the Coves was previously discussed in Section A 1.7 and shown on Figure A 1.7.3.

Although most of the subwatershed has long since been developed, there are a number of properties in the immediate area of the Coves itself which remain wholly or partly intact. The most extensive of these is the abandoned orchard on the Valspar property (formerly the Lilly Industries Inc. property) within the Coves itself. Other nearby properties that remain in a relatively natural state are the Ruppe property, the Tippel property and the Chata Holdings property. The locations and limits of these properties are illustrated in Figure B 6.3.1.

Prior to the residential development that swept through the Subwatershed beginning in the 1870s, most or all of the tablelands would have been forested. The last extensive area of forested tableland within the subwatershed was on the Bogue farm on the southwest edge of the Coves. Virtually all of that forest was removed in the mid 1950s in preparation for the construction of the Southcrest subdivision. One small remnant of that woodlot remains. It is located in the southeast corner of the Kensal Park French Emersion Public School property (straddling the subcatchment A7 / A6 boundary on Figure B 3.3.1).

Although most of this part of London has been developed over the past 150 years, the study determined that the Subwatershed retains a potential for many as-yet undiscovered archaeological sites in addition to surviving remains of the known sites. That potential includes large and/or sensitive prehistoric sites such as Iroquoian villages and burials. In addition, it includes sites that are currently rare in the archaeological record, such as 18th century historic Ojibwa camps. Finally, it also includes a potential for significant 19th century Euro-Canadian sites, including the mansion of at least one prominent early Londoner: John Wilson, M.P.P.

The areas of archaeological potential within the subwatershed obviously include the extensive undeveloped or essentially undeveloped lands in the immediate vicinity of the Coves itself: the Valspar, Ruppe, Tippel and Chata Holdings properties and the
Cove Mobile Homes Park. They also include various public parks as well as older road rights-of-way and long-established residential subdivisions.

**B 6.2 Land Use**

The land use of the Coves Subwatershed is a mixture of residential, commercial and industrial. However, the predominant use is single family residential. The main arterial corridors of Wharncliffe Road and Commissioners Road criss-cross the central portion of the subwatershed with secondary routes sharing additional traffic load. The area associated with the Coves is approximately 50% Open Space and 50% residential (combination of single family, multiple family low density and a trailer park).

The remaining Open Space designation in the subwatershed include parks, school yards, cemeteries and golf courses (Figure B 3.3.8). High density residential use is focused on the area south of Euston Park toward the busiest intersection in the subwatershed being the Wharncliffe and Commissioners Road intersection. That intersection north to Emery and south across the subwatershed boundary has a mix of Restricted Service Commercial and Highway Service Commercial. Small pockets of High Density Residential also occur along Commissioners Road West (north side) and near Highland Woods southeast of the busy intersection (Figure A 2.1.1).

**B 6.2.1 London Urban Boundary Evolution**

The Coves Subwatershed developed from the downstream portion first to the upstream portion last. The Kensal park survey of 1879 (Figure A 1.7.2) shows the area surrounding what later became known as Springbank Drive as a residential node with an extensive lot layout between the Coves and the Thames River. This pattern of development can be seen in the 1922 air photo mosaic that shows the agricultural lands still being farmed around Commissioners Road and Emery Street. The archeological summary provides a detailed explanation of the boundary changes that occurred in the City of London within the Subwatershed. These changes are illustrated on Figure B 6.2.1 Annexations of London which show that the majority of the Coves Subwatershed was in Westminster Township until 1961 when the Township was annexed. Prior to that date, the Cove West and Centre ponds were used as the western boundary of the City after the 1890 annexation.

**B 6.2.2 Existing Zoning and Official Plan**

When reviewing the planning documents for the subwatershed, it is noteworthy to highlight that despite the occurrence of park space in the subwatershed there is no “OS5” designation. This designation is reserved for areas where floodplain and conservation management objectives predominate and dictate that no structures are to be built. This OS5 designation is common for other ESA features within the City of London where conservation is a primary reason for the designation. This statement is repeated as a recommendation further in the Plan.

Also noteworthy is the discontinuous but approximate northwest – southeast alignment of open space that crosses the subwatershed (refer to Figure B 3.3.8). The alignment appears to begin at the Thames River,
Coves Subwatershed Study
London, Ontario
Annexations of London

Legend

Subwatershed Boundary
Cove Ponds
1993 Annexion Date

Source: GIS & Information Services, City of London
Coves Subwatershed Study
London, Ontario
Sanitary Sewer System
through the Coves and Silver Creek corridor to Euston Park and then re-appears southeast of the Wharncliffe / Commissioners Road intersection in the Highland Woods ravine connecting to the Highland Woods Golf Course. From that point, the corridor continues south through Earl Nichols Park into the Dingman Creek Subwatershed. This corridor is also illustrated on the subwatershed map (see Figure A 1.1.1) showing the remaining vegetation cover that matches these open space designations. It is both ironic and unfortunate that this corridor has the Wharncliffe / Commissioners Road intersection, (the busiest intersection) as the only major obstacle to re-connecting the corridor for natural heritage and trail system purposes.

It is also ironic that the only actual industrial use in the subwatershed is the former Valspar Industries site (also known as Almatec and Lilly Industries) in the centre of the Coves and in the centre of the Coves ESA. Despite the former industrial use, this location is zoned R1 – single family residential which permits the construction of a single family residence similar to the Duke Street neighbourhood and the Tippel Property (see Figure B 6.3.1). However, since the industrial use was established prior to the zoning by-law being passed, it becomes a legally existing, non-conforming use. When the operation was closed in 2002, any future possibility of it being used as a paint factory is limited. The site is not well suited for intensive truck traffic use due to the safety issue of truck traffic flowing through a residential neighbourhood (Duke Street area).

### B 6.2.3 Historic Fill Areas

The southward expansion of the City of London south has been documented in the previous Section. This southward expansion also included the need for fill areas to accommodate urban development in the City as the urban boundary expanded south. These areas include locations where household garbage was placed, construction material as well as inert fill material. Commonly, these areas correspond with the subwatersheds ravines and wetlands. The term “fill” is used as opposed to “landfill” since the latter term reflects a more recent process of regularly placing topsoil over the imported fill material to promote decomposition of the waste. Most of these areas within the Coves Subwatershed predate this technique and therefore the precise methodology of filling is unknown. The term “Fill Areas” reflects this ambiguity.

#### History of Filling

The history of the Coves Subwatershed contains many examples of how low lying areas were filled with various types of materials as areas were needed and as were convenient. For example, the meander of the river was filled starting in the early late 1800s / early 1900s which contributed to the creation of the 3 pond features that exist today. Some of these fill areas would have been located in the Westminster Township at the time prior to the City boundary extending to the present location. The historical record of many of these areas is incomplete due to the early date when these areas were filled and the separate jurisdictions that had control over them. Records are therefore incomplete and an assessment underway (2003) by the Waste Management Division,
City of London had not yet completed summaries of each site. The information contained below is therefore limited to available data and the data sheets are contained in Appendix J.

Filling of low areas and ravines was much more common, more acceptable and even considered common practice during the late 1800’s early 1900’s. Today, much more scrutiny would be given to slope stability, methane gas production and the impacts on the functioning system that the ravine or wetland represents. None of these areas are actively being used as fill areas. The current landfill site for the City landfill is the Westminster Landfill Site south of Highway #401 in South London.

**Fill Sites**

There are 15 sites within the subwatershed that have been identified as being fill sites. Figure B 2.1.5 – “Historic Fill Areas” shows the site locations and their corresponding name and number. The name is based on street or place name and the number is based on the overall City of London database. Therefore the numbering system is not sequential and represents the chronology of the filling or of the review and assessment needed in order to develop at the site. Sites with smaller numbers (#8, 9, 11 and 12) indicate areas that were filled earlier with the larger numbers (#72, 74, and 84) being later sites. The sites have been divided into three categories by the City of London, Waste Management Division:

a. Fill Area (Evidence of Methane Gas)
b. Fill Area (No Evidence of Methane Gas)
c. Natural Methane Gas Producing Area

**Fill Areas (Evidence of Methane Gas)** are areas where household garbage has been placed and methane gas is a by-product from the decomposition of the material.

**Fill Areas (No evidence of Methane Gas)** are areas that contain inert material that does not decompose, therefore not producing methane gas. These are likely areas filled with construction materials, excess excavation materials and similar inert materials.

**Natural Methane Gas Producing Areas** are indicative of areas where naturally occurring vegetation was covered by fill material and the methane gas is being produced by the decomposition of these vegetation sources. These areas are commonly locations where headwater drainage courses, ravines or wetland depressions formerly existed.

Table B 6.1 describes the specific sites and provides comments on their creation and use.

**B 6.2.4 Coves Area Special Policy Area**

This policy provides a floodplain management approach approved by the City, the UTRCA and by the Province (MNR). This approach recognizes the entire area is subject to the Thames River Regulatory Floodplain (see Figure C 3.2.1.) while also realizing the historic urban development that has occurred in the area. The policy contains the following four components:

- It reflects the desire to support the long-term viability of the existing residential community through upgrading to existing dwellings and infill activity in a manner that is consistent
with Provincial floodplain management objectives.

- It supports the redevelopment of the Valspar property to a use that is more compatible with the adjacent residential community.

- New development activity should not be permitted in previously undeveloped areas where the potential damage from flooding is expected to be most severe.

- Areas that include important environmental features such as steep slopes, ravines, wetlands and undisturbed habitat, should be maintained in a natural state. (City of London, 1996).

Since that policy statement was written it has been updated to reflect the ESA status that the area now possess. The original inventory in 1996 indicated that 550 people lived in the SPA being 101 single detached dwellings, 17 two-family dwellings and 129 mobile home within the Coves Mobile Home Park. Duke Street was developed in the early 1950s, the paint factory (now closed) was approved in 1951 with several expansions since that time, and the German Canadian Club also began at that time.

The recent work by Dillon (2003) has confirmed three damage centres exist for both the 100 year and 250 year flood event in the SPA being the Brookdale / McAlpine area, the southwest part of the trailer park and the German Canadian Club site. These three areas remain the most susceptible to flood damages due to their locations in the meander, their degree of development and their relative value.

B 6.2.5 Coves Environmentally Significant Area

The Coves area has been recognized as an Environmentally Significant Area (ESA) by the City of London in their land use planning documents. As mentioned in Section A 1.1, this designation reflects a 43 ha site that includes... "the distinctive landforms displayed by the series of oxbow ponds, the presence of forest area sensitive species, the hydrologic characteristics, the broad diversity of species and the linkage function the area provides to the Thames River corridor". (Appendix F). The Coves ESA comprises floodplain, steep slopes, Silver Creek and related ravine that drain land from the south (the upper subwatershed) into the Coves ponds.

The Coves ESA was designated based on the biologic inventory completed in 1989 by Stephenson. However, the boundaries were never specified as a detailed line on the map due to the limitations of the site without publicly owned lands and without a Conservation Master Plan (see Section D 2.1). This has served to create a situation where most residents are unaware of the designation and why it exists. Recent discussions concerning this study, the Springbank Road Widening Project and the Edward Street Storm Drain have likely raised the profile of this designation somewhat.

The intent of the designation was to highlight an area approximated by the top of the valley bank that would contain the ponds, the ravines and the diverse species of wildlife and vegetation that is contained within this landform feature known as an oxbow lake. This designation is illustrated on Figure C 2.1.1 with the benefit of a refinement completed as part of this study and based on topography / contours or an updated vegetation analysis (see Figure B 2.1.6 for a comparison of the vegetation analysis completed). Minor clarifications to the boundary have been incorporated to better reflect the ESA criteria and the
more detailed information that is available in 2004. These incorporations include the orchard area of the Valspar site (former meander scrolls), the Erie Creek ravine (topography considerations), areas of the Tippel property (vegetation and habitat conditions) as well as minor clarifications due to vegetation boundaries and the top of slope regions surrounding the Coves valley slopes and ravines. The designation is not intended to include residential buildings.

The ESA designation could also include the satellite woodland patches being the former Bogue farm woodlot (now south of Kensal Park public school) and the remnant valley slopes of a former meander of the Thames River located between Forest Hill and Wildwood Avenues. Both meet ESA criteria.

The area includes approximately 74 properties with no public land except for the bed of the former Thames River, several roadways and several lots in the McAlpine / Brookdale area and Silver Creek / ravine areas. These properties were purchased by the City of London when the lands were up for sale.

### B 6.2.6 Sanitary Servicing

The entire subwatershed is serviced by a sanitary sewer system that follows the existing road pattern (see Figure A 1.7.3). This system has main trunk sewers located along major streets as well as one running the length of Silver Creek to Langarth Street where it then runs along the adjacent street system to Springbank Drive. All sanitary sewer lines run to the Greenway Sewage Treatment Plant (STP) located next to the Thames River at the north end of Wildwood Avenue.

There are a small number of confirmed and suspected lots that still relay on individual sewage disposal units (septic systems) for household sewage. These lots are located along McAlpine and Brookdale Streets. The Valspar Plant site and the German Canadian Club are also reliant on septic systems for their sewage treatment.

During the investigations for the Edward Street Storm Outlet Project it was determined that there are cross connections between it and the Sanitary Sewer System that also follows the same route. These cross connections are due to the antiquated system that is currently being upgraded as part of this project and ongoing replacement programs.
### Table B 6.1  Fill Areas

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Euston Road Natural and Fill Site</td>
<td>Active site from 1963 to 1971; sanitary landfill method used; some evidence of a wetland feature being filled on both sides of Centre Street; active methane gas collection system designed when high rise development occurred along south side of Park.</td>
</tr>
<tr>
<td>9</td>
<td>Elmwood Avenue Fill Site</td>
<td>Part of the Edward Street Storm drain outlet behind Ah-So Gardens Restaurant</td>
</tr>
<tr>
<td>11</td>
<td>Greenside Avenue Fill Site</td>
<td>Active site from 1946 to 1960; Historic meander fill site north of Springbank Drive where bottling plant formerly existed</td>
</tr>
<tr>
<td>12</td>
<td>Cove Road Fill Site</td>
<td>Including construction of Cove Road, parking lot and area behind Erie Ave</td>
</tr>
<tr>
<td>36</td>
<td>Duchess Avenue Fill Site</td>
<td>Formerly London South Creek waterway; now Duchess Ave. Park</td>
</tr>
<tr>
<td>41</td>
<td>Beaconsfield Avenue Fill Site</td>
<td>Former meander of the Thames / Coves</td>
</tr>
<tr>
<td></td>
<td>Briscoe Street Natural and Fill Site</td>
<td>Former ravine to the Coves located at west end of Briscoe Street</td>
</tr>
<tr>
<td>42</td>
<td>McAlpine Avenue Natural Site</td>
<td>Part of the former meander; located on east side of McAlpine Street</td>
</tr>
<tr>
<td>48</td>
<td>Highland Place Natural Site</td>
<td>Former London South Cr assessed for cul de sac and residential develop</td>
</tr>
<tr>
<td>49</td>
<td>Communications Road Natural Site</td>
<td>Headwater ravine assessed to build CFPL station</td>
</tr>
<tr>
<td>50</td>
<td>Highview Avenue Natural Site</td>
<td>2 areas; one is a remnant of London South Creek assessed for automotive car lot development</td>
</tr>
<tr>
<td>63</td>
<td>Applegreen Grove Natural Site</td>
<td>Headwater of Silver Creek; assessed when cul de sac and Commissioners Road development</td>
</tr>
<tr>
<td>69</td>
<td>Highview Crescent Natural Site</td>
<td>Next to Commissioners Road where cluster townhouses were constructed</td>
</tr>
<tr>
<td>78</td>
<td>Highland Woods Natural Site</td>
<td>Former London South Creek assessed for construction of Highland Woods Court development</td>
</tr>
<tr>
<td>84</td>
<td>Cliftonvale Avenue Natural Site</td>
<td>Former ravine where a duplex being constructed required fill assessment</td>
</tr>
</tbody>
</table>
B 6.3 Potential Impacts to the Coves

Based on the available information, only 3 sites have been analyzed to assess the contribution that effluent from these sites may have on the overall water quality of the Coves. This analysis is restricted to:

- Site #8, Euston Park Natural and Fill Site.
- Site #9, Elmwood Ave Fill Site.
- Site #11, Greenside Avenue Fill Site.

Site #8 Euston Park Natural and Fill Site is the largest fill area (12 ha or 30 acres) in the subwatershed and is a prominent landmark due to the height of the mounding over the landfill. Historic photography from 1922 shows the site being excavated possibly for gravel and later filled including some wetland depressions located along what is now Centre Street. The site was an active City operated sanitary fill site from 1963 to 1971. Monitoring based on long term monitoring of methane gas and effluent derived from the site that contributes to the flow of Spring Creek, the main tributary of the Coves. A development along the south side of Euston Park was required to install a private monitoring and collection system to vent the methane gases as a condition of development.

Site #9 Elmwood Ave Fill Site is a 2.5 ha (6 acres) closed municipal fill site that is currently being analyzed as part of the on-going work by the City associated with the Class EA review of the Edward Street Storm Drain Expansion that is being planned through this area. Site #9, is a historic fill area behind Ah-So Gardens Restaurant that currently has Methane Gas being emitted from the fill material. The site is currently signed, “Caution: Possible Environmental Hazard”. This area was the former location of the London South Creek that eventually was filled in with household garbage. The adjacent area also accommodated the placement of the Edward Street Storm Drain outlet in the channel. This outlet is currently being twinned with a larger pipe that is proposed to extend down the ravine to the slope base and along the channel beside the German Canadian Club tennis courts.

Site #11, Greenside Avenue Fill Site has been closed since 1960 but began in 1946 when the original meander channel was filled and a bottling plant located nearby. The installation of irrigation associated with a soccer field in 2001/02 uncovered rubble, bottles and broken glass.

The results of the investigation associated with the Coves Drainage and Erosion Master Plan (Dillon, 2003) reveals that:

- Methane producing sites were assessed and very little potential exists (other than one having a low potential) for adversely impacts to the aquatic environment in the Coves Area due to the presence of these landfill areas.
- Non methane producing landfill sites are believed to contain inert materials and they therefore pose very limited potential to adversely impact the surface and/or groundwater resources.

B 6.4 Land Ownership

The ownership of the subwatershed is primarily private ownership with the exception of the large parks such as Euston, Greenway Highland Woods and Basil Grover Park. Outside the Coves ESA the largest land holdings is the Highland Golf Course located at extreme southeast corner of the
B 6.4.1 Coves Pond

The bed of the Cove ponds are considered to be Crown Land due to the former position of the Thames River through this oxbow lake. This opinion is as stated by MNR in correspondence provided during the SPA process. This is based on the fact that the farm lots surveyed (being lots 3, 4, 5 and 6, West of Wharncliffe Highway) were not surveyed as 100 acres parcels rather the Cove meander was omitted and the lot dimensions are reduced by between 9 and 11 acres.

The largest land holdings in the Coves ESA area are the Valspar, Tippel, Chata Holdings German Canadian Club and Coves Trailer Park (see Figure B 6.3.1).

B 6.4.2 Ravine and Sloping Lands

Generally speaking, most ravines and slopes are considered private lands with the exception of some areas purchased by the City along Silver Creek ravine. The management of the ravines has been inconsistent due to this fact. This fact also has contributed to slope stability issues since there has been little direction provided to landowners other than site specific recommendations by technical staff of the UTRCA and City and only when requested. However no overall approach or plan has been available to ensure the ravine and associated slopes that make up the landscape feature in its entirety, have been wisely managed.

The Silver Creek ravine, or Southcrest Ravine as some refer to it, can be divided into two portions; that north of Emery Street comprised primarily of the rear portion of private residential lots, and that south of Emery Street which is City owned greenspace known as Southcrest Ravine. Only small areas of Briscoe Woods located at the west end of Briscoe Street West, and Murray Park located on lands between the west end of Tecumseh and Cliftonvale Avenues, contain lands that are owned by the City.

Several private properties with frontage on Ridgewood extend down the slope and across the ravine to the opposite side (east side). The other significant landowner at the mouth or outlet of the ravine and associated slopes to the east is the German Canadian Club (see Figure B 6.3.1). Due to the complexity of the legal survey in this area where the Cove ponds lie between the Club facilities and the valley and ravine slopes to the south, more information and confirmation is needed to ensure that lot lines and property ownership adjacent to the ponds is clearly understood. This recommendation is supported by numerous cases of confusion regarding lot lines and property ownership that have arisen during the course of this study and background investigations.

B 6.4.3 Parks and Open Spaces

Those lands zoned “Parks and open space” comprise 15% or 115 hectares of the entire subwatershed. Many of these lands are publicly owned parks (see Figure B 3.3.8). They include Greenway Park near the Thames River, Briscoe Woods, Southcrest
Ravine, Euston Park, Highland Woods, Basil Grover Park, Arthur Ford Park, and Odessa Park. Smaller parkettes areas exist including Duchess Avenue Park and Dunkirk Place Park. However, the vast majority of this park space is contained within the 3 areas that area also referred to as the natural heritage “anchors” or “nodes”, described further in Section C 2.1.

Over half the park and open space designation for the subwatershed (69 ha or 60% of the parks and open space designation) is privately owned lands contained within the Coves ESA area. This includes the orchard portion of the Valspar property, the slope and lowland portion of the Chata Holdings site, German Canadian Club site, Silver Creek ravine and the associated valley slopes. The natural and, in some instances re-vegetated lands contained within these properties are important components of the natural landscape that makes up the Coves ESA. These properties are also prime candidates for acquisition as public lands when the opportunity arises in a willing buyer / willing seller scenario.

**B 6.5 Neighbourhood Identification**

The subwatershed contains a number of neighbourhoods or portions thereof, due to the use of a natural boundary rather than the road pattern that typically defines neighbourhoods. To the east, the limit of the subwatershed roughly follows the alignment of Wortley Road through Wortley Village and the eastern portion of the Old South neighbourhood. Several existing residential neighbourhoods define the other limits of the subwatershed. They include Kensal Park and Berkshire Village to the west, Woodbank to the southwest, and the Glendale neighbourhood to the south. Within the central part of the subwatershed are Manor and Highland Park, Springbank Road, Southcrest, Southcrest Estates and Norton Estates.

“Enclaves” are defined as distinct groups that live or operate together within a larger community. The subwatershed has a number of these areas if we use this term to identify smaller neighbourhoods defined where road access terminates in cul-de-sacs and dead end roads. The residents of these smaller geographic areas range from being loosely to well-organized community groups. They include Erie Avenue (29 residences), the Cove Trailer Park (127 trailers), Duke Street (31 residents), Cawrse / Johnson Avenues extending north of Springbank Drive (28 residents), and the McAlpine / Brookdale Avenues extending south of Springbank Drive (14 residences). Two examples of community action from these groups include the coordinated filling of the Erie Street ravine in the 1950’s and the traffic safety concerns of the Duke Street residents to address truck traffic from the Valspar Industry plant located at the end of the street.

A new neighbourhood is emerging as a result of the public meetings and newsletters produced as part of this study. Public awareness is creating a Coves Subwatershed community which is an emerging neighbourhood defined by the natural watershed boundary that flows to the Coves and to the Thames River. This new neighbourhood will continue to implement this plan provided the plan provides them with direction and a vision for the improved health of the subwatershed and its residents.
B 7.0 COVES CHRONOLOGY

The following is a summary of the key dates regarding historic development of the Coves Subwatershed that are of interest to the Coves Subwatershed Study.

<table>
<thead>
<tr>
<th>Date</th>
<th>Description (Historic Events / Dates)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1793</td>
<td>The Coves was documented by John Simcoe on his journey upstream to the forks of the River Thames (Antler River at that time). Subsequent map was drawn from sketch and notes prior to 1800.</td>
<td>London Middlesex Historical Notes (from Major Edward B. Littlehales diary who was Simcoe’s military secretary)</td>
</tr>
<tr>
<td>1819</td>
<td>Crown Lands map by M. Burwell of Wharncliffe Highway showing complete meander not cut off with shadow image (?) of the meander located immediately west</td>
<td>UWO source as documented in F. Armstrong, “An Illustrated History of London”</td>
</tr>
<tr>
<td>1824</td>
<td>Survey showing meander not cut off and labeled “Cove” with islands in main Thames channel</td>
<td>Dana Poulton file</td>
</tr>
<tr>
<td>1850 (+/-)</td>
<td>Grand Trunk Railway crossed the area including the “Coves Bridge” over the Thames River as described by James Hamilton.</td>
<td>James Hamilton watercolour found in F. Armstrong, “An Illustrated History of London”.</td>
</tr>
<tr>
<td>1862</td>
<td>Middlesex County map showing property ownership and listing Julia Kent and Alex Arthur as owning most of lands including the Coves (Lots 3 &amp; 4, West of Wharncliffe Highway)</td>
<td>London Room, Main Library</td>
</tr>
<tr>
<td>1873</td>
<td>Kensal Park was surveyed</td>
<td>Plan #376</td>
</tr>
<tr>
<td>1922</td>
<td>City of London Insurance Plan, Chas Goad &amp; Company, Civil Eng. Showing the city boundary running down the center of the Coves west pond and east along Elmwood Ave (also the boundary of Lots 3 &amp; 4, West of Wharncliffe Hwy)</td>
<td>London Room, Main Library</td>
</tr>
<tr>
<td>1922</td>
<td>Air photography of the City of London</td>
<td>UWO map room library</td>
</tr>
<tr>
<td>1926</td>
<td>First topographic survey map completed for the City of London and environs</td>
<td>UWO map room library</td>
</tr>
<tr>
<td>1935</td>
<td>Plan of Coves rifle Range military base camp</td>
<td>Rob Sterling, surveyor</td>
</tr>
<tr>
<td>1940's</td>
<td>East cove pond filled in south of Cove Rd</td>
<td>?</td>
</tr>
<tr>
<td>1945</td>
<td>Air photography (1:12,000)</td>
<td>UWO library</td>
</tr>
<tr>
<td>1950 (+/-)</td>
<td>German Canadian Club constructed</td>
<td>?</td>
</tr>
<tr>
<td>1950</td>
<td>Air photography (1:14,000)</td>
<td>UWO library</td>
</tr>
<tr>
<td>Date</td>
<td>Description (Historic Events / Dates)</td>
<td>Source</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>1955</td>
<td>Air photography (1:17,000)</td>
<td>UWO Library</td>
</tr>
<tr>
<td>1961</td>
<td>City expansion including lands south and west of the Coves ponds</td>
<td>London Room, Main Library</td>
</tr>
<tr>
<td>1970's (+/-)</td>
<td>Lilly Paint Factory expands operations</td>
<td>?</td>
</tr>
<tr>
<td>1988</td>
<td>Air photography (digital)</td>
<td>City</td>
</tr>
<tr>
<td>1989</td>
<td>Preliminary Life Science Inventory</td>
<td>Woodfern Research report</td>
</tr>
<tr>
<td>1991</td>
<td>Coves Urban Hydrology Update Study</td>
<td>Delcan / UTRCA</td>
</tr>
<tr>
<td>1998</td>
<td>Initial Site Inspection with Allan Ralph &amp; Thom McClenaghan</td>
<td>P. Donnelly</td>
</tr>
</tbody>
</table>
Section C
Natural Systems Integration
Section C Cover
Looking north across the East Cove from the Cove Road crossing.
SECTION C – NATURAL SYSTEMS INTEGRATION

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C 1.0 NATURAL SYSTEMS INTEGRATION

C 1.1 Introduction

The purpose of this section is to bring together the abiotic, biotic and cultural elements discussed in the previous section (Section B) into a comprehensive and holistic analysis of the Coves Subwatershed. This is accomplished under the subheadings of the natural heritage / terrestrial ecosystem and the aquatic ecosystem.

As described in their landmark paper, Riley & Mohr (1994) suggested that “…the ecological concepts important in conserving the fragmented natural landscapes of settled southern Ontario can be expressed around the themes of landscape retention, landscape restoration and ecosystem replacement. The diverse conservation interests in lands and waters can be grouped around three priorities: core conservation lands and waters; natural corridors; and restored connecting links in landscapes and in biodiversity” (report abstract).

This subwatershed and the natural systems that exist within it, still maintain some of the building blocks required to recreate a healthy system. These building blocks require protection and rehabilitation to ensure that the system does not further deteriorate. As in most urban landscapes, these systems and the individual features that form the systems have been neglected or ignored. The Coves Subwatershed is not different from most urban landscapes however the local community in conjunction with the City and UTRCA are now interested in changing that course through the implementation of the subwatershed plan.

C 2.0 NATURAL HERITAGE / TERRESTRIAL ECOSYSTEM

The terrestrial ecosystem is described under the headings core areas, linkages and corridors both within the subwatershed and outside the subwatershed, trail systems, and land issues. These six areas combined make up the terrestrial ecosystem within the subwatershed.

C 2.1 Core Areas / Natural Heritage Anchors

From a regional or landscape perspective, the Coves Subwatershed contains a number of Core areas that form the anchors or nodes for establishing a natural corridor, or greenway system. However, as is the case in most urban settings, these potential systems are challenged by the urban pattern of development that has interrupted and disconnected the potential system. Roads and service corridors criss-cross the subwatershed severing or interrupting the continuous fabric that was once in place. Regardless, it is worthwhile to recognize where these Core areas exist and visualize where potential corridors may be able to re-connect these features into an ecosystem fabric or pattern.

Natural heritage anchors within the subwatershed can be described as 4 main areas:

a) The Coves orchard; b) Chata Holdings / Tippel Properties; c) Euston Park; and d) Highland Woods and Golf Course (see Figure C 2.2.1). They are summarized and discussed individually below.

The Coves ESA (Figure C 2.1.1) is a remnant of the Thames River system being a meander of that river. This feature including the Coves ponds, Silver Creek...
The ravine and valley slopes, is located at the downstream end of the subwatershed. The designation requires the continued protection and possible restoration given the criteria that was met when the ESA was designated in 1997. It remains arguably the most important component of the subwatershed in that it provides the outlet of the associated watercourses, the habitat for a rich and diverse range of terrestrial species and includes a geomorphologic landform including valley slopes, river banks and meander ridges that are well preserved in the urban context. It also provides the linkage both terrestrial and aquatic, with the Thames River.

Within the Coves ESA area, two nodes exist; the orchard located on the Valspar Industries site and the site comprised of the Chata Holdings and Tippel properties. These properties are highlighted on Figure B 6.3.1 – Coves Property Ownership.

The orchard site provides an important node strictly by the size of the area and the potential for rehabilitation. Zoned Open Space and part of the revised ESA boundary, the orchard is a significant node providing linkages north along the West Cove, south along the ravine including Silver Creek, and east towards the East Cove and the second node within this area.

The second Cove area node is comprised of the Chata Holding and Tippel Properties both containing natural heritage attributes. This site is located on both sides of the East Cove and contains one of the two rare habitats found within the subwatershed – Black walnut deciduous forest on the Chata Holdings property. The ecological significant area of the Chata Holdings property is only that area below the top of the valley bank. The portion extending from the top of bank to Orchard Street has no features that would warrant inclusion into the ESA criteria. There are however some large trees along the top of the bank and slope stability considerations will need to be included in any future plans for this property. The tableland portion would provide a key pedestrian trail linkage / entrance point from Orchard Street.

Euston Park is the third node within the subwatershed located immediately south or upstream from the Coves area. It is a former landfill connected to the Coves ESA by Silver Creek and associated ravine system. It is located centrally in the subwatershed. The park remains the largest single publicly owned property within the subwatershed. As a former wetland, it had a hydrologic function of moderating surface flow by storing peak flows and slowly releasing them to the Silver Creek and the Coves ponds. Historically, it had been excavated for gravel and then filled as a landfill site. Now as a closed landfill site, it has the potential for restoration. This potential restoration work is discussed in Section D.2.

Highland Woods (north) and adjacent Highland Golf Course is another large block of land that still contains remnants of natural forest cover located. The golf course is located on the watershed divide with Dingman Creek watershed to the south with approximately 40% of the golf course contained within the Coves Subwatershed and the remaining 60% contained within adjacent subwatersheds (see Figure B 3.3.4). The wooded area surrounds a ravine that is the headwaters of London South Creek which now flows through the Edward Street Storm Drain. The feature has been evaluated as a Cultural Thicket in the vegetation evaluation by David Stephenson.
Highland Woods contains remnants of Sugar Maple and Basswood Deciduous Forests. A Silver Maple Deciduous Swamp is located in Highland Woods (south) located outside the subwatershed boundary.

C 2.2 Linkages and Corridors External to the Subwatershed

The Coves Subwatershed is a north-south trending, natural heritage corridor and is connected to the regional Thames River corridor located at the north or downstream end of the subwatershed. This major east-west trending corridor is the most prominent natural heritage corridor running through the City of London.

The only other external corridors are interrupted linear park features that have limited potential to connect due to residential development located between them. Two routes exist to the south connecting into the Dingman Creek subwatershed via Jesse Davidson Park and Westmount Lions Park to the southwest and via Highlands park (south) and Earl Nichols Park to the southeast (see Figure C 2.2.1). Establishing either of these corridors as natural heritage corridors would be unfeasible without a major redevelopment initiative that would alter the urban design and development as presently constructed.

C 2.3 Linkages and Corridors Internal to the Subwatershed

The internal linkages and corridors within the subwatershed are also limited by the degree of urban development that separates them from nearby natural features. This fact is similar to those described above as external corridors. Commissioner Road and Wharncliffe Road are major east-west and north-south transportation corridors that hamper corridor establishment within the subwatershed. Although a relatively short distance geographically, the corridor linkage from the east end of Euston Park to the north end of Highland Woods is interrupted by the major intersection of two arterial transportation routes; Wharncliffe and Commissioners Roads. This again provides no opportunity for an ecological connection without a major redevelopment initiative that is unfeasible to comprehend given the current planning framework.

C 2.4 Trail Systems (Existing / Potential; hard and soft surface)

There is an opportunity to create recreational / passive transportation linkages through trails from the Thames, through the Coves, Silver Creek connecting to Euston Park over to Highland G.C. and south to Westminster Ponds, another ESA located approximately 2 kilometres to the east near the intersection with Wellington Street and Commissioners Road in London (see Figure A 1.1.1). As previously stated, establishing this corridor as a natural heritage corridor would be unfeasible without a major redevelopment initiative that would alter the urban design and development as presently constructed.

The “Big Picture” exercise by Carolinian Canada and Ministry of Natural Resources provided another landscape-scale perspective of potential corridors across southern Ontario. This project suggested a potential corridor connecting Euston Park to the east with Westminster Ponds, another ESA located approximately 2 kilometres to the east near the intersection with Wellington Street and Commissioners Road in London (see Figure A 1.1.1). As previously stated, establishing this corridor as a natural heritage corridor would be unfeasible without a major redevelopment initiative that would alter the urban design and development as presently constructed.
Dingman Creek and east to Westminster following the idea of Big Picture idea (see Figure C 2.2.1).

The subwatershed has some trails that exist primarily along the Thames River corridor and Greenway Park. This well established trail system consists of both pedestrian and cycle paths that are comprised of a paved surface with lane markings to separate the various users. This is contrasted with the wooden boardwalks and stone chip trails that exist in Highland Woods, south portion just outside the subwatershed boundary. No other formal trail exists within the subwatershed however numerous unofficial trails and pathways exist surrounding the Coves ponds and throughout Silver Creek ravine and Euston Park.

The Coves ESA would benefit from a formal trail system however only with careful planning and erosion control. This is partly due to the steep slopes and eroding banks that exist along some portions of the valley side and the ravine slopes. Trail placement in ESA must consider the sensitivity of the area and the need to manage both the environment with the trail users to ensure they can co-exist without damaging the ESA attributes (City of London background report; trails and ESAs, 1997

C 2.5 Land Issues

Within the Coves Subwatershed, a number of issues related to the land base exist. These issues all have the potential to impact the ecosystem and can be summarized into three categories: contamination, slope instability, and slope erosion. They are discussed below.

C 2.5.1 Contamination

The Coves Subwatershed contains a number of potential sources of contamination that may leach into the Coves ponds. These sources include past fill sites, industrial uses and out-of-date sanitary sewer facilities (both individual septic systems and cross connections with storm sewers). Assessed either individually or combined, these issues have the potential to contaminate the natural terrestrial or aquatic system.

Fill Sites

There are 7 known landfill sites with the subwatershed, none currently operational (see Section B 6.2.3). Of these, four produce methane gas and are likely filled with mixed municipal waste. NOTE: there are also 8 locations described as natural areas (bogs or marshes) that produce methane gases. Methane producing sites were assessed and very little potential exists (other than one site having a very low potential) for adverse impacts to the aquatic environment in the Coves Area due to the presence of these landfill areas. Non methane producing landfill sites are believed to contain inert materials and they therefore pose a very limited potential to adversely impact the surface and/or groundwater resources. These findings are based on the preliminary results of the Coves Drainage and Remediation Master Plan (Dillon, 2003). However, further confirmation is required to more accurately assess the land fill sites. The land fill sites were currently being researched and assessed as part of an on-going program with the Solid Waste Division, Engineering & Environmental Services Dept, City of London. Most of these sites date back to their origins with the Township of
Westminster prior to annexation with the City and the historical record is therefore less than complete.

**Industrial Uses**

Industrial uses are few within the subwatershed however the most notable is the former Valspar Plant located in the centre of the Coves ponds at the south end of Duke Street. This operation has been active from 1950 when it was opened by Alma Paint Industries to manufacture vehicle paint for the automobile industry. It closed in 2002 by the owner, Valspar Industries after being previously owned by Lilly Industries and Almtex Corporation. The fumes from this industry into the relatively calm microclimate of low lying floodplain is well documented with Ministry of the Environment staff investigating possible pollution complaints in the mid 1970s. These claims did not result in charges and no clean up orders were recorded. However, a prospective purchaser of the property in 2003 initiated a Stage 1 Environmental clean up to determine the level of contamination, if any. During this investigation, many truck loads of soil were transported off-site to the toxic waste facility near Sarnia. Due to privacy laws, the contamination threats remain unfounded but highly suspected given the size and age of the paint manufacturing business and through anecdotal evidence of neighbouring landowners.

**Sanitary Sewer Facilities**

Edward Street storm drain and sanitary sewer cross-connections exist but should be remediated by ongoing projects such as the Edward Street and Area Storm Extension and Outfall Structure (Dillon, 2003). This project has assessed and recommended actions including the construction of a new trunk sewer along Cathcart Street and Elmwood Avenue. Continued assessment of these cross connections should be made to ensure that the unsuitable sections of sanitary sewer are removed and replaced over time.

**C 2.5.2 Slope Instability and Erosion**

Slopes associated with instability can be divided into two groups: river valley and ravine slopes. Both groups of slopes have been impacted by poor management practices and by water erosion.

**River Valley Slopes**

The valley slopes that form a 15 metre high bank surrounding the Coves ponds were assessed to be marginally stable with some sections of instability (Dillon, 2003).

This assessment obtained slope inclinations, recorded seepage zones, toe erosion, leaning trees, old or recent landslide features, fill placement on the slopes, and identified problem areas. Geotechnical investigations revealed three areas of concern (see Figure C 2.5.1):

1. West Cove west bank slopes
2. Silver Creek Ravine slopes
3. Erie Creek Ravine slopes, and
4. London South Creek Ravine slope.

In these locations, a number of old landslide features, toe erosion, fill placed on the slopes, and residential structures located near the top of the slope were noted. Geotechnical results show that slopes are marginally stable with some unstable sections noted. These observations are typical of river valley wall
slopes that have been allowed to regress uncontrolled for many years and where adjacent development has resulted in the placement of materials over the top of the natural slope. This condition has been aggravated by the filling of many of the historic ravines to permit development and road construction near the Coves area (see Figures B 2.1.3 and B 2.1.4 for historic comparisons).

Ravine Slopes

A number of ravines cut through the valley side and form as a result of the change in elevation that the water needs to traverse to reach the lower floodplain lands (Figure C 2.5.1). The ravines have historically adapted and adjusted to changes in the subwatershed over time. Recent erosion monitoring work in the ravines suggests these changes are still ongoing.

As the drainage network became more channelized and piped, the velocity and erosive energy of the moving water increased. This has caused ravines to down cut or erode downward making the channel deeper and the side slopes more unstable. This situation has been aggravated by the placement of fill and construction of buildings close to the ravine top of bank. These materials contribute added weight to an already unstable location which can result in minor slumps or landslides downslope.

As documented by the investigation for the Edward Street Storm Sewer (Dillon, 2003) the ravines have been down-cutting significantly over the short period of investigation during this study. A longer period of recording the erosion rates would be beneficial to track the changes in these features. This down-cutting appears to be event-driven during higher flow periods after storms and heavy surface runoff.

C 3.0 AQUATIC ECOSYSTEM

C 3.1 Drainage Network

Simply put, the aquatic ecosystem in the Coves is generally degraded. Poor water quality, extreme sedimentation, unstable stream channel morphology and degraded fish habitat are a result of intense urbanization of the majority of the subwatershed.

The drainage network is composed of an older (circa 1820, in some areas) stormwater management system that pipes water under the city street system via storm drains to the ravines adjacent to the Coves Ponds. The Coves ponds are the remnant of a meander of the Thames River that now provides a location for “settling” of sediments and “storage” for stormwater. This storage function has been the reason for many of the management challenges which we face today.

This system would have been a series of natural watercourses prior to European contact that would have formed in the uplands of the Ingersol Moraine (or Winery Hill, where Basil Grover Park is located) and flowed north to the Coves. Some of these watercourses may have evolved into municipal drains where the land use was primarily agricultural and eventually into the storm drain system. Remnant sections of these watercourses are seen on older mapping and discussed in Section B 2.1.2.

C 3.2 Flooding

Due to the nature of the system described above,
flooding occurs in two ways:

a. On the tablelands when the storm drainage system backs-up due to insufficient capacity in the pipes. There is no overflow mechanism or any large land area set aside to receive the flood waters when they occur. Therefore, the result is flooded streets and basements in the tableland area of the subwatershed, especially problematic in the area south and east from the Wharncliffe and Edward Street area.

b. Within the low lying lands adjacent to the Cove ponds which is floodplain lands for the Thames River and for the Coves Subwatershed. Figure C 3.2.1 illustrates the extent of the Regulatory flood in this area.

C 3.3 Fishery & Benthic

An inventory of fisheries and benthic resources was completed as part of the Characterization Report of the Coves Drainage and Remediation Study: Characterization Report. This report combined the work completed by UTRCA staff (benthic analysis) and work completed as part of the Springbank Road Widening Project (Stantec Consultants subcontracted to Natural Resource Solutions Inc.). The results of this investigation suggest sediment, pollutants and temperature increases have created aquatic challenges.

Natural sedimentation processes in the Coves have been accelerated by artificial inputs of sediment from urban surface water runoff. Urban surface water runoff that contains pollutants such as road sand and salt, hydrocarbons (gasoline and oil), pesticides and other ‘urban’ chemicals is directed to the north part of the subwatershed via ‘storm sewers and enters the Coves ponds untreated.

Poor aquatic habitat and a degraded aquatic community result mainly from sediment loading and high water temperatures. Carp dominate the West Cove pond while the East Cove pond contains a more diverse and stable fish community. Fish population tolerant of poor conditions, such as carp, maintain poor conditions by continuing to stir up sediments and preventing aquatic vegetation from becoming established.

Benthic sampling reveals poor water quality and low diversity of communities. Indicator indices suggest the most severe degradation areas are in the West Cove with improvements in the East Cove.

Fish migration is hampered by outlet structure and poor conditions for spawning by resident river fish species. The West Cove is dominated by carp species (warmwater species) that out competes any other species and has eliminated riparian vegetation.

Improved habitat conditions are noted for the East Pond as evidenced by the sampling of predator sport fish species including yellow perch and black crappie.

C 3.4 Geomorphology (Abandoned Meander)

Geomorphic assessment enabled the characterization of the overall sediment budget, erosion rates, potential erosion thresholds and local geomorphology.

The Coves Ponds have been infilling due to urban development and natural forces that impact oxbow
lakes. This infilling relate to an overall increase of sediment and an elimination of flow through the ponds to the Thames River. This imbalance has been aggravated by the added sediment and fill by infilling actions of ravines (see Figure B 2.1.3 and B 2.1.4 historic ravine infilling) and by the installation of the flap gate at the West Cove outlet to the Thames River.

The rate of infilling of the Coves Ponds has been increasing steadily and dramatically since 1920. This increase is likely due to the drainage system channelization and storm sewer installations undertaken during this time. Current stormwater management considerations related to sediment load and water quality were not undertaken during this time frame. These changes to the drainage network were related to the residential and commercial development pattern taking place on the tablelands in the upper watershed.

Erosion pins have provided a monitoring network for very short term changes however preliminary results (Dillon, 2003) show that Silver Creek and Edward Street Outfall ravine systems provide 88 m³ / year of sediment to the Cove ponds, primarily in the “delta” areas that separate West Cove from Centre Cove and Centre Cove from the East Cove. Analysis of the delta feature in the West Cove was completed providing a visual impression of the migration of this delta downstream. It is currently located as far north in the West Cove as the trailer park.

Core sampling of the three ponds show that substantial deposition (generally over 1 metre in depth) of fines has occurred since the channel was abandoned. The East Pond has seen the lowest rates of accumulation and was the only pond that core samples contacted materials characteristic of river deposits that was buried by an organic layer likely deposited after the channel broke through (or avulsed) creating the abandoned oxbow lake.

C 3.5 Water Quality

Water quality as well as sediment and benthic sampling in the 3 Cove ponds show water quality results comparable to other locations in the Thames River. The water quality in the Coves is similar to the Thames however is more variable due to seasonal effects and the impact of storm outflow locations. Provincial Water Quality Objectives exceedences were observed at each of five locations for one of the following: phosphorus, metals and dissolved organic carbon. Water quality in the Coves degrades slightly downstream from East to Centre to West Cove due to increased stormwater entering the ponds.

C 3.6 Sediment Quality

Sediment samples were analysed from core samples within the ponds for a number of parameters as part of The Coves Drainage and Remediation Master Plan (Dillon, 2003) including Total Kjeldahl Nitrogen, Polycyclic Aromatic Hydrocarbons, Polychlorinated Biphenyls, Volatile Organic Compounds, and a list of heavy metals. Several records exceeded the Lowest Effect Level but all were well below the Severe Effect Level with the exception of Total Kjedahl Nitrogen that was within 25% of the Severe Effect Level.

Samples were not obtained from private lands adjacent to these ponds however an inquiry was made to the MOE to obtain the results from a Phase 1 Environmental Assessment conducted in 2002 on the
Valspar property by a prospective purchaser. If made available, this information may provide additional data on the state of the sediment quality in the Coves area.

C 3.7 Wetlands

Wetlands have been virtually eliminated in the Coves Subwatershed. The only exception is the organic meadow marsh (Vegetation Unit MAM 3-3) found along the West Cove in the biologic investigation conducted as part of this study. Healthy watersheds should maintain at least 10% wetlands where this subwatershed currently contains approximately 0.1%. As stated before, an urban subwatershed typically does not reach this 10% objective.

Historically however, the evidence suggests that wetlands did cover a greater area of the subwatershed than present. In 1989, the biologic assessment (Stephenson, 1989) that provided background data for the ESA designation (see Figure B 2.1.6) found a cattail marsh located near the south side of the Euston Park (now a high density residential unit on Centre Street) and a wetland feature at the outlet of the Edward Street Storm Drain near the German Canadian Club (now part of the parking area). Both these features have since been eliminated.

Historic wetland areas are implied by the location of the land fill areas that are listed as “natural areas” (see Figure B 2.1.5 – “Natural Areas” shown in green) that produce methane due to the break down of vegetation material that has been buried. Although exact dimensions of these areas is unknown and the identification of these areas as wetlands is somewhat speculation, the total area combined with the 2 previous areas identified in 1989 would likely meet the 10% wetland coverage recommendation.

Wetland restoration potential exists along the banks of the ponds and in the low lying area at the south end of McAlpine Street on the Chata Holdings property. This area is also the site of numerous amphibian observations (Stephenson, 2003).
Section D
Management Alternatives
Section D Cover
Looking south across the East Cove Pond from Springbank Drive and the park benches installed by local community members in 2002.
SECTION D – MANAGEMENT ALTERNATIVES

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D 1.0 CONSTRAINTS AND OPPORTUNITIES

The purpose of this section is to transform Section C: Natural Systems Integration into an Implementation Plan providing both constraints and opportunities as well as management strategy tools to accomplish the implementation. The section identifies constraints and opportunities in the context of the ecosystem discussed in Section C. This section also discusses constraints and opportunities in the context of cultural factors which have been encountered or observed throughout the project. These cultural factors may take the form of perceptions and comments made by residents during public meetings and events but are important to consider in garnering public support. Both are discussed to assist in effective implementation.

D 1.1 Ecosystem Constraints

1. Sedimentation: The Coves ponds and ESA has an abundance of sediment due to stormwater management practices, soil conditions and vegetation removal.
2. Land Fill: There are numerous sites within the subwatershed that are former landfill locations (such as Euston Park). These sites, both former City and private landfill areas may contribute leachate to the Coves Ponds. Monitoring programs are limited to only the largest sites and have shown that minor amounts of leachate does leave the site and flow downstream.
3. Untreated Stormwater: There are no facilities that provide a level of stormwater management quality and quantity control for the subwatershed other than the Coves ponds.
4. Industrial / Commercial Run-off: Sites such as the Valspar Industries and car lots next to Springbank Drive have drainage that may contain contaminants due to the past land use. These sites have limited buffering capacity due to their location along the banks of the Coves.
5. Lack of Connectivity: Greenspace and natural corridor interruptions are common due to filling, development as well as the isolation of the flap gate at the Coves outlet to the Thames River.
6. Riparian and Slope Encroachment: Residential development has encroached into the sensitive adjacent lands of the ponds and valley slopes. For example, the trailer park has developed over the riverbank in locations providing a hard vertical surface at the water's edge.
7. Sewage Contributions: Storm / sanitary overflow and antiquated septic systems.
8. Unstable Slopes: Along ravines and along Coves ponds contribute sedimentation.
9. Urban Land Use: General practices involve the environmentally unfriendly use of pesticides, vegetation removal, proliferation of non-native species (especially along slopes) and the use of asphalt instead of paving blocks which reduce surfacewater infiltration.
10. Overall Lack of Vegetation: Healthy subwatersheds need 25% forest cover; this subwatershed has less than 5%.
11. Poor Infiltration Capacity of the Subwatershed: more pavement than
exposed soil and surfaces that allow infiltration.

D 1.2 Cultural Constraints

1. Lack of public land ownership is a major constraint in the Coves ESA. Only the bed of the Coves ponds are considered public land (Crown land) being the former bed of the Thames River.

2. The perception of the area as industrial (already lost to contamination due to Valspar site and numerous closed landfill sites).

3. The perception of the area as the low lying lands next to the river (“mosquito infested swamp”).

4. Poor road access to the Coves ESA area (Cove Road and Duke Street are dead end streets) leading to vandalism due to lack of vehicular traffic. Also the lack of formal, maintained pedestrian trails which would promote community watch conditions by users.

5. Lack of public awareness as a City ESA (as opposed to such areas as Sifton Bog, Westminster Ponds, Killaly Woods which have signage and publicity).

6. Aromatic nature of the Coves: The microclimate being within a “cove” of the river and associated floodplain contributed to minimal air circulation and when paint plant was in operation, created the conditions for foul smell of paint in the air.

7. Poor management examples evident from key vantage points compared to other ESA: trailer park encroachment along the shoreline, busy Springbank Road vistas; filled-in portion as a parking lot at German Canadian club; backyard waste treatment.

8. Lack of actual and visual connectivity of open space corridors from headwater through to outlet.

9. Lack of coordinated effort to manage the ESA amongst all groups (City departments, agency efforts and community groups - with the exception of the Coves Clean-up).

D 1.3 Ecosystem Opportunities

1. Special Policy Area: This policy has restricted future development in the ESA. This restriction will serve to ensure that additional development pressure is not contributing to stresses on the Cove ponds especially in the floodplain area. There may also be opportunities for willing buyer / willing seller transactions to occur in those areas where development cannot occur and conservation is viewed as an alternative use. This would secure public lands in an area where such is limited (see Figure B 6.3.1).

2. Environmentally Sensitive Area: This designation provides ecosystem opportunities for the community to focus their attention to promote the area for its environmental significance. It also provides a focal point for environmental stewardship. The presence of the ESA may also provide the justification for public land acquisition using a number of conservation programs since land ownership is key to wise management of the ESA (Eco-Visions of the Cove).
3. **Corridors and Trail Linkages**: Establishing pedestrian trails and corridors for ecosystem connectivity provides a number of benefits. The subwatershed has a number of nodes (described in Section C 2.1) that can be connected for both ecological and recreational purposes.

4. **Cove Ponds Restoration Scenarios**: The restoration of the Cove Ponds is assisted by the ESA and the SPA designations. These ponds have not been actively managed partly due to lack of information concerning the Coves system and the lack of public lands in the area (only the bed of the water bodies is considered public / Crown Land). Public lands and public participation in the active management of the Coves will provide opportunities for enhancement which has not been a focus of activities in the past in the Coves ESA.

5. **Stormwater Management Improvements**: There may be an opportunity through redevelopment of urban space and municipal capital works projects to improve stormwater management in the subwatershed.

**D 1.4 Cultural Opportunities**

The Cultural Heritage land use policies outlined earlier in this plan (Section A 2.4) provide an opportunity to link land use planning policies to recognize “landscapes” and “vistas” important elements to the Coves ESA. Public meeting participants repeatedly made reference to the ability to enter into the Coves ravines or other portions of the ESA and enjoy the peace and isolation of the natural environment away from the concrete urban environment. This alternative to the typical urban environment includes vistas and sight lines that are dominated by natural vegetation and not typical urban forms such as high rise, high density residential buildings and office towers.

These vistas are important from both the vantages achieved from the top of the valley slope looking down into the Coves as well as from the lowest elevation within the Coves ESA looking up the slopes to the top of the valley sides. This vista composed primarily of natural vegetation and “wilderness” should be considered, and maintained in future development proposals for lands both within the Coves ESA and on lands adjacent to the ESA that overlook the feature. This important aspect related to topography and natural vegetation is the landscape feature that needs to be recognized in land use and cultural policies for the area.

From a cultural standpoint, there are a number of opportunities related to the implementation of the subwatershed plan to involve the community. This has been assisted by the creation of “Coves Implementation Teams” as part of the Coves Subwatershed Study. These implementation teams have been formed by the FOTCSI Board of Directors in response to the resident’s interest in taking part in the implementation of key elements of the Plan as they were being proposed throughout the study process. These teams were formed in 2003 and include the:

1. Land Team.
2. Information Team.
3. Habitat Team.
4. Action Team.
The **Land Team** has been charged with the task of undertaking initiatives related to recreational trail development, conservation initiatives, stewardship programs and strategic land acquisition planning within the Coves ESA (see Figure B 6.3.1). The focus of this group is to coordinate the necessary resources and information in order to facilitate wise management through public ownership of a portion of the Coves ESA. This may entail conservation easements and other measures in the interim until such public lands are secured. Land ownership in the ESA is viewed as essential in order to ensure the health of the ESA is maintained and improved. The method of land acquisition is proposed as a willing buyer / willing seller arrangement. The ownership of the lands will not rest with the Friends of the Coves Subwatershed however this community group will facilitate the process with the appropriate groups (ex, City, UTRCA and Thames Talbot Land Trust) as much as possible.

The **Information Team** has been focused on communication efforts to ensure that the data collected as part of the subwatershed study is available to the community. This is especially relevant to the historic and archeologic data that was researched by Dana Poulton in his work for the study (Poulton, 2003). Suggested areas of focus for this team is in establishing library resources, development of school education resources, and the development of historical reference information. A “Coves Corner” has been proposed for the display of many of the public meeting resource materials and study findings in Landon Library, located in the subwatershed in Wortley Village.

The **Habitat Team** will undertake initiatives related to terrestrial habitat enhancement and rehabilitation, species at risk protection, bird feeder watch / count programs and amphibian monitoring programs.

The **Action Team** has been charged to coordinate community-based programs to increase awareness and empower the residents. Examples such as the Coves Clean Up, the Coves Art Exhibition and the Yellow Fish Storm Drain Marking program are planned for 2004 / 2005 season. Refer to the Coves website (www.thecoves.ca) for more information on these teams and other initiatives.

### D 2.0 MANAGEMENT TOOLS

The following section describes the available tools that will be used to implement the Plan recommendations. The recommendations and Action Plan follow in Section E.

#### D 2.1 Conservation Master Plan

The preparation of a Conservation Master Plan has typically been a reflection of the need to manage publicly owned lands in the ESA lands in the City of London. Therefore, such a Plan specifically for the Coves ESA has never been completed. Such a plan would provide goals, tasks, objectives, and potential partners to implement the tasks and would provide the specific direction needed to manage the property. Due to the nature of this ESA, active involvement of the landowners who own a portion of the ESA is needed in any Conservation Master Plan to ensure their continued participation and support. This Subwatershed Plan provides the basic framework for a Master Plan however no attempt has been made to contact and involve each landowner who shares in
the ownership of the ESA. Tax credits have not been investigated as part of this designation which may provide incentives for landowners who are part of the ESA. The completion of a Conservation Master Plan is a recommendation of this subwatershed plan.

D 2.2 Property Acquisition

Public property acquisition of key sites within the Coves ESA is a specific recommendation of this Plan. Ownership is the best approach to ensuring wise management of key areas within the ESA. Priority sites should include those listed on Figure B 6.3.1 and are in order of priority ranking: the orchard portion of the Valspar site, Chata Holdings below the top of the valley bank and the Tippel property. In addition, the Friends of the Coves Subwatershed Inc. in conjunction with their partners should investigate conservation easements, and development right exchanges as provided by the City.

D 2.3 Zoning

Within the Cove ESA there are a variety of Open Space designations which should be reviewed to ensure that the ecological significance of the area is reflected in the designation. These areas that should be reviewed include the ponds (OS4), orchard (OS1) German Canadian Club (OS2) and adjacent lands to increase protection and more accurately reflect their attributes as an ESA (OS4 or 5). The protection of all the individual Open Space areas is also recommended as they are key components of the Coves Subwatershed natural heritage framework (see Figure C 2.2.1).

The ESA boundaries should also be confirmed through the relevant planning documents to ensure that the confirmed boundary as established in this Plan is recognized in future planning applications.

Areas surrounding the ESA should be reviewed to ensure that height restrictions for re-development is consistent with vistas and vantage points overlooking the Coves ESA.

D 2.4 Capital Works Projects – Servicing

This is the most important tool to address the sedimentation and stormwater quality issues within the subwatershed. Quality improvements will be achieved by repairing antiquated storm and sanitary drain conditions that permit cross contamination throughout the subwatershed. This condition is known to exist in the Edward Street Storm drain project. In addition, a small number of properties rely on individual septic systems for sewage disposal. These systems may require updating and should be monitored.

D 2.5 Monitoring and Reporting

Monitoring and reporting is critical in addressing the changing landscape that is found within the subwatershed. Using the principal of adaptive environmental management, this function is required to evaluate the success of the recommended actions. Examples of where monitoring should be directed include water quality, fish and benthic communities, erosion, and land fill sites.

D 2.6 Trail System

Create and preserve trail and natural corridors across the subwatershed and between subwatersheds from
the Thames River in the north to the Dingman Creek
subwatershed in the south and Traction Creek to the
east.

D 2.7 Subwatershed Plan
Endorsement

Strive to seek City endorsement of the Subwatershed
Plan as a reference document to the City Official
Plan. This endorsement would provide direction for
future initiatives of all City departments (planning,
engineering and environmental services and parks
and recreation).

Strive to seek UTRCA endorsement of the
Subwatershed Plan as a guiding document for
program delivery within the subwatershed and
possibly as a pilot project for other urban
subwatersheds in the Thames watershed.

D 2.8 Stewardship

Stewardship is a commitment on the part of the City,
agencies and most importantly the community to
improve land use practices and land management.
Stewardship may take the form of rehabilitation,
restoration, and best management practices.

One site specific example is Euston Park. The end
use of this important feature will be determined by the
City and their Solid Waste Department. However,
current initiatives involving the London Community
Foundation, Friends of the Coves Subwatershed and
UTRCA are providing needed attention on the
possible rehabilitation of this area via stewardship and
rehabilitation.

D 2.9 Public Education

Public education fosters an understanding and
respect for the environment. Education programs
targeted at variety of audiences will promote an
understanding of the Coves subwatershed and a
willingness to share in the implementation of the Plan.
These programs and methods in achieving education
are detailed in Section E.

Specific rehabilitation locations and treatments are
shown on Figure D 2.8.1 "Coves Rehabilitation Plan."
These areas shown are also described in the previous
Section D 1.3
Pond Restoration

West Pond
- Carp Removal
- Sediment Management
- Candidate Wetland Enhancement Area (Meadow marsh)
- Riparian Buffer

Centre Pond
- Sedimentation Management
- Riparian Buffer

East Pond
- Riparian Buffer

All Ponds
- Benthic Monitoring
- Water Quality Monitoring
Section E
Action Item to Implementation
Section E Cover
Three participants in the Coves Clean-up examine their soggy treasures (Note: the yellow rope to assist in the removal from the Centre Cove.)
SECTION E – ACTION ITEMS TO IMPLEMENTATION

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E 1.0 GENERAL RECOMMENDATIONS

This section presents a series of recommendations that form the implementation or “Action Plan” section of the subwatershed plan. The responsibility for the implementation of the Plan will be shared by the Friends of the Coves Subwatershed Inc., the City of London and the UTRCA through partnerships with other agencies, environmental groups, foundations, community organizations and landowners. The implementation of specific recommendations may be lead by a particular group (i.e., Municipal projects lead by City of London) but will involve the active participation of several other groups in a supporting role.

Provided below is a summary of the general areas in which specific recommendations were developed. The specific recommendations are detailed in Table E 1.1

1. The Subwatershed Plan should be adopted as a reference document by the City of London, UTRCA and other agencies to inform future work within the subwatershed.

2. This Plan should be adopted by the FOTCSI, UTRCA and the City of London as a resource to guide implementation to achieve Plan objectives and enhance and protect the subwatershed.

3. Protect the Coves ESA and other terrestrial features through education programs, land acquisition, land stewardship and best management practices, and terrestrial rehabilitation and enhancement initiatives. These initiatives will be guided by specific recommendations and the Coves Rehabilitation Plan (Figure D 2.8.1).

4. Improve the aquatic ecosystem by addressing significant stressors and impacts. Reduce artificially high sediment inputs and improve stormwater quality through redevelopment / redesign and upgrades to existing subwatershed service infrastructure. Reduce continued aquatic ecosystem degradation caused by exotic species.

5. Establish a monitoring framework that includes participation and responsibilities by City of London, UTRCA and other agencies with the possibility of utilizing community based monitoring programs (e.g., feeder watch, frog watch).

6. Retain natural elements and develop corridors and linkages through enhancement of green / open space and pedestrian bike trails. Land acquisition in the Coves ESA and public ownership and access is a component of this recommendation. Focus on identified anchors / nodes such as the Thames River, Coves ESA, Euston Park, Highland Woods and beyond the boundary of the subwatershed.

7. Adoption of the confirmed ESA boundary by the City as shown on Figure C 2.1.1.

8. Explore rehabilitation opportunities with the objective of improving water quality to be more suitable for aquatic life and recreation (MOE, 1994; rev 1995).

E 2.0 SPECIFIC RECOMMENDATIONS

Specific recommendations, actions and outcomes are detailed in The Coves Subwatershed Action Plan (Table E 1.1). The table is organized around the key watershed components of Groundwater, Aquatic Ecosystems, Terrestrial Ecosystems and Cultural
<table>
<thead>
<tr>
<th>Key Watershed Component</th>
<th>Related Current Initiatives</th>
<th>Recommendation or Action</th>
<th>Intended Outcome / Products</th>
<th>Potential Partners</th>
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<td><strong>GROUNDWATER</strong></td>
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<td>- Recharge</td>
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<td>- Discharge</td>
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<td>- Wells and Septic Systems</td>
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<td><strong>Rationale</strong></td>
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<td>The basic groundwater functions of recharging, transmitting, filtering, natural groundwater storage and discharge play an essential role in maintaining a healthy ecosystem. Generally, groundwater is replenished all along its flow path but is most susceptible to contamination in recharge zones, which are the main areas where groundwater is replenished. Groundwater discharge areas replenish surface water systems by providing base flow. The Coves Subwatershed Plan identified low permeability in the soils found in the tableland areas. These areas are not likely to contribute in a significant way to groundwater recharge. Furthermore, the heavily urbanized environment within the subwatershed inhibits surface water infiltration and therefore significantly decreases recharge potential. Some groundwater discharge areas have been identified anecdotally within the Coves. There is evidence of a shallow water table, particularly within the Coves feature. Generally, there is a need to better understand the interaction between surface activities and groundwater within the Coves subwatershed, particularly within the Coves feature. Wells represent a direct connection between surface activities and groundwater and may act as a conduit for contamination. Existing wells and septic systems found in the upper part of the Subwatershed, in the vicinity of the Coves, may pose threats to groundwater quality.</td>
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<td><strong>Middlesex - Elgin Groundwater Study (January 2004)</strong></td>
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<td>The study will assess groundwater resources in the context of regional groundwater flow systems, and develop strategies to protect groundwater resources as a safe supply of potable water. Funding for the study is shared between the Ministry of the Environment and the various municipal partners. The groundwater study has three main components: • Regional aquifer characterization involves developing an understanding of the aquifers throughout the study area and the processes that control how groundwater moves through them. • Municipal water wellhead protection entails mapping all the areas that contribute water to the municipal wells in Dorchester, Thordale, Birr, Melrose, Komoka/Killworth, Delaware, the City of London, and in the various Municipal water wellhead protection areas in the vicinity of existing and potential areas in and around the Coves. • Development of a groundwater protection and management strategy that will address both regional groundwater protection and local wellfield protection measures. The study used data from well sites throughout Middlesex and Elgin County and included well sites within the Coves Subwatershed and other areas within the City of London.</td>
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<td><strong>Ontario Low Water Response</strong></td>
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<td>Operates at Upper Thames River Watershed scale but relates to a general water conservation ethic. The Low Water Response Program, formulated by the Ontario Government, Conservation Authorities and Municipalities, deals with low water management issues. Water Response Teams (WRT) are formed on a watershed basis and are comprised of local water users and managers. The plan is intended to mitigate the effects of drought through short-term low water response and long-term management strategies that address both water supply and demand. These include public education, conservation, and the development of appropriate land use policies and efficient water management infrastructure.</td>
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<td><strong>Potential Infiltration for the Coves Subwatershed</strong></td>
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<td>A GIS mapping exercise completed by the UTRCA combines soil and slope data to determine the high, medium and low potential for surface water infiltration. The application may have limited utility in a heavily urbanized subwatershed such as the Coves however; it can be used as a tool for further work.</td>
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<td><strong>Recharge and Discharge</strong></td>
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<td>• The Middlesex - Elgin Groundwater Study completed an aquifer characterization and mapping to identify recharge and discharge areas. Once this mapping is complete, the information can be used to examine groundwater conditions in the Coves. Because the scale of the Middlesex-Elgin Groundwater Study will be coarse relative to the scale of the Coves Subwatershed, the Groundwater Study may serve as an ideal starting point for identifying future, more detailed work that could be undertaken within the Coves. Review and examine the Middlesex-Elgin Groundwater Study to identify possibilities for future work at a smaller scale i.e. Coves Subwatershed scale. (H) • Record and map the location of groundwater seep indicators such as the presence of watercress or localized areas of low water temperature. Although these are rough field indicators, the information will be useful in identifying localized areas of groundwater discharge. • Combine land use mapping with groundwater mapping to identify specific areas that are sensitive to groundwater contamination. • Develop and distribute information packages or fact sheets for landowners about groundwater recharge, discharge areas and well protection. MOE and OMAF may have fact sheets available for this purpose. (H)</td>
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<td><strong>Wells and Water Sources</strong></td>
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<td>- Confirm and map the location of private wells within the Coves Subwatershed. Consider including sand points and shallow wells in this survey. Shallow wells and sand points locations are not recorded by MOE and may provide additional useful information with respect to water use and sources. Develop a program to identify abandoned or poorly constructed wells and points. (H) • Develop an outreach program for local landowners with wells. Encourage the proper maintenance of wells that are still in use and support decommissioning of abandoned wells according to MOE standards. Pursue funding opportunities with other local and regional groundwater initiatives and the City of London and explore the potential for well decommissioning subsidies. (H) • Produce an information pamphlet or fact sheet on “10 Ways to Conserve Water” that provides best management practices related to the general conservation of water sources. This will tie into the Water Response Team efforts. Pamphlets could be distributed as inserts to PUC bills. (H) • Support/Sponsor a larger scale educational program such as a Groundwater Festival to build an understanding of groundwater protection in the community and foster a sense of stewardship.</td>
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<td>- Groundwater vulnerability mapping for the subwatershed, indicating groundwater recharge and discharge zones and groundwater sensitivity based on land use. • Database for active and inactive wells, septic tanks and beds for residences within the Coves. • Increased awareness among residents about the connection between groundwater quality and surface water quality, recharge and discharge zones and wells. • Increased awareness of residents about wellhead protection strategies and best management practices to implement on their own property. • Develop public presentations and or display material as communication tools to community and school groups. • Increased awareness of residents about low water response and the protection of water sources through conservation practices.</td>
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<td><strong>Potential Partners</strong></td>
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<td>City of London, Middlesex London Health Unit, Ontario Ministry of Agriculture and Food, Ministry of the Environment Upper Thames River Conservation Authority</td>
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### Table E.1 Coves Subwatershed Action Plan

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<tr>
<th>Key Watershed Component</th>
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<tbody>
<tr>
<td><strong>AQUATIC ECOSYSTEM</strong></td>
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<tr>
<td>• Surface and Storm Water Quality</td>
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<tr>
<td>• Sedimentation</td>
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<tr>
<td>• Fish and Fish Habitat</td>
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<tr>
<td>• Stream Channel Morphology</td>
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<tr>
<td>• Species at Risk</td>
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</table>

**Rationale**
The aquatic ecosystem in the Coves is generally degraded. Poor water quality, extreme sedimentation, unstable stream channel morphology and degraded fish habitat are a result of intense urbanization of the majority of the subwatershed.

Natural sedimentation processes in the Coves have been accelerated by artificial inputs of sediment from urban surface water runoff. Urban surface water runoff that contains pollutants such as road sand and salt, hydrocarbons (gasoline and oil), pesticides and other ‘urban’ chemicals is directed to the north part of the subwatershed via storm sewers and enters the Coves untreated. The impact of other contaminants from landfill and industrial locations (Valspar) is not known but will be monitored.

Poor aquatic habitat and a degraded aquatic community result mainly from sediment loading and high water temperatures. Carp dominate the West Cove pond while the East Cove pond contains a more diverse and stable fish community. Fish population tolerant of poor conditions, such as carp, maintain poor conditions by continuing to stir up sediments and preventing aquatic vegetation from becoming estabished.

The timing of this study was ideal because it provided a means to undertake more detailed technical analyses that were beyond the scope of the Subwatershed Study.

**Springbank Drive Widening Project**
The purpose of this Municipal Class Environmental Assessment was to produce a final design for the widening of Springbank Drive from Horton Street to Berkshire Drive in the north end of the Coves Subwatershed. The design will include delivering treated stormwater to the East and West Cove ponds in an effort to enhance water movement through the ponds.

**Surface and Storm Water Quality**
- The most significant long term improvements to water quality will be achieved through the elimination of untreated stormwater entering the Coves pond area. Through municipal capital works projects, opportunities should continue to be identified to improve the design and function of storm sewers and outlets to the Coves. (H)
- Because the surface water conveyed by storm sewers transports contaminants and sediment to the Coves ponds. Upgrades to existing storm sewers, or new sewer systems should include a reasonable level of water quality treatment to remove sediment and oil/grease, particularly for water entering the East Cove pond. (H)
- FOTC and agencies can support City of London urban stormwater management initiatives through information exchange and review.
- Maintain and enhance existing surface water channels and topographic depressions within the subwatershed where possible. These provide temporary and short term water storage.
- Continue to explore the potential to retrofit stormwater management facilities in the Coves Subwatershed. Opportunities may arise through redevelopment of land (Highlands Golf Course) to incorporate stormwater storage and treatment options.
- Educate residents regarding urban Best Management Practices such as the reduction and proper use of pesticides and fertilizers and proper disposal of hazardous household waste. (H)
- Develop and implement a rain barrel program. Seek funding opportunities to subsidize rain barrels for subwatershed residents. Consider combining the rain barrel program with an educational component to promote the disconnection of roof leaders from sewer systems. UTRCA has implemented rain barrel programs in other parts of the Thames River Watershed and may be a resource/partner. (H)
- Develop educational posters that bring all of the components of the ABCs together. Create a visual presentation that integrates the hydrologic cycle, surface water and groundwater quantity and quality, erosion, flooding, terrestrial and aquatic ecosystems and cultural activities.
- Assess the feasibility of introducing modifications to the operation of the Thames River flap gate at the outlet to benefit aquatic species exchange and flow augmentation.

**Sedimentation**
- Work with the City of London, MNR and UTRCA to assess the feasibility of dredging the West and Centre Cove ponds. Dredging may be a possible remediation technique to remove at least a portion of the excessive sediment that has been delivered to the Centre and West Cove pond. The feasibility assessment would give FOTC, the City and agencies an opportunity to discuss whether this option is technically possible, the cost-benefit of such an undertaking and whether or not the concept is worth pursuing.
- Create a list of field-verified erosion hot spots and work with private landowners to develop a plan for implementation of erosion remediation and erosion control measures. An "erosion awareness" program could be established whereby landowners have an opportunity to have an engineer assess erosion problems on their property. This program would connect landowners with the expertise (City of London, UTRCA staff) that can assist them in addressing erosion issues on their property. (H)
<table>
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<tr>
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<tbody>
<tr>
<td>AQUATIC ECOSYSTEM (CONTINUED)</td>
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<td>Species at Risk Ecosystem Recovery Plan</td>
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<td>The Plan is being prepared on a Watershed-scale and includes two aspects; a Recovery Strategy to be developed by a recovery team that identifies recovery goals, objectives and approaches; and an Action Plan that specifies actions to achieve objectives. Within the watershed, activities would include raising awareness about the diversity of species, involving the community in species recovery, and monitoring for changes in species populations. Some of the specific objectives of the Ecosystem Recovery Plan include:</td>
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<td>• Developing effective recovery strategies that address the principle threats to aquatic Species at Risk in the watershed using the best available scientific information; and</td>
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<td></td>
<td>• Improving public consultation and awareness in order to foster responsible public and private actions that benefit aquatic habitats in general.</td>
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<td></td>
<td>Sedimentation (Continued)</td>
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<td>• Compile a list of Best Management Practices and create a fact sheet for erosion prevention for landowners to implement good land use practices on their own land. UTRCA or OMAF may have existing fact sheets to use as a foundation.</td>
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<td></td>
<td>Fish and Fish Habitat</td>
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<td>• Rehabilitation of the West Cove pond must include consideration of removing the carp population. Implement a carp removal program for the West Cove Pond. Work with MNR, Thames River Anglers and UTRCA to develop a “carp derby” (or other strategy) to remove carp from the pond. (H)</td>
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<td>• Benthic invertebrates are an ideal indicator of surface water quality and ecosystem health. Examine the feasibility of implementing a consistent benthic sampling program. Look for partnerships between FOTC, UTRCA, school groups and private landowners to implement sampling program. Use results from benthic and surface water monitoring programs to continue to monitor water quality and ecosystem health. (H)</td>
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<td>• Encourage landowners around the Coves ponds to maintain vegetative buffers and enhance existing riparian vegetation to stabilize stream banks, filter runoff and provide shade and cover. This is especially critical along shorelines such as the trailer park where vertical walls have been constructed into the ponds.</td>
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<td></td>
<td>Stream Channel Morphology</td>
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<td></td>
<td>• Identify opportunities to employ natural channel design techniques during municipal or capital works projects in the Coves. Capital projects that involve work in and around the Coves ponds should incorporate natural channel design principles and strategies to the extent possible.</td>
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<td>• Perform a fluvial geomorphologic assessment and stream reconnaissance to identify opportunities for stream restoration, natural channel design and bioengineering. Efforts to restore the stream channel could be integrated into projects for erosion control, flood control and fish habitat enhancement.</td>
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<td></td>
<td>Species at Risk</td>
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<td>• Support the implementation of the Upper Thames River Conservation Authority Species at Risk Recovery Plan by promoting the awareness and protection of rare species by integrating findings into watershed report cards, posting information on UTRCA website and through community meetings and newsletters.</td>
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<td>• Coordinate with the UTRCA to bring the Species at Risk education program to schools within the Coves Subwatershed.</td>
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</table>
### Table E 1.1 Coves Subwatershed Action Plan

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<tbody>
<tr>
<td><strong>TERRESTRIAL ECOSYSTEM</strong></td>
<td><strong>Recommendation</strong></td>
<td><strong>Intended Outcome</strong></td>
<td><strong>Potential Partners</strong></td>
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<tr>
<td>Natural Heritage</td>
<td>Amended the ESA boundary and designation criteria to include updated information about the features within the Coves.</td>
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<td>Trillium Foundation</td>
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<tr>
<td>Corridors and Linkages</td>
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<td>TD Friends of the Environment</td>
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<td>Wetlands</td>
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<td>World Wildlife Fund</td>
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<td>Slope Stability and Erosion</td>
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<td>Environment Canada</td>
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<tr>
<td>Contamination</td>
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<td>Conservation Authority</td>
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</table>

**Rationale**

The Coves Subwatershed is a heavily urbanized area. The only wooded areas that remain are associated with the Highlands Golf Course and the Coves Environmentally Significant Area. The Coves ESA comprises the floodplain, steep slopes and Silver Creek and related ravines that drain land from the south into the Coves ponds.

The ESA designation is based on the “distinctive landforms displayed in the series of oxbow ponds, the presence of forest area sensitive species, the hydraulic characteristics, the broad diversity of species and the linkage function the area provides to the Thames River corridor.”

Forest cover within the ESA is considered an “edge” habitat because of the lack of forest “interior.” Interior is typically defined as area within the forest that is a minimum of 100m from the forest edge. A very small pocket of forest interior may exist in the Silver Creek ravine portion of the ESA.

When looking for opportunities to naturalize or restore native vegetation, priority should be given to areas adjacent to existing woodlands or open spaces that coincide with potential corridor and linkage opportunities.

The ravine areas in Coves ESA have experienced increased erosion and destabilization as a result of poor land and stormwater management practices.

Ecological literature suggests that forest cover targets should be 30% to sustain biodiversity. This is an unrealistic target given the current nature of the subwatershed. For the Coves Subwatershed, any increase in forest or tree cover will be seen as an improvement. Therefore, no specific targets were established other than the use of existing and absent native species in the key areas provided on Figure D 2.8.1. Specific management criteria will be provided for the rare habitat locations.

### Table E.1.1 Coves Subwatershed Action Plan

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<td><strong>TERRESTRIAL ECOSYSTEM (CONTINUED)</strong></td>
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#### Corridors and Linkages
- Identify and pursue opportunities to create or enhance green corridors and linkages throughout the Coves subwatershed. Large open spaces such as Euston Park represent key elements to building corridors across the Coves Subwatershed.

#### Corridors and Linkages (Continued)
- Retain natural elements and integrate the Coves as part of a larger natural corridor that includes Dingman Creek, Dorchester Swamp, Komoka Park and the Thames River. Key properties include the orchard, Chats / Tippel properties, Euston Park and Highland Woods.
- Work with the City of London to plan and develop hard surface and soft surface trails throughout the subwatershed. Trail systems will form an integral part of constructing linkages from the Thames River through the Coves Subwatershed and into the Dingman Creek Subwatershed. The trail system will also allow foot traffic in less sensitive areas of the ESA. Boardwalks and stairway creation may be necessary where slopes are severe.

#### Wetlands
- Develop a project to examine the possibility of establishing native wetland vegetation in the vicinity of the Centre and West Coves ponds. Assemble appropriate agencies (MNR, DFO, UTRCA, City of London and Ducks Unlimited) to explore the feasibility and potential benefits of enhancing wetland vegetation communities in this area. An impact assessment, including potential impacts to hydrology, water conveyance, geomorphology etc. would be the next step in understanding and weighing potential positive and negative impacts.

#### Slope Stability and Erosion
- Erosion monitoring stations established during the Coves Drainage and Remediation Master Plan should continue to be monitored and evaluated. This could be achieved through a partnership among the City of London, UTRCA, FOTC and private landowners.
- Identify opportunities in future municipal projects (storm sewer and outlet improvements) to incorporate ravine remediation and restoration combined with planting of native species.
- Create a list of field-verified erosion hot spots and work with private landowners to develop a plan for implementation of erosion remediation and erosion control measures. An "erosion awareness" program could be established whereby landowners have an opportunity to have an engineer assess erosion problems on their property. This program would connect landowners with the expertise (City of London, UTRCA staff) that can assist them in addressing erosion issues on their property.
- Compile a list of Best Management Practices (e.g., pesticide use on your lawn, proper disposal of lawn clippings and yard waste) and create a fact sheet for erosion prevention for landowners to implement good land use practices on their own land. UTRCA or OMAF may have existing fact sheets to use as a foundation.
- Develop an educational package for landowners and the community to foster an improved understanding of the balance between land use, soil erosion and stream dynamics. It will be important to acknowledge the difference between human-induced and natural erosion processes and the importance of natural erosion to stream morphology and overall stream health.

#### Contamination
- Create a "hot spot" database that will hold information on areas of concern in the Coves Subwatershed. The existing landfill information that was gathered as part of the Subwatershed Study could become part of this database. Anecdotal and confirmed evidence of land contamination could also be organized in this database. The database format will aid in managing this information and communicating concern to appropriate personnel at the Ministry of the Environment and City of London. (H)
<table>
<thead>
<tr>
<th>CULTURAL HERITAGE</th>
<th>Edward Street Area Storm Extension and Outfall Structure (2003)</th>
<th>Historical</th>
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<tbody>
<tr>
<td>This study will afford an opportunity to check the possibility that remains of the prehistoric Iroquoian village at Edward Street and Tecumseh Avenue still survive within residential lots in the area of that intersection.</td>
<td>Implement the recommendations of The Archaeological Component of the Coves Subwatershed Study, City of London, Middlesex County, Ontario (D.R. Poulton and Associates Inc. 2003). These include:</td>
<td>Implementation of various community education programs.</td>
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<td>o Update City of London Archaeological Master Plan to include the information presented in the Poulton report. That would include revisions to the inventory of known and suspected archaeological sites of the portion of the City contained within the Subwatershed and immediate vicinity. (H)</td>
<td>Development a distribution of various Best Management Practices packages to target groups within the Coves.</td>
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<td>o Revise City of London GIS-based archaeological site potential mapping to include the interior blocks of Manor and Highland Park neighbourhood. (H)</td>
<td>An increased awareness and appreciation of the Coves area (ravines, ponds, ESA) demonstrated by reduced dumping, improved land stewardship, increased membership in FOTC etc.</td>
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<td>o City of London and Ministry of Culture make use of the Poulton report and Subwatershed Study in future planning with respect to the archaeological resources of the subwatershed.</td>
<td>Evolution of the Coves Clean-up Day to a Coves Celebration Day which could be hosted in winter with ice skating.</td>
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<td>o Future development of parks infrastructure, utilities or other impacts within parklands should be subject to an archaeological assessment to address known, suspected and as-yet undiscovered archaeological remains.</td>
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<td>o Development such as linear corridors of impacts along road rights-of-way and through privately owned land, most notably road widening and the installation of utilities and other infrastructure should be evaluated on an individual basis and archaeological assessments conducted where appropriate as a condition of approval.</td>
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<td>o The older established neighbourhoods in the Subwatershed have a potential for archaeological remains. Any severances or other development applications affecting these neighbourhoods should be evaluated on an individual basis and archaeological assessment should be required where appropriate as a condition of approval.</td>
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<td>o The Coves floodplain includes extensive areas of undeveloped land and areas with a high degree of potential for well preserved archaeological sites. Any future change in land use may trigger a requirement for archaeological assessment.</td>
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<td>o FOTC could take a proactive approach in identifying possible ways and means of further archaeological survey and test excavation to expand the knowledge of the below-ground heritage resources of the subwatershed. This may be achieved by identifying opportunities and funding sources for archaeological surveys.</td>
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<td>o Look for opportunities to involve volunteers from the London Chapter of the Ontario Archaeological Society and London Historical Society in future Coves research.</td>
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<td>o Establish and maintain a central repository of all Coves resources. This might be best suited to Landon Library located within the subwatershed. This repository would include the Subwatershed Plan and all reference material used to complete the Subwatershed Study, including historical maps, documents etc. (H)</td>
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<td>o Highlight historical Significance of the Coves area through awareness programs such as the proposed Landon Library Coves Corner. Initiate similar programs with the City of London Heritage Planner.</td>
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<td>o Develop and install a ‘Coves interpretive sign’ along the Thames River trail at Greenway Park. The purpose of this sign would be to bring attention and awareness to the Coves area, explain cultural significance, provide information on the geomorphic processes that formed the Coves ponds etc.</td>
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<tr>
<td>Key Watershed Component</td>
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<td>Recommendation or Action</td>
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<tr>
<td>Cultural Heritage (Continued)</td>
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**Cultural Programs**
- Develop and support culturally-based programs that raise the profile of the Coves. The Coves Art Exhibit is a good example of how art, culture and environmental awareness can be combined in a creative way. Continue to generate ways of achieving environmental awareness in cultural programs.

**Community Education**
- Various Best Management Practice packages have been proposed through recommendations and actions associated with groundwater, aquatic ecosystem and terrestrial ecosystem components (previous sections of this table). A summary of the potential themes for Best Management Practices is presented below (H):
  - Surface runoff management – rain barrels, reducing impervious surfaces around the house/property
  - Land stewardship targeted in and around the ESA includes slope/hazard management and erosion remediation
  - A guide to planting native species around the home
  - Septic systems and well management and decommissioning
- School programs have been suggested in previous sections. Many school programs already exist and are undertaken through the environmental education facilities of the school boards by UTRCA and other agencies. There may be an opportunity to develop additional programs, specific to the Coves, with local schools. Some of the programs that are currently delivered by UTRCA include: (H)
  - Species at Risk
  - Tree Planting
  - Fish and Fish Habitat
  - Water Quality and Benthic Sampling
- Research environmental education programs developed by other agencies and organizations and develop a strategy to implement these programs to local schools. Programs include Yellow Fish Road, Feeder Watch, Amphibian surveys etc. Look for programs developed by Environment Canada or other grassroots environmental organizations.
- Continue with Coves Clean-Up Day. (H)
- Seek support and sponsorship of local Coves businesses for the development and delivery of educational programs to local schools. Often it is a lack of funding on the part of the school that limits the number of outside programs and opportunities a school can pursue. Friends of the Coves is well positioned to seek monetary support to bring specific educational programs to local schools. Costs will vary with programs. Existing programs with local agencies such as the UTRCA, Stewardship Council etc., are a good starting point for this work. (H)

**Land Use Designation / Future Use**
- Confirmation of the boundaries of the ESA is needed to ensure consistent application of programs and feature protection. (H)
- Consistent zoning designation (OS4 or OS5) of the Coves ESA features is needed to reflect ESA criteria and protection. (H)
- The vistas and natural views from the lowlands within the ESA and from the top of slopes looking into the ESA need to be protected and considered in any applicable land use change proposals. (H)
- The future use of the lands within the Coves ESA should be considered with respect to ESA and SPA criteria with any property redevelopment plans. (H)
Heritage. The table also includes related current initiatives that provide some description of projects that may serve as a resource during implementation.

The specific recommendations are based directly on the general recommendations listed above and include project ideas and direction that incorporate monitoring, rehabilitation, habitat enhancements and related topics.

In order to prioritize the tasks, the focus should be first to “retain” environmental conditions, second to “rehabilitate” and finally to “replace” environmental features and functions. With this prioritization mechanism as a guide, the table indicates those actions that are most desirable and given a high (H) priority ranking. This ranking however should not preclude acting upon specific opportunities if and when they present themselves.

This Subwatershed Plan is a long range (e.g., 25 year) planning document. It will serve to guide resource management and land use decisions within the subwatershed. These decisions will involve a number of groups, offices and agencies. It will also involve key properties and geographic areas within the subwatershed, such as the Coves ESA (including the Valspar property, Tippel property, German Canadian Club, Coves Trailer Park), in addition to Euston Park, Highland Woods (park) and Highlands Golf Course.

A key recommendation of this plan is to initiate or continue, monitoring of specific subwatershed characteristics and use this material to adjust management strategies accordingly. This is a concept referred to as “Adaptive Environmental Management” and is portrayed on Figure A 1.5.1. Therefore, this plan will need to be periodically reviewed and updated.

It is recommended that a formal review of the Plan occur every 5 years and be managed by the Friends of the Coves Subwatershed Inc. with assistance by the City of London and the Upper Thames River CA. In the short term, a review of the findings (once completed) from the “Coves Area Drainage and Remediation Master Plan” by Dillon Consultants should be conducted in relation to this Coves Subwatershed Plan. This review would be conducted to identify inconsistencies between the two documents and address conflicting recommendations. We anticipate that the two studies are complimentary and that the inconsistencies will be of a minor nature.
SECTION F – REFERENCES


City of London, 2002. Cultural Heritage Landscapes, a Planning Committee Report by Christine Nelson, Cultural Heritage Planner to City of London Planning Committee Meeting, March 11, 2002


Environment Canada. 1998. Great Lakes Fact Sheet – How Much Habitat is Enough?


Ibarzabal, J. and A. Desrochers. 2001. Lack of Relationship Between Forest Edge


Natural Heritage Information Centre, Ontario Ministry of Natural Resources. 2003. Online: www.mnr.gov.on.ca/MNR/nhic/nhic.cfm


