



ETOBICOKE CREEK WATERSHED FISHERIES MANAGEMENT PLAN

Detailed Implementation Chapter

DRAFT

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1 ACKNOWLEDGEMENTS

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2 ACRONYMS

AIS	Aquatic Invasive Species
DFO	Fisheries and Oceans Canada
EMP	Environmental Management Plan
FMP	Fisheries Management Plan
FMZ	Fisheries Management Zone
GIS	Geographic Information System
HDF	Headwater Drainage Feature
HIP	Habitat Implementation Plan
IPO	Implementation Project Opportunity
LID	Low-Impact Development
OMNR	Ontario Ministry of Natural Resources
OMOE	Ontario Ministry of Environment
ORAC	Oak Ridges Aquifer Complex
PWQMN	Peel Water Quality Monitoring Network
QEW	Queen Elizabeth Way
ROP	Restoration Opportunities Plan
RWMP	Regional Water Monitoring Program
SNAP	Sustainable Neighbourhood Retrofit Action Plan
STEP	Sustainable Technologies Evaluation Program
SWM	Stormwater Management
TGC	Toronto Golf Club
TNHS	Terrestrial Natural Heritage System
TNHSS	Terrestrial Natural Heritage System Strategy
TRCA	Toronto and Region Conservation
WUMP	Water Use Management Plan

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3 INTRODUCTION

In 2006, the Etobicoke Creek Fisheries Management Plan (TRCA, 2006a), was developed by Toronto and Region Conservation (TRCA) in partnership with the Ontario Ministry of Natural Resources (OMNR) and the Fisheries and Oceans Canada (DFO). The document provided a historical and contemporary characterization of environmental conditions within the watershed, with particular attention on the aquatic ecosystem. The objectives of the Fisheries Management Plan (FMP) were to identify critical issues, develop management targets and suggest implementation opportunities that would provide in-stream and riparian conditions that are sustainable to fish communities. Since the writing of the Etobicoke Creek FMP, the implementation chapter of FMPs in general have evolved into far more comprehensive documents that bridge the gap between broad project suggestions and the practical application of restoration work, data collection and resource management. In other words, recent FMP structure has focused on translating identifiable issues into more detailed and workable solutions.

During the writing of the Etobicoke Creek FMP, an evaluation of current watershed target achievements was being conducted through *Turning over a new leaf: the Etobicoke and Mimico Creeks Watersheds Report Card* (TRCA, 2006b). Since this evaluation, additional watershed planning has been achieved by means of improved acquisition and application of technical data. Gaps in our understanding of baseflow and in-stream barriers, for example, have since been filled to an extent that some of the original FMP management and implementation recommendations can now be updated. Recently, the *Etobicoke and Mimico Creeks Watersheds Technical Update Report* (TRCA, 2010a), herein referred to as the *Technical Update*, was completed using the guidance of the *Etobicoke and Mimico Creeks Watersheds Report Card* to fill in this missing technical information and spearhead an update to management priorities for the entire watershed. Critical data gaps discussed by the *Technical Update* include the following areas:

- Groundwater quantity and quality
- Surface water quantity
 - Baseflow and water use
 - Stormwater management and streamflow
- Fluvial geomorphology
- Surface water quality
- Terrestrial natural heritage system (TNHS)
- Aquatic system – in-stream barriers to fish passage

Although each of these areas were addressed within the context of entire watershed health, and not specifically from a fisheries perspective, the integrated role they play in affecting aquatic systems management positions the *Technical Update* as a prime resource for integration with the Etobicoke Creek FMP. The *Technical Update Report* serves to inform the direction of updated or new and more detailed implementation projects presented in this addendum to the original FMP.

This *Detailed Implementation Chapter* will address project opportunities in eight distinct catchments within the Etobicoke Creek watershed (refer to section 4 *Fisheries Management Zones* for catchment boundary delineation). Within each section, an updated summary of features and conditions will preface the details surrounding project implementation. Figures of each subwatershed present the geographical location of projects and are followed by project sheets (Tables) that explain the potential project components that should guide the implementation of fisheries management projects within Etobicoke Creek.

3.1 Objectives

In the context of both the Etobicoke Creek FMP and *Technical Update*, the purpose of this *Detailed Implementation Chapter* is two-fold. First, it serves as an addendum to the FMP, taking old and new issues into account by providing a list of well-detailed project opportunities and geographical locations for implementation. Secondly, it serves as a supplementary resource to the *Technical Update*, filling in the riparian and fisheries perspectives not included in the initial scope of that report.

The principle objectives of this *Detailed Implementation Chapter* are:

- to integrate updates in technical data, planning and management concerns with the recommendations of the Etobicoke Creek FMP;
- to update existing Etobicoke Creek FMP project opportunities and identify new areas of interest;
- to provide a more detailed direction for implementation planning and opportunities beneficial to the aquatic ecosystem.

3.2 Project Approach

Projects within the Etobicoke Creek watershed that have been selected and recommended for completion through this update are identified as Implementation Project Opportunities (IPOs). Selection of the types and geographical position of IPOs involved guidance from the following resources:

- *Etobicoke and Mimico Creeks Watersheds Technical Update Report* (TRCA, 2010a);
- various FMPs, including *Rouge River Watershed Fisheries Management Plan* (TRCA, 2010b), *Humber River Fisheries Management Plan* (TRCA, 2005), and *Fisheries Management Plans for Duffins Creek and Carruthers Creek* (TRCA, 2004);
- *Etobicoke-Mimico Creek Watersheds Habitat Implementation Plan* (HIP) (TRCA, 2003);
- *Etobicoke and Mimico Creek Watersheds Restoration Opportunities Plan* (ROP) (TRCA, 2010c);
- *Terrestrial Natural Heritage System Strategy* (TNHSS) (TRCA, 2010a);

- *Greening Our Watersheds: Revitalization Strategies for Etobicoke and Mimico Creeks* (TRCA, 2002)
- site visits;
- and various other TRCA or municipal studies and reports (refer to section 5 *References* for a complete list).

To determine the types of IPOs that may be designated for the watershed, various distinguishing geophysical features and aquatic habitat conditions were considered. Water quality, water withdrawals, flow regime, riparian vegetation, anthropogenic in-stream barriers, channelization, Index of Biotic Integrity (IBI) ratings, and data gaps were employed as the central drivers for project selection. Types of habitat degradation that have significantly limited the viability of fish through ecosystem impairment were primarily used to decide the locations and project types suggested within this document. Although locations that are high in priority for aquatic ecosystem health are suggested here, some IPOs are rationalized according to their high community participation value or due to their timing with other implementation projects in the area.

Most IPOs suggested in this document specify a general location where the suggested project may be implemented. Certain IPOs that could reasonably apply to the entire subwatershed are also listed (e.g. water quality improvement, channel naturalization, riparian restoration, upland tree planting) but with the understanding that other programs are in-place or will be in-place to further specify project priorities and locations beyond the fisheries perspective (e.g. "Peel Channels Study", Riparian Opportunities Plan (ROP), Municipality Stormwater Retrofit Studies).

IPOs do not represent an exhaustive list of all project opportunities within the watershed and therefore do not preclude other projects that may also serve to enhance the aquatic community. Other programs, strategies and municipal planning that is or will be developed within Etobicoke Creek, provide numerous opportunities for the complementation of work presented within these IPOs.

4 FISHERIES MANAGEMENT ZONES

In past watershed planning documents, including the Etobicoke Creek FMP, the watershed has been divided into four major subwatersheds: Upper Etobicoke, Spring Creek, Little Etobicoke and Lower Etobicoke. The recent *Technical Update* report recharacterized Etobicoke Creek subwatershed boundaries by updating the drainage network through a series of improved modelling and GIS tools. Through this process, eight subcatchments were determined. The smaller areas defined by these subcatchment boundaries have more easily allowed the identification of unique physiogeographic, land use and conservation concerns that can be used to better scope the direction of management than the original four broad catchments. For instance, a gradient in habitat quality tends to start high towards the headwaters and moves downstream through to poorer quality urbanized lands. Despite the similarities between some subwatersheds, variations in land use, stream order, fish communities, groundwater features and distribution of quality habitat, such as wetlands, are all used to characterize each by their unique contribution to fish sustainability.

To stay consistent with the *Technical Update*, the positioning of detailed fish management projects developed through this document have adopted the delineation of the eight subwatersheds. These subwatersheds, which are referred here as Fisheries Management Zones (FMZ), are illustrated in **Figure 2-1**, and presented as follows:

Upper Etobicoke

- FMZ 1 Etobicoke Headwaters
- FMZ 2 Etobicoke West Branch
- FMZ 3 Tributary 3

Spring Creek

- FMZ 4 Spring Creek

Little Etobicoke

- FMZ 5 Little Etobicoke

Lower Etobicoke

- FMZ 6 Etobicoke Main Branch
- FMZ 7 Tributary 4
- FMZ 8 Lower Etobicoke

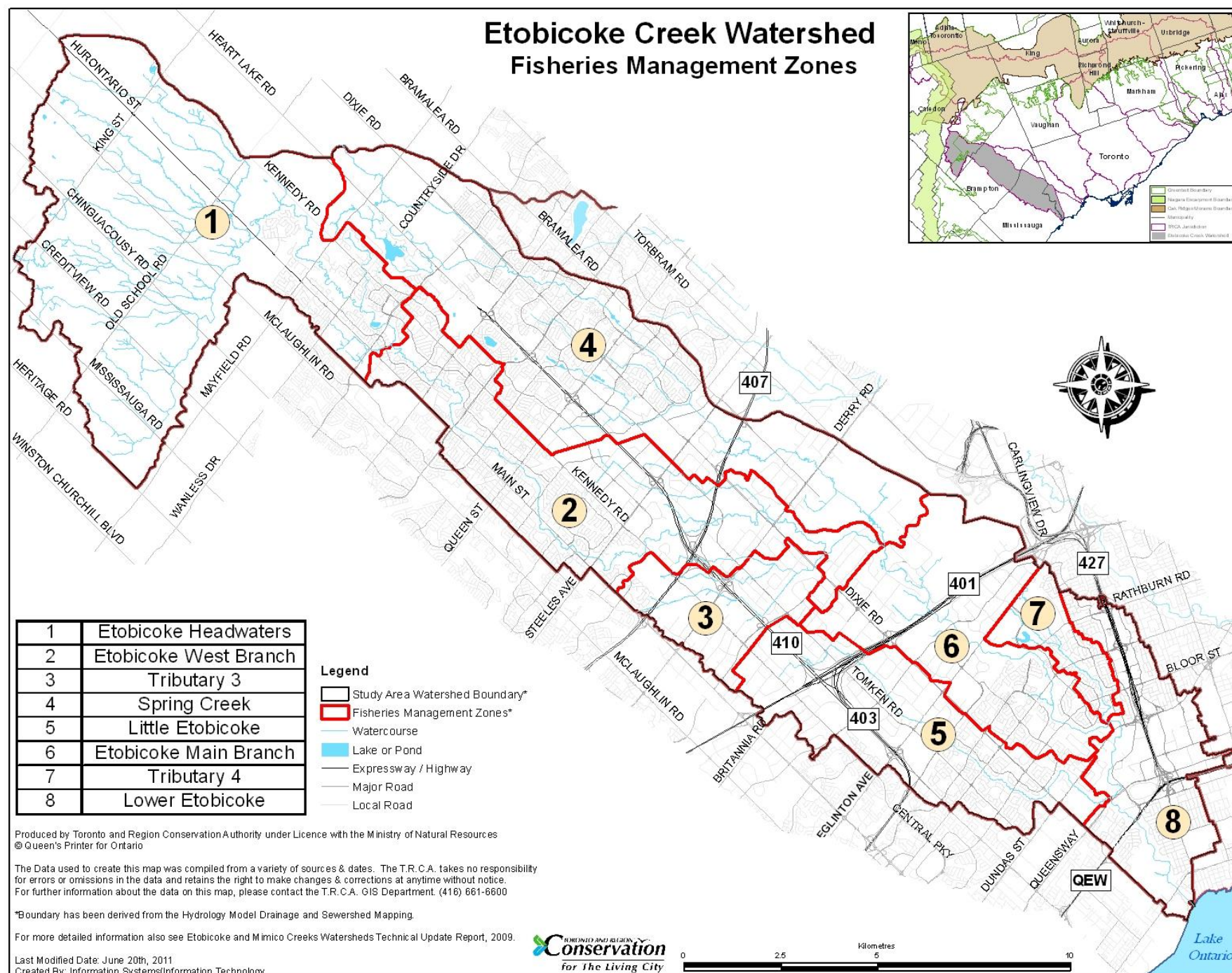


Figure 4-1: Etobicoke Creek Fisheries Management Zones Delineation

4.1.1 Etobicoke Headwaters (FMZ 1)

Land use within the Etobicoke Headwaters (FMZ 1) has predominantly accommodated an agricultural function, allowing the subwatershed to still support the highest quality aquatic habitat in Etobicoke Creek (**Figure 4-2**). Although this large portion of agricultural land has devastated much of the historic terrestrial features, the relatively high upland connectivity and large tracts of natural cover have had a lower impact on the receiving streams in comparison to highly urbanized catchments lower in the watershed. Habitat diversity within FMZ 1 is further enhanced by the fact that it is one of only two zones within Etobicoke Creek that possesses a wetland feature, with the other being in Spring Creek. The scarcity of such habitat emphasizes the importance of protecting and enhancing it to help maintain and improve present biodiversity (Meyer *et al.*, 2003).

Since FMZ 1 is largely composed of private lands, data collection here has been severely limited. Many of the habitat assumptions made by the original FMP, including fish community characterization and thermal regime, were based on minimal to no data but recent land use planning has provided a growing opportunity to confirm these assumptions. Recent and future municipal infrastructure and capital works (e.g. expansion of Highway 410, widening of Mayfield Road, water feeder main installation) have been set forth to accommodate future growth planning north of Mayfield Road (CH2M Hill Engineering Ltd., 1995; TRCA, 2010a). Land use changes are now anticipated through the direction of Mayfield West Phase I, Mayfield West Phase II and Snell's Hollow Secondary plans. Therefore, the main project opportunities within this FMZ, such as data collection and habitat enhancement, stem from the potential shift of private to public land ownership.

Data collection that helps characterize the fish community and thermal regime are of highest priority. The majority of tributaries within FMZ 1 are currently defined as warmwater due to a lack of temperature data, as advised by the original FMP. Therefore, the single coldwater division at the southwest tributaries of the Headwaters may not be the only coldwater habitat retained here. Habitat conditions seldom found in the other Etobicoke Creek subwatersheds, including coldwater, good thermal stability, minimal known anthropogenic barriers and an entirely natural streambed, have all allowed this FMZ to support a relatively high Index of Biotic Integrity (IBI) (TRCA, 2010a). IBI measurements, illustrating high biodiversity, fish abundance and strong trophic structure, are relevant indicators of aquatic ecosystem health between Old School Road and Mayfield Road. However, as a result of inevitable private to public land use conversions, measurements of ecosystem health may be established beyond the bounds. Since planning has not yet occurred for this area, working with private landowners in the interim is the primary option in order to achieve management goals in a timely manner.

Another implication of the conversion of agricultural lands to high-density urban developments is the increase in impervious surfaces that results in reduced infiltration. This may have negative affects on important recharge and discharge zones in the region near the Oak Ridges Aquifer Complex (ORAC) (TRCA, 2010a). Resultant alterations in surface flow can impact thermal regime, water quality and aquatic habitat. As a result, it is imperative to ensure low-

impact development (LID) approaches are incorporated into community designs in order to protect recharge, and water balance as a whole. Retaining this infiltration condition in the developing area has further downstream benefits at important discharge zones (e.g. Mayfield Road to Bovaird Drive within FMZ 2) (TRCA, 2010a).

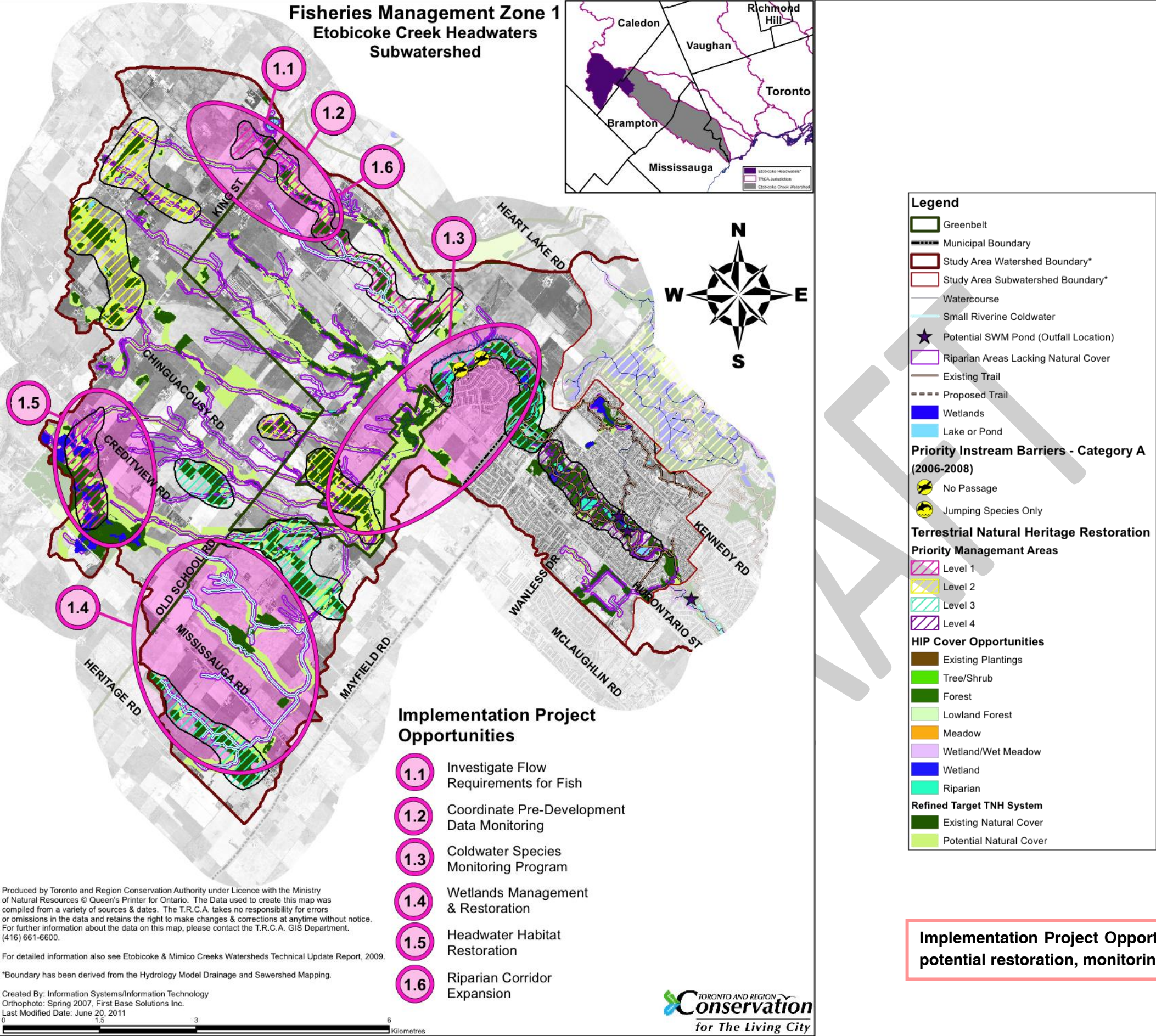
Maintaining infiltration is important to ensure consistency in baseflow in the developing areas, however baseflow fluctuations have also been an issue in low-order streams that are situated beyond current planning zones. Some headwater tributaries experience intermittent conditions during the summer months that create seasonal limitations in terms of the ability of aquatic species to access upstream habitat, potentially including Headwater Drainage Features (HDFs). This natural limitation is exacerbated by the point that the highest quantity of irrigation, commercial, and livestock water-takers exist in the Headwaters. The *Technical Update* identifies a northern tributary that is currently highly sensitive to surface withdrawals during these low flow conditions. It is important to address the water sensitivity concerns here to prevent the loss of small intermittent and ephemeral streams during dry weather, particularly in the headwaters where quality habitat is seasonally limited (TRCA, 2007).

While planning progresses in FMZ 1, LID techniques should further incorporate HDFs into their designs. As more data is collected on the benefits of HDFs in urbanized settings, the importance of retaining them has elevated (TRCA, 2007). Although these ephemeral features can provide direct benefit through temporary fish habitat, they further supply a resource of flow, sediment and quality nutrients for indirect downstream benefit. As development proceeds in FMZ 1 and the science of HDFs is better understood, maintaining them or incorporating them as an alternative to designing stormwater management (SWM) controls is a popularizing option for consideration.

Since land use in the Headwaters has been predominantly rural and there have been minimal high-density developments, stormwater management controls have not yet been a necessity, however Municipal Stormwater Retrofit Studies have designated opportunities for the area (TRCA, 2010a; Aquafor Beech Ltd., 2003). The minimal amount of impervious surfaces have not yet made these a priority from a fisheries perspective, and data from Regional Water Monitoring Program (RWMP) stations still indicate relatively unimpaired water quality. Other strategies and programs in the works for FMZ 1 that still have relevance to fish sustainability include the TNHSS (TRCA, 2010a) and ROP (TRCA, 2010c). The ROP in particular has identified four general areas within the FMZ that are priority locations for planned increases in natural cover to either restore what has been lost or improve connectivity. Further initiatives include watershed planning directions that may be found in the *Technical Update* (2010a).

4.1.1.1 Implementation Project Opportunities FMZ 1

Six IPOs have been identified for the Etobicoke Headwaters, with their approximate locations indicated in **Figure 4-2**. A description of each project and direction for potential project components can be found in Error! Reference source not found. **Table 4-1, Table 4-2, Table 4-3, Table 4-4, Table 4-5, and Table 4-6.**



FMZ 1 - Opportunities and Challenges

- Higher habitat quality (e.g. coldwater, wetlands), and water quality is present here in comparison to downstream FMZs.
- Biodiversity and IBI rating is among the highest in the watershed.
- Urban growth planning north of Mayfield Road provides several data monitoring opportunities as private lands come under public ownership.
- Priority habitat restoration opportunities exist, as identified through TRCA's Terrestrial Natural Heritage System Strategy and Riparian Opportunities Plan.
- Valuable groundwater discharge and recharge zones require protection as upstream urban growth threatens water infiltration.
- Seasonally sensitive tributaries have been identified as a result of water-taking during baseflow conditions.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Figure 4-2: FMZ 1 Etobicoke Headwaters IPO Locations

Table 4-1: IPO 1.1 Investigate Flow Requirements for Fish

Implementation Project Opportunity	
Project Name	IPO 1.1 Investigate Flow Requirements for Fish
Priority Rationale	Significant surface water withdrawals have been identified by the Surface Water Vulnerability Assessment (TRCA, 2010a) for the northern headwater tributary from King Street to Old School Road. Greater than 25% of available baseflow is taken from this reach during water-taking activity, putting it in a state of high vulnerability during low flow summer conditions. Seasonal sensitivity caused by dry summer conditions limits the use of habitat by fish and interrupts downstream benefits. With Headwater land use being primarily under private ownership, many data gaps exist regarding aquatic species abundance and diversity at or near this location.
Management Target(s)	Surface Water Regime, Aquatic Community
Project Description	Determine in-stream flow requirements for fish species and habitat at reaches that are sensitive to surface withdrawals by water-takers, as identified by the Surface Water Vulnerability Assessment. An analysis of flow requirements may provide a resource for executing water allocation decisions at these sensitive reaches for the purpose of maintaining water balance and preventing seasonal habitat loss.
Related IPOs	Table 4-7, Table 4-29
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Pre-study fisheries characterization	- Updating historical fish sampling locations and/or designating new locations is required to determine the presence, abundance and diversity of fish communities within and downstream of sensitive water-taking reaches. - In sensitive reaches contained on privately owned lands, work with landowners to acquire temporary access.
Post-study fisheries characterization	- If proposed water-use guidelines or engineered solutions are implemented, continue to monitor fish presence to determine project study success. - Monitoring will be facilitated as lands come into public ownership.
2. Flow Regime	
Gauge location identification	Determine the location of any existing flow gauges that are either located within the sensitive reach or within a reach of similar physical, geological and hydrological characteristics (e.g. flow volume, stream order).
Determine Flow Requirements	- In reaches requiring the transfer of gauging data from other streams, select an approach for transferability (Aquafor Beech Ltd., 2005). - Transferability from reaches within or outside of Etobicoke Creek should take into account various factors affecting water-use sensitivity, including: physical factors underlying flow regime, land use, and the water-taking activity itself. - Use DFO's in-stream flow calculations to determine fish requirements for sensitive reaches.
3. Analysis and Communication	
Reporting results	- Document updated fish community data. - Coordinate the findings for in-stream flow requirements with existing water-taking data. - Assess the need for alternative water-use systems.
4. Landowner Stewardship	
Implementation	Assist water-takers in developing Water Use Management Plans (WUMPs) and Environmental Management Plans (EMPs) for the management of water-use alternatives, including fixed intake, sustainable off-stream storage and supply or risk-assessment monitoring systems.

* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).

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Table 4-2: IPO 1.2 Coordinate Pre-Development Data Monitoring

Implementation Project Opportunity	
Project Name	IPO 1.2 Coordinate Pre-Development Data Monitoring
Priority Rationale	With planned land use changes and future development projects expanding through the Etobicoke Headwaters, acquiring baseline data has become a prime concern in order to maintain and enhance the quality aquatic conditions that remain here and improve downstream locations. In particular, Mayfield West Phase I and II, and Snell's Hollow Secondary Plans define a major development zone within the bounds of Mayfield Road to the North, Old School Road to the South and Chinguacousy Road to the West.
Management Target(s)	Groundwater Regime, Thermal Regime, Aquatic Community
Project Description	Improve the coordination of existing stream monitoring programs. The compilation of baseline flow, thermal and fish community data collected by developers requires coordination with TRCA's RWMN, Sustainable Technologies Evaluation Program (STEP) and fisheries databases.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Coordination	
Multi-level data synchronization	Determine existing/pre-urbanization monitoring efforts enforced through development planning and integrate the data with programs throughout the TRCA, including RWMN, STEP and fisheries databases.
Monitoring	- Identify the need for increased monitoring of flow, thermal regime and fish community at locations absent of gauges/stations or relative to sensitive and quality aquatic habitat. - Ensure long-term monitoring is conducted to encompass a period of pre- and post-development as to understand the ecological implications and effectiveness of mitigation techniques as development progresses.
2. Data Implementation	
Low-impact development (LID)	- Ensure development plans incorporate existing data such that the integrity of the aquatic system can be maintained through the implementation of LID techniques. - Use resources provided by the TRCA's STEP to incorporate sustainable community designs (e.g. porous surfaces).
Zero-order streams	- Incorporate existing HDFs/zero-order streams into the planning and design of innovative SWM controls, with emphasis on maintaining water quality, thermal regime and water balance. - Developers and consultants should evaluate, classify and manage HDF opportunities using existing headwater guidelines (CVC and TRCA, 2009).
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-3: IPO 1.3 Coldwater Species Monitoring Program

Implementation Project Opportunity	
Project Name	IPO 1.3 Coldwater Species Monitoring Program
Priority Rationale	The southern headwater tributaries from Creditview Road to Heritage Road remains the only known coldwater region within the Etobicoke Headwaters, and only one of two known regions within the entire watershed. With development plans now moving northward, it is anticipated that this coldwater region will eventually be exposed to surrounding urban development. Current development plans downstream of this location may further threaten the migration of species towards this upstream habitat. The northernmost coldwater reach located immediately West of Creditview Road should be of focus, as it has been previously identified as permanently flowing (TRCA, 2010a) and is also contained within a priority habitat restoration opportunity identified in the ROP.
Management Target(s)	Aquatic Community, Aquatic Habitat
Project Description	Ensure habitat conditions and the presence of fish species within coldwater reaches is properly characterized to fill existing knowledge gaps, especially with the prospect of on-going alteration in land use, and private to public ownership changes. Assess and/or refine current management targets for coldwater species.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Landowner stewardship	- Coldwater reaches are out of the bounds of current development plans, and access to streams will be limited in this area. - Identify potential locations and work with private landowners to access lands for fish sampling prior to any future development or land use changes. - If necessary, use educational tools (e.g. pamphlets, presentations) to assist landowners in understanding the importance of their property in relation to the coldwater habitat and the relevance of sampling.
Fisheries sampling	Collect fish samples to confirm or refine present fish community management targets for the coldwater reaches of this subwatershed.
2. Riparian Habitat	
Riparian characterization	Record descriptions of existing riparian habitat conditions as an aid for refining fish community targets and narrowing restoration opportunities.
ROP implementation	- Coordinate identified riparian enhancement opportunities with ROP-identified priority sites within this coldwater reach. - Focus on riparian vegetation and enhancement designs that reflect sustainability for coldwater species.
Landowner stewardship	Promote existing programs and workshops available to landowners as a tool for education and stewardship (e.g. tree planting, wetland/riparian maintenance, HDFs, SWM).
3. Aquatic Species Barrier	
Identification	- Work with private landowners to identify barriers previously not assessed, that may block fish passage to quality coldwater habitat and force species towards downstream development zones that contain less hospitable conditions. - Use previously unknown barrier locations on private lands to complete current databases. - Agency consultation and approvals will be required prior to mitigation work.
4. Data Integration	
Coordination	- Coordinate coldwater fisheries data with existing data collected by developers in downstream plan sites. - Determine the relevance and potential impact of downstream urban developments on upstream coldwater fisheries.

* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).

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Table 4-4: IPO 1.4 Wetlands Management and Restoration

Implementation Project Opportunity	
Project Name	IPO 1.4 Wetlands Management and Restoration
Priority Rationale	In the entire Etobicoke Creek watershed, the Cheltenham Wetland Complex contains the only other major wetland habitat apart from the Heart Lake Wetland Complex in Spring Creek. Maintaining wetlands such as this is an important component in aquatic sustainability (Meyer <i>et al.</i> , 2003) and the general location has already been identified through the TNHSS and ROP as being a high quality, high potential system with a habitat restoration priority. Moreover, OMNR has intentions to determine the value of designating this location as Provincially Significant in late 2011.
Management Target(s)	Terrestrial Natural Heritage
Project Description	Meeting the objectives of priority wetland restoration/creation work and supporting wetland evaluation initiatives that are anticipated for the FMZ.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Wetland Habitat	
Wetland evaluation initiative	Support OMNR's initiative to evaluate wetland locations as Provincially Significant and modify wetland management directions.
Habitat identification	- Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. - Coordinate priority sites with existing private landowner stewardship projects. - Determine the appropriate extent of wetland recovery or design of wetland creation sites using existent and historical knowledge of wetland form and function. - Emphasize wetland creation that is sustainable to fish species historically found in the subcatchment.
ROP implementation	- Implement approved wetland restoration plans. - Intermittently monitor the progress of wetland recovery to ensure establishment of vegetation and overall success of restoration efforts.
2. Data Monitoring and Sampling	
Fisheries sampling	- Characterize the existent fish community diversity and abundance in Cheltenham-associated headwaters. - Assess fish community dynamic and interaction with or use of the wetland complex.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-5: IPO 1.5 Headwater Habitat Restoration

Implementation Project Opportunity	
Project Name	IPO 1.5 Headwater Habitat Restoration
Priority Rationale	Extensive agricultural land use in the headwaters has limited the quality of habitat within and around the riparian zone. The TNHSS and ROP have both identified the northern tributary between King Street and Old School Road as being both low in natural cover and high in habitat potential. As private land eventually falls into public ownership, or where private landowners permit, restoration opportunities become relevant.
Management Target(s)	Terrestrial Natural Heritage
Project Description	The low quantity and quality of natural cover in high agricultural regions of the headwaters should be restored in cooperation with the existing ROP to provide appropriate spawning and feeding habitats sustainable to fish communities.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Landowner Stewardship	
Landowner relationship	- Identify priority riparian restoration locations requiring permission from and interaction with landowners. - Establish a rapport with landowners willing to learn more about the aquatic system, the ecological importance of their land and/or improve habitat on their land.
Educational workshops	Promote existing programs and workshops available to landowners as a tool for education and stewardship (e.g. tree planting, wetland/riparian maintenance, HDFs, SWM).
2. Riparian Habitat	
ROP implementation	- Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. - Coordinate priority sites with existing private landowner stewardship projects. - Focus on riparian vegetation and enhancement designs within permanently flowing streams.
Zero-order streams	Identify HDFs on private land and restoration opportunities, as permitted by landowners.
Monitoring	Implementation sites should be periodically monitored to ensure the success of vegetation at these locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-6: IPO 1.6 Riparian Corridor Expansion

Implementation Project Opportunity	
Project Name	IPO 1.6 Riparian Corridor Expansion
Priority Rationale	The HIP for Etobicoke Creek established an improved network of riparian conditions within the Snelgrove Master Plan project area, south of Mayfield Road (TRCA, 2003). The improvements at Snelgrove will help maintain some quality here, especially as development progresses North of Mayfield Road. However, with development planning currently underway, there have been TNHSS- and ROP-identified priority locations to improve habitat at locations upstream of Snelgrove. An expansion of the efforts at Snelgrove through these upstream sites should be considered as a method of improving habitat connectivity.
Management Target(s)	Terrestrial Natural Heritage
Project Description	Connectivity with existing habitat implementation work will improve the riparian corridor in a rapidly growing and urbanizing community. Subwatershed sections, particularly at the receiving end of several headwater tributaries, should receive riparian restoration in cooperation with the existing ROP to provide appropriate spawning and feeding habitats sustainable to fish communities.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Landowner Stewardship	
Landowner relationship	- In lands that are still under private ownership, identify priority riparian restoration locations requiring permission from and interaction with landowners. - Establish a rapport with landowners willing to learn more about the aquatic system, the ecological importance of their land and/or improve habitat on their land.
Educational workshops	Promote existing programs and workshops available to landowners as a tool for education and stewardship (e.g. tree planting, wetland/riparian maintenance, HDFs, stormwater management).
2. Riparian Habitat	
ROP implementation	- Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. - Coordinate priority sites with existing private landowner stewardship projects. - Plan implementation efforts consistent with land-use changes that will arise as development in the area progresses.
Zero-order streams	- Identify HDFs on private land and restoration opportunities, as permitted by landowners. - Support the integration of HDFs for SWM control in developing lands. - Developers and consultants should evaluate, classify and manage HDF opportunities using existing headwater guidelines (CVC and TRCA, 2009).
Monitoring	Implementation sites should be periodically monitored to ensure the success of vegetation at these locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.2 Etobicoke West Branch (FMZ 2)

The Etobicoke West Branch (FMZ 2) represents a transition between quality habitat in the Etobicoke Headwaters and a substantially urbanized zone in the south (**Figure 4-3**). Land use in FMZ 2 is primarily low-medium density residential in the middle and upper reaches, but also comprises a section of industrial land in the lower reach. The proximity of the West Branch to Spring Creek (the East Branch) also allows it to offer an important terrestrial connection between the west and east sides of the watershed.

One of the most distinguishing alterations that has recently occurred in the Etobicoke Creek watershed is the rebounding of the Brampton Esker in Spring Creek (refer to section 4.1.4 *Spring Creek (FMZ 4)* and the *Technical Update* for details). The rebound has ensued interest in a potential increase in groundwater discharge in the middle reaches of the West Branch, perhaps within the vicinity of the already significant discharge reach from Bovaird Drive to Steeles Avenue, thought to coincide with an ORAC outcrop. Baseflow levels in the West Branch may rise as a result; there is an interest in how this may affect the flow regime from Steeles Avenue to Dixie Road, a location currently identified as a “losing reach” sensitive to existing water withdrawals (TRCA, 2010a). The two water-takers at this reach together withdraw the largest quantity of baseflow of any other subwatershed and therefore there may be cumulative affects on the system. Investigating this reach is relevant to ensure that there is consistency in baseflow and thermal regime, while also improving water quality.

IBI ratings for FMZ 2 are improved from downstream locations, a statistic that may be aided by the fact that it has reduced habitat fragmentation issues. Barriers for fish passage mostly include natural barriers (e.g. beaver dams) and there is only one no-passage anthropogenic fish barrier preventing access to the headwaters (TRCA, 2010a). Although not many barriers exist, the presence of this one anthropogenic barrier, a weir located at the downstream exit point of the Brampton By-pass (downtown Brampton), is the greatest limiting factor preventing access to upstream habitat. To exacerbate this concern, the weir is coupled with channelized streambed for less than one kilometre upstream. Channelization here is not as extensive as in other areas of the watershed, but its ability to alter flow velocity, natural streambed, and the growth of vegetation all limit the streams ability to support aquatic function.

South of the Brampton By-pass, the quality of in-stream condition begins to degrade. The By-pass therefore not only acts to fragment habitat, but is suspected to aggravate downstream erosion, creating one of the most rapid rates of channel adjustment in the watershed (TRCA, 2010a). As a flood-vulnerable area (FVA) with designated Special Policy Areas (SPAs), regeneration plans in the vicinity of the By-pass would need to reflect progress within the designated Brampton Urban Growth Centre. Regeneration plans and infrastructure redevelopment is also expected, including new public transit lines and the widening of Queen Street (TRCA, 2010a).

In downstream sections, particularly south of Steeles Avenue, FMZ 2 still retains a large section of meadow habitat and therefore provides suitable habitat enhancement and protection

opportunities. Near Highway 407 and 410, riparian vegetation remains of somewhat high quality but continues to degrade as it approaches the confluence of the West Branch and Spring Creek. As a result of the high habitat potential located within these sections, the TNHSS and ROP both identify high priority works here.

The West Branch was initially developed with little quality and erosion stormwater management controls in place (TRCA, 2010a). A Peel Water Quality Monitoring Network (PWQMN) station in the lower reaches is currently meeting objectives for total suspended solids, chloride, nitrate, unionized ammonia, copper, iron, and zinc, outlined in the Etobicoke-Mimico Report Card (TRCA, 2006b). Although chloride, phosphorus and *Escherichia coli* are not expected to meet long-term targets here, quality concerns are higher than in downstream, more industrialized portions of the watershed and have therefore not been placed as a fish priority at this time.

The programs and strategies currently existing for FMZ 2 should also complement or be incorporated into the plans for IPOs. Municipal Stormwater Retrofit Studies, and the upcoming “Peel Channel Study” will both address habitat fragmentation concerns in the subwatershed. Further, habitat regeneration projects are available via the TNHSS and ROP, and evident through regeneration partnerships and initiatives such as the Valleybrook Green Stewardship Project, Partners in Project Green’s Pearson Eco Business Zone and the TRCA’s County Court Sustainable Neighbourhood Action Plan (SNAP). Infrastructure and redevelopment projects are also slated across the watershed, and include the designated Brampton Urban Growth Centre. Further guidance for watershed-wide objectives and recommendations that may complement a fisheries perspective is available through the *Technical Update*.

4.1.2.1 Implementation Project Opportunities FMZ 2

Four IPOs have been identified for the Etobicoke West Branch, with their approximate locations indicated in **Figure 4-3**. A description of each project and direction for potential project components can be found in **Table 4-7**, **Table 4-8**, **Table 4-9**, and **Table 4-10**.

- Etobicoke West Branch provides North-South and East-West connection between stream habitat.
- Biodiversity and IBI ratings remain “fair.”
- Valuable groundwater discharge zones require protection as upstream urban growth (FMZ 1) threatens water infiltration.
- Rebounding groundwater at the Brampton Esker in FMZ 4 has potential implications on West Branch water balance.
- Seasonally sensitive tributaries have been identified as a result of water-taking during baseflow conditions.
- Moderate habitat fragmentation is present through channelization and in-stream fish barriers.
- The Brampton By-pass is the primary limiting barrier preventing fish access to higher quality habitat in the headwaters.
- Priority habitat restoration opportunities exist, as identified through TRCA’s Terrestrial Natural Heritage System Strategy and Riparian Opportunities Plan.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Toronto and Region Conservation, 2011

Table 4-7: IPO 2.1 Investigate Flow Requirements for Fish

Implementation Project Opportunity	
Project Name	IPO 2.1 Investigate Flow Requirements for Fish
Priority Rationale	Significant surface water withdrawals have been identified by the Surface Water Vulnerability Assessment (TRCA, 2010b) for the reach located between Steeles Avenue and Derry Road. Between 5% and 25% of available baseflow is taken from this reach per water user during taking activity, putting it under medium vulnerability during low flow summer conditions. Two water-takers at this location may have a cumulative effect on the suitability of habitat for fish occupancy.
Management Target(s)	Surface Water Regime, Aquatic Community
Project Description	Determine in-stream flow requirements for fish species and habitat at reaches that are sensitive to surface withdrawals by water-takers, as identified by the Surface Water Vulnerability Assessment. An analysis of flow requirements may provide a resource for executing water allocation decisions at these sensitive reaches for the purpose of maintaining water balance and preventing habitat loss.
Related IPOs	Table 4-1, Table 4-29
For Project Ideas, please refer to Table 4-1: IPO 1.1 Investigate Flow Requirements for Fish in the Etobicoke Headwaters.	
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-8: IPO 2.2 Consideration for Brampton By-Pass Restoration

Implementation Project Opportunity	
Project Name	IPO 2.2 Consideration for Brampton By-Pass Restoration
Priority Rationale	The only anthropogenic barrier within the Etobicoke West Branch exists as a weir (refer to MEE023 in the <i>Technical Update</i>) at the end of the Brampton By-pass channel, south of Queen Street. No fish can pass this barrier and migration efforts would be limited if they did, considering it is followed by just under a kilometre of channelized stream. High flow velocity and lack of in-stream vegetation along this channel do not facilitate upstream movement. Due to its location within a FVA and designated SPAs, the By-pass is a highly political issue, but regeneration plans through the Brampton Urban Growth Centre may facilitate the progress of planning initiatives. Further development of the Peel Channels Study and Flood Remedial Works will provide direction towards the integration of this extensive project.
Management Target(s)	Aquatic Community, Aquatic Habitat
Project Description	Move forward from existing Brampton By-pass studies to assess the implementation of natural channel works.
Related IPOs	Table 4-9
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Channelization	
Peel Channels Study	- As the By-pass continues to extend beyond its designed lifespan, planning of long-term, sustainable and practical solutions is needed. - Coordinate recommendations from the Peel Channels Study with that of existing assessments and studies of the Brampton By-pass.
Action planning	- Develop an action plan with the objective of achieving By-pass management recommendations, particularly with respect to the Peel Channels Study and Brampton By-pass Feasibility Study. - Plan should stipulate a regeneration schedule, implementation designs, objectives and the merits of By-pass regeneration and mitigation. - Ensure the consolidation of flooding and erosion control features with naturalization components that meet the requirements of a healthy aquatic ecosystem.
Public meetings	Regular meetings with the public, stakeholders and City of Brampton should be held for updates and feedback during the planning and remediation process.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-9: IPO 2.3 Naturalization Strategy for Channelized Streams

Implementation Project Opportunity	
Project Name	IPO 2.3 Naturalization Strategy for Channelized Streams
Priority Rationale	High velocity flows conveyed by channelized streambed limits the upstream migration of fish, prevents the establishment of in-stream vegetation that can be used for refuge, and induces downstream erosion. They degrade water quality, substrate and as most channels are approaching the end of their design life, they threaten infrastructure. The Peel Channels Study is an upcoming report with the primary objective of naturalizing concrete-lined or hardened streambed within Etobicoke Creek watercourses. Planning, potential project sites and recommendations will be identified by the report, which is slated for completion by 2012.
Management Target(s)	Aquatic Community, Aquatic Habitat, Surface Flow Regime
Project Description	In compliance with the Peel Channels Study, move towards the assessment of channels and implementation of restored natural channel design in priority sections of hardened streambed.
Related IPOs	Table 4-8, Table 4-18, Table 4-19, Table 4-25
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Peel Channels Study	
Database development	Characterize the quality and delineation of existing concrete-lined or hardened streambed.
Prioritization	Develop an evaluation strategy to prioritize channel naturalization opportunities.
2. Implementation	
Planning and design	- Conceptualize designs for implementation, with emphasis on innovative and novel technologies. - Should involve the inclusion of locations for pilot projects that emphasize naturalization methods or manageable solutions incorporated in other watersheds (e.g. Mimico Creek).
Renaturalization	Apply design approvals to pilot study or priority locations.
Monitoring	Assess conditions at the study site, with emphasis on: fluvial geomorphology, flow regime, and aquatic community composition and abundance.
Study expansion	Using study results, expand solutions to other previously identified priority locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-10: IPO 2.4 Priority Habitat Restoration Opportunity

Implementation Project Opportunity	
Project Name	IPO 2.4 Priority Habitat Restoration Opportunity
Priority Rationale	The stream reach from Steeles Avenue to Courtney Park Drive has been designated under the ROP as a high priority habitat restoration opportunity as a result of its reduced natural cover. The large potential for cover opportunities would provide increased connectivity to higher quality upstream habitat from downstream subwatersheds (e.g. FMZ 3, FMZ 4, FMZ 6). Rehabilitation work here would complement existing TNHSS priority landscape designations.
Management Target(s)	Terrestrial Natural Heritage
Project Description	Improving quality of habitat in the lower section of the Main Branch will augment habitat connectivity and provide refuge for fish such that they may avoid poorer water quality conditions in adjacent subwatersheds.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Riparian Habitat	
ROP implementation	- Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. - Planning and design of implementation efforts should consist of improvements to canopy cover and riparian vegetation that promotes high quality spawning, feeding and refuge habitats.
Monitoring	Implementation sites should be periodically monitored to ensure the watering and successful establishment of vegetation at these locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.3 Tributary 3 (FMZ 3)

With the exception of a small residential neighbourhood north of Highway 407, land use in Tributary 3 (FMZ 3) is almost exclusively industrial and commercial (**Figure 4-4**). Although this subwatershed supports one of the highest proportions of natural cover surveyed in the Etobicoke Creek watershed (TRCA, 2010a), this statistic is not only a result of the FMZs small size, but it does not account for the quality of this existing cover, which requires improvements.

Of all habitat conditions within Tributary 3, the greatest concern lies in its in-stream conditions, particularly water quality. Although a large portion of the southern tributaries has been developed to include quantity and quality stormwater management controls, sections of the northern tributaries, including a residential housing district, lack similar controls. This, in addition to occasional chemical spills associated with the area, has caused water quality to be a major concern in the subcatchment. No regional water quality stations (e.g. RWMP, PWQMN) currently exist in this FMZ, however a watershed-wide chemical spills study (Li, 2003) and Catchment 219 study (TRCA, 2010a) have both indicated water quality issues here. The Catchment 219 study serves as a pilot research report that models various combinations of stormwater management controls to assess their outcomes in a typical industrial tributary. Direction for traditional and innovative technologies for stormwater management through residential and industrial source controls is recommended by the study to improve the quality within this FMZ.

Another in-stream condition that has limited the natural features of FMZ 3 has been the degradation of substrate quality, through both streambed hardening and in-stream vegetation. Extensive channelization that has occurred within the smaller southern tributaries severely limits fish habitat use. Generally, channelization can impede fish movement through increased flow velocity and a loss of fluvial geomorphic function, including the establishment of in-stream and riparian vegetation. Downstream of most of the channelization issues in FMZ 3 is the presence of an anthropogenic barrier towards its confluence with the West Branch (FMZ 2). The *Technical Update* (TRCA, 2010a) identifies a weir here, south-west of Midway Boulevard and Dixie Road, as a potential block for upstream fish passage.

Despite some opportunities to recover in-stream quality through naturalization of channelized streambed and mitigate barriers, the small size of Tributary 3 does not provide much beneficial habitat upstream to prioritize natural channel works at this location. Instead, water quality control should be the in-stream issue of greatest concern within FMZ 3. Water quality cannot only regulate species occupancy within the focal subwatershed itself, but within downstream subwatersheds as well.

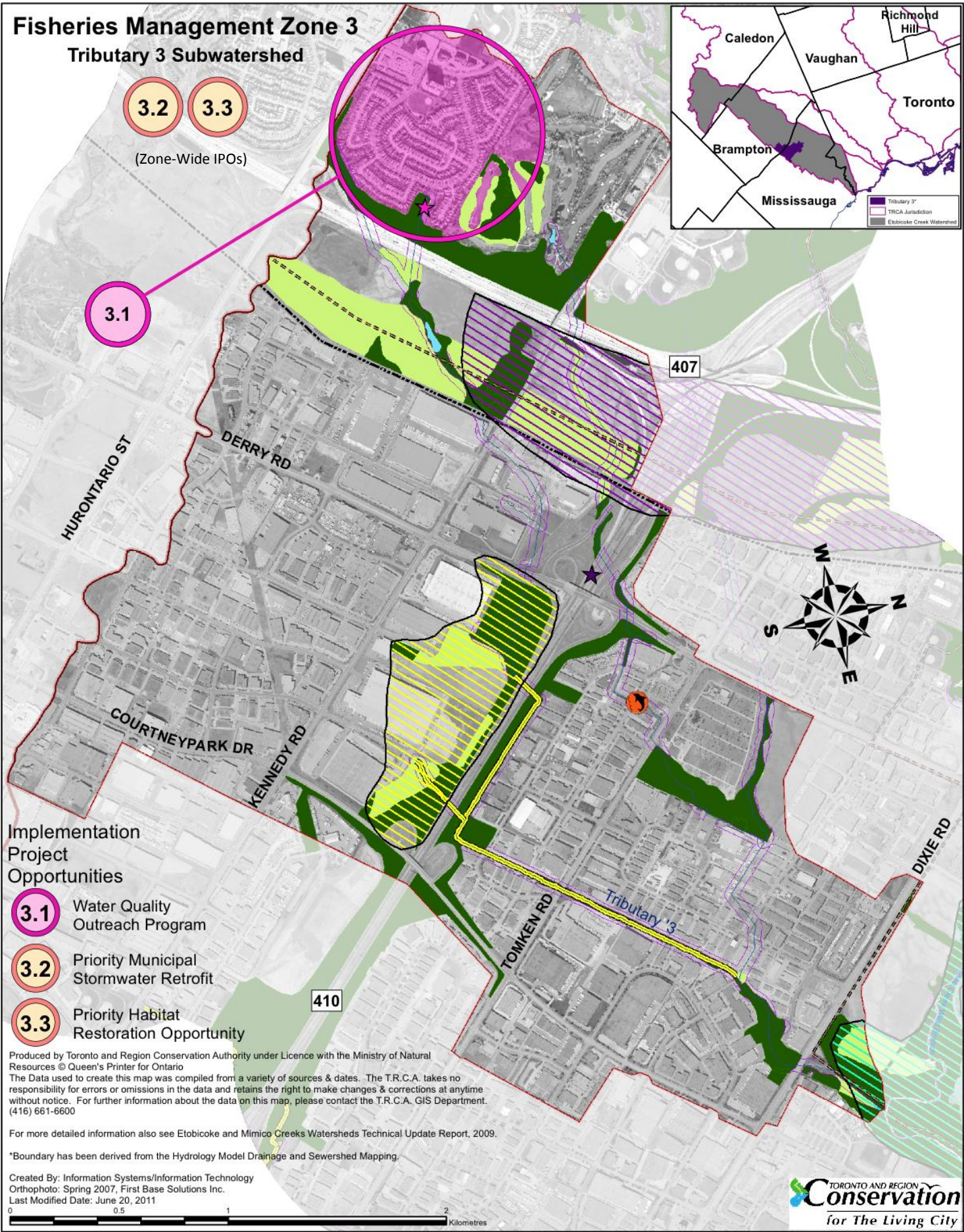
Although the focus of IPOs in this subwatershed is to ensure water quality, other strategies have been developed for the area as well. The TNHSS and ROP will complement riparian-focuses projects here, and the upcoming “Peel Channel Study” will serve as a useful fisheries resource to direct naturalization projects. Further, much of the residential and industrial IPO programs directed for the area will need to take into account existing regeneration initiatives,

including the County Court SNAP and the Pearson Eco Business Zone, which together comprise the majority of this FMZ.

4.1.3.1 Implementation Project Opportunities FMZ 3

Three IPOs have been identified for Tributary 3, with their approximate locations indicated in **Figure 4-4**. A description of each project and direction for potential project components can be found in **Table 4-11**, **Table 4-12**, and **Table 4-13**.

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FMZ 3 - Opportunities and Challenges

- Highest proportion of existing natural cover within the Etobicoke Creek watershed.
- High proportion of industrial and minimal residential land use.
- Biodiversity and IBI ratings are “poor.”
- Water quality is severely threatened by chemical spills and limited stormwater management controls.
- Priority municipal stormwater retrofits have been identified within this subwatershed.
- High habitat fragmentation is present through channelization and in-stream fish barriers.
- Priority habitat restoration opportunities exist, as identified through TRCA’s Terrestrial Natural Heritage System Strategy and Riparian Opportunities Plan.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Figure 4-4: FMZ 3 Tributary 3 IPO Locations

Table 4-11: IPO 3.1 Water Quality Outreach Program

Implementation Project Opportunity	
Project Name	IPO 3.1 Water Quality Outreach Program
Priority Rationale	High industrial land-use, poor biodiversity, and poor SWM control in the northern tributaries indicates that water quality is at risk within the subwatershed. The presence of only two tolerant species in this habitat serves as an indicator of the poor conditions located here. Biodiversity cannot be regained without extensive and integrated rehabilitation works, but by improving water quality, there will be benefits to the remaining aquatic community, as well as cumulative benefits in receiving subwatersheds downstream. The residential neighbourhood within this FMZ provides an opportunity to implement community-based programs, particularly in conjunction with the County Court SNAP initiatives.
Management Target(s)	Water Chemistry
Project Description	The small residential neighbourhood on the western side of Tributary 3 provides an opportunity to begin preliminary steps to incorporate the findings of the Catchment 219 study, improving water quality through the implementation of Trout Unlimited Canada's Yellow Fish Road Program.
Related IPOs	Table 4-24
Making contact as soon as possible following a spill and supplying photographs can help OMOE assess and respond as required to the occurrence. The OMOE Spills Action Centre phone number is 416-325-3000.	
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Water quality sampling	- Strategically select easy, spatially-relevant locations for water quality sampling within or near the targeted residential neighbourhood. - Sampling should be conducted before and after the initiation of water quality programs.
2. Public Education and Stewardship	
Yellow Fish Road Program	- Coordinate and support volunteer groups and schools in their registration with the Yellow Fish Road Program. - Encourage involvement in house-to-house delivery of educational materials and active participation SWM awareness.
Presentation/educational workshop	- Prepare a presentation directed at schools (e.g. children, parents, teachers) and/or environment volunteer groups - Provide educational information about SWM, water quality and the potential implications of ignoring these issues in relation to aquatic ecosystems and human wellness.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-12: IPO 3.2 Priority Municipal Stormwater Retrofit

Implementation Project Opportunity	
Project Name	IPO 3.2 Priority Municipal Stormwater Retrofits
Priority Rationale	SWM practices have recently evolved to better incorporate long-term environmental impacts into their design (OMOE, 2003). Most SWM controls within Tributary 3 are for water quantity. While quality control does exist, it is limited to the southern tributaries and spills studies have determined Tributary 3 to be highly degraded in water quality (Li, 2003; TRCA, 2010a). Since projects here are limited in their potential to fully recover the aquatic community, quality is of the primary focus as it can have cumulative effects in downstream reaches. Municipally-driven SWM projects have been identified within this FMZ and should be supported (Aquafor Beech Ltd., 2003; TRCA, 2010a).
Management Target(s)	Water Chemistry
Project Description	Priority SWM controls and retrofit opportunities have been identified by the City of Brampton and Mississauga and are indicated by stars in Figure 4-4 . These projects should be supported through integrated and complementary restoration work.
Related IPOs	Table 4-20, Table 4-26, Table 4-27
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Quality sampling for SWM controls	- Sample water quality at locations up and downstream of SWM control locations, where applicable. - Ensure pre- and post-retrofit sampling is conducted to provide comparable data and measure whether the objectives for SWM retrofits are met from a fisheries perspective.
2. Stormwater Management	
Priority implementation	- Prioritize SWM retrofits and outfalls according to their perceived benefit, with emphasis on water quality concerns associated with fish communities. - Support municipal implementation of new SWM outfall ponds and existing retrofit or outfall opportunities (Aquafor Beech Ltd., 2003).
3. Analysis and Communication	
Reporting results	- Using pre- and post- data and post-retrofit assessments, determine the efficacy of SWM control implementation. - Complete a report that details mitigation results, whether objectives have been achieved, and makes recommendations for future management of SWM controls.
4. Water Quality	
Public outreach programs	- Facilitate water quality improvements at municipal SWM controls by implementing public-focused outreach programs. - Refer to Table 4-11: IPO 3.1 Water Quality Outreach Program for details.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-13: IPO 3.3 Priority Habitat Restoration Opportunity

Implementation Project Opportunity	
Project Name	IPO 3.3 Priority Habitat Restoration Opportunity
Priority Rationale	Although Tributary 3 is primarily industrial in land use, some natural cover south of Highway 407 has been identified through the TNHSS and ROP as priority locations for habitat regeneration opportunities. Forest and riparian work here would complement water quality concerns within the subwatershed by acting as a buffer to improve the infiltration of surface run-off.
Management Target(s)	Terrestrial Natural Heritage
Project Description	Existing habitat within Tributary 3 requires regeneration as a means of providing more optimal riparian conditions, and further helping to rectify a distinct water quality issue that characterizes this subwatershed.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Riparian Habitat	
ROP implementation	• Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. • Planning and design of implementation efforts should consist of improvements to canopy cover and riparian vegetation that promotes high quality spawning, feeding and refuge habitats.
Monitoring	• Implementation sites should be periodically monitored to ensure the watering and successful establishment of vegetation at these locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.4 Spring Creek (FMZ 4)

The boundaries delineating Spring Creek (FMZ 4) range north, from Mayfield Road, downstream to the Greater Toronto Airport Authority (GTAA) lands (**Figure 4-5**). A majority of the land in this FMZ is devoted to residential and industrial function, however agriculture is still a relevant component in the uppermost reaches. Due to the latitudinal span of FMZ 4, it covers a gradient of habitat types that generally reflect high quality to the north and poor quality to the south. For instance, north of Queen Street, the major natural feature is Heart Lake Conservation Area (HCLA), which maintains one of the two remaining major wetland complexes in the entire watershed and supports quality terrestrial habitat. In contrast, the southern portion of FMZ 4 is occupied by poor valley corridor connectivity, as well as the most degraded water bodies in the watershed, Esker Lake North (private land) and Chinguacousy Ponds (public land) (Gartner Lee Ltd., 2006).

As a result of the habitat diversity within this FMZ, fisheries management is broadly directed towards a range of aquatic system concerns. Since Spring Creek shares Little Etobicoke in having the worst habitat fragmentation in the watershed, this is one of the primary quality issues identified here. Fragmentation in the form of streambed channelization and in-stream barriers can negatively affect flow, in-stream vegetation and fish access to upstream tributaries. Channelization concerns will soon be addressed by the “Peel Channels Study” and in some instances, have already been under municipal investigation (e.g. Alfred Kuehne Boulevard) (Geomorph Solutions, 2010).

Another major issue that has arisen within Spring Creek has been rebounding groundwater at the Brampton Esker, as briefly discussed in section 4.1.2 *Etobicoke West Branch (FMZ 2)*. The Brampton Esker is the most notable hydrostatigraphic unit in the watershed and is a feature grouped as equivalent to the ORAC. The aquifer here has been the cause of high levels of groundwater discharge and is an important contributor to the coldwater regime of the Bramalea tributaries in Spring Creek. The recent groundwater rebound at the Esker has caused increasing quantities of baseflow at the Bramalea tributaries, and although the Esker is within the Spring Creek subwatershed, it may have additional baseflow consequences in the West Branch (FMZ 2). Groundwater rebounding can have important implications on fish, whether through improvements to baseflow, water quality, or thermal regime. Since the Brampton Esker response may induce a multitude of alterations within the Bramalea tributaries, multiple monitoring efforts are needed to address data gaps here. Further, since sections of this coldwater habitat are comparatively still good in forest and riparian quality, efforts towards enhancing and maintaining this corridor should be recognized. This will become increasingly critical as fish migration is facilitated through the mitigation of downstream aquatic barriers and channelization.

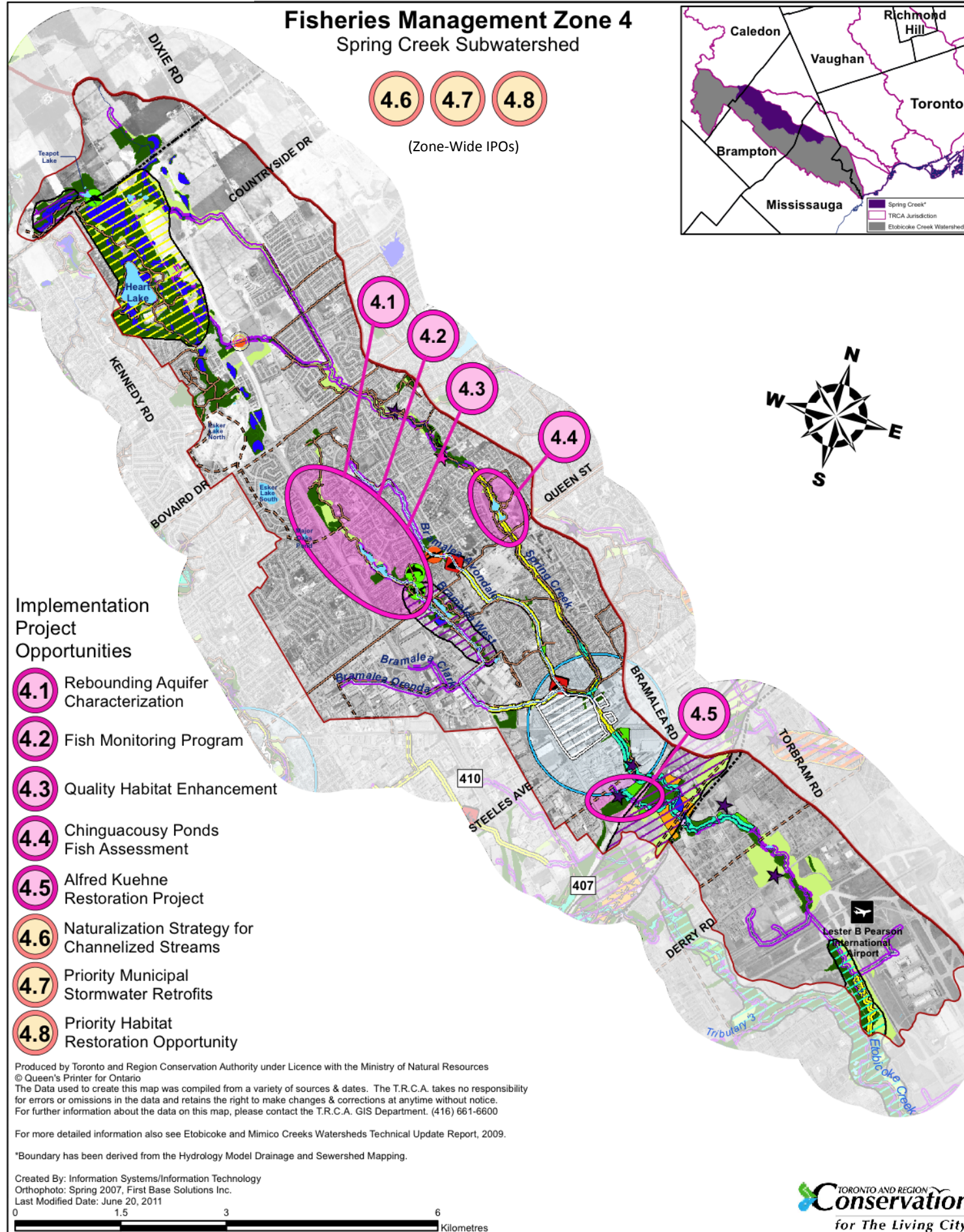
As with the Etobicoke Headwaters (FMZ 1), urban growth planning and redevelopment is becoming an increasingly relevant opportunity across Spring Creek. Development near the Spring Creek headwaters and HLCA, have occurred with quality and quantity stormwater management controls, yet such controls are expected to enhance as new development plans

are implemented. Mayfield West Phase I and Springdale North Secondary Plans are currently expected for the upstream catchment area, and could threaten remaining natural cover or upland aquatic refuges near the headwaters. Other regeneration initiatives, including the HCLA Master Plan should take this increased development potential into account. Since further redevelopment is also expected at the Brampton Esker (TRCA, 2006a), and with regeneration anticipated for the Brampton Urban Growth Centre and initiatives intended for the Pearson Eco Business Zone, sound development techniques along the Bramalea tributaries should be incorporated.

Although the IPOs for FMZ 4 approaches a wide range of issues, the extent of both watershed-wise and fisheries concerns will also be further investigated and approached through various municipal infrastructure and stormwater management retrofit works, as well as implementation strategies, including the TNHSS and ROP.

4.1.4.1 Implementation Project Opportunities FMZ 4

Eight IPOs have been identified for Spring Creek, with their approximate locations indicated in **Figure 4-5**. A description of each project and direction for potential project components can be found in **Table 4-14**, **Table 4-15**, **Table 4-16**, **Table 4-17**, **Table 4-18**, **Table 4-19**, **Table 4-20**, and **Table 4-21**.



- A diversity of habitat quality is found throughout this subwatershed.
- Biodiversity and IBI ratings are “poor.”
- Higher habitat quality (e.g. coldwater, wetlands), and is present upstream in comparison to downstream reaches.
- Among the worst habitat fragmentation has been identified in this subwatershed as a result of extensive channelization and in-stream fish barriers.
- Rebounding groundwater at the Brampton Esker provides several opportunities for filling data gaps and updating existing data (i.e. groundwater, baseflow, temperature and fish communities).
- Urban growth planning north of Mayfield Road provides the opportunity to incorporate low-impact development techniques.
- Priority municipal stormwater retrofits have been identified within this subwatershed.
- Priority habitat restoration opportunities exist, as identified through TRCA’s Terrestrial Natural Heritage System Strategy and Riparian Opportunities Plan.

Table 4-14: IPO 4.1 Rebounding Aquifer Characterization

Implementation Project Opportunity	
Project Name	IPO 4.1 Rebounding Aquifer Characterization
Priority Rationale	The Brampton Esker, west of Highway 410 between Mayfield Road and Queen Street, supplies groundwater to Spring Creek and Etobicoke West Branch. The function of this hydrogeological unit was altered when aggregate extraction of a former gravel pit began. Following the cessation of aquifer dewatering to operate this gravel pit, groundwater began to rebound near Highway 410 and Bovaird Drive. An increased discharge may alter baseflow and thermal regime to consequently alter the favourability of in-stream fish conditions. Further, with development expected at the Brampton Esker and Brampton Urban Growth Centre, conditions related to the interaction of the Esker rebound with local development is necessary.
Management Target(s)	Flow Regime
Project Description	With the recent rebound of the Brampton Esker, it is necessary to characterize baseline flow and groundwater conditions such that augmentation to the water table may be detected and used for interpreting a fisheries response, or informing future development plans.
Related IPOs	Table 4-15
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Flow Regime	
Baseflow assessment	- Track long-term changes to receiving watercourses through the use of intermittent baseline measurements of baseflow. - Should address pre- and post-urbanization affects in relation to pending development near Esker Lakes.
Groundwater assessment	- Strategically positioned piezometers may be used to determine long-term changes in groundwater levels as a response to the Esker rebound. - Emphasize implications of groundwater regime changes, including alterations in target fish species and management recommendations.
Coordination with existing databases	Integrate baseflow and groundwater data with historical and present data for comparison and as a future planning resource.
2. Development Planning	
Infrastructure design	Work with collected data in a way that simultaneously minimizes infrastructure or SWM concerns in response to the rebounding aquifer.
3. Wetland Habitat	
Wetland creation opportunities	- Identify opportunities for wetland habitat creation within the vicinity of the Brampton Esker. - Focus on wetland potential in Major Oaks Park, White Spruce Park, Heart Lake, and Bramalea Limited Community Park.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-15: IPO 4.2 Fish Monitoring Program

Implementation Project Opportunity	
Project Name	IPO 4.2 Fish Monitoring Program
Priority Rationale	The Brampton Esker, west of Highway 410 between Mayfield Road and Queen Street, supplies groundwater to Spring Creek and Etobicoke West Branch. The function of this hydrogeological unit was altered when aggregate extraction of a former gravel pit began. Following the cessation of aquifer dewatering to operate this gravel pit, groundwater began to rebound near Highway 410 and Bovaird Drive. An increased discharge may alter baseflow and thermal regime to consequently alter the favourability of in-stream fish conditions. Further, with development expected at the Brampton Esker and Brampton Urban Growth Centre, conditions related to the interaction of the Esker rebound with local development is necessary.
Management Target(s)	Aquatic Community, Aquatic Habitat, Thermal Regime
Project Description	A fish monitoring program that will allow for characterization of the present fish community within the current coldwater habitat. By filling in any knowledge gaps, we can further interpret the effect of potential changes in thermal regime or flow supply.
Related IPOs	Table 4-14
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Fisheries characterization	- Collect fish samples to confirm or refine present fish community targets for the coldwater reaches of this subwatershed. - May include multi-year samples to address alterations in fish community in response to continued increase in groundwater discharge or implementation of development plans. - Identify opportunities for coldwater habitat enhancement.
Riparian habitat assessment	Assess existing habitat at fish sampling locations and make recommendations on the suitability of this habitat for minimizing thermal fluctuations and permitting coldwater species inhabitation.
2. Thermal Regime	
Temperature gauges	Seasonal use of stream temperature gauges is needed to monitor relevance of increasing groundwater discharge and baseflow in relation to the potential of changes in aquatic community composition and fish management targets.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-16: IPO 4.3 Quality Habitat Enhancement

Implementation Project Opportunity	
Project Name	IPO 4.3 Quality Habitat Enhancement
Priority Rationale	Abundant channelization and several barriers in downstream portions of the Bramalea tributaries have limited fish access to higher quality in-stream and riparian habitat in the Bramalea headwaters. In the Bramalea West tributary, one of few coldwater reaches, there is already existing quality forest habitat. Keeping that Bramalea West remains a coldwater output location for much of the groundwater discharge from the aquifer, enhancing riparian forest and wetland conditions would facilitate these conditions. Habitat reconnection, in conjunction with barrier mitigation projects, would provide a habitat reconnect of up to 2.5km.
Management Target(s)	Terrestrial Natural Heritage, Aquatic Community, Aquatic Habitat
Project Description	An assessment and enhancement of quality forested and wetland habitat located at the Bramalea West tributary will improve connectivity to highly favourable fish habitat.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Aquatic Species Barriers	
Mitigation assessment	- Support the mitigation of medium priority limited-passage fish barriers (SPBRWE009 and SPBRWE012, as identified in the <i>Technical Update</i>) located north-west of Queen Street and Hillside Drive. - Investigate the feasibility of barrier removal or mitigation and detail long-term benefits to the aquatic system. - Agency consultation and approvals will be required prior to mitigation work.
2. Riparian Habitat	
Natural cover enhancement	- Implement the enhancement of riparian zone vegetation as means of improving upland forest connection and expanding the existing ecological unit. - Maintain existing coldwater conditions by emphasizing improved tree canopy cover.
3. Wetland Habitat	
Wetland planning and design	- Use existing knowledge of the Brampton Esker rebound, fish community, historical wetlands and present land use to determine the opportunity for strategic wetland creation. - Emphasize wetland designs that are sustainable to fish species historically found in the subcatchment.
Implementation	- Implement approved wetland restoration plans. - Intermittently monitor the progress of wetland recovery to ensure successful establishment of restoration work.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-17: IPO 4.4 Chinguacousy Ponds Fish Assessment

Implementation Project Opportunity	
Project Name	IPO 4.4 Chinguacousy Ponds Fish Assessment
Priority Rationale	The Chinguacousy Ponds, to the West of the Bramalea Road and Queen Street intersection, have been identified as one of the worst major waterbodies in Etobicoke Creek in terms of water quality, terrestrial vegetation/wildlife and fisheries (Gartner Lee Ltd., 2006). Of these evaluations, it is considered the worst in fisheries, receiving poor scores in habitat quality, biodiversity and trophic composition. Recent restoration plans by the City of Brampton include watercourse enhancements within Chinguacousy Park.
Management Target(s)	Aquatic Community, Aquatic Habitat
Project Description	An aquatic ecosystem service assessment at Chinguacousy Park ponds is necessary to ensure that the City of Brampton's desired goals for the ponds meet water quality, vegetation and fish community targets. Strategic planning, in conjunction with current restoration efforts at Chinguacousy Park, is necessary to achieve aquatic community potential.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Data coordination	- Cooperate with the City of Brampton in projected Chinguacousy Park pond clean-outs to attain data that characterizes present fish community diversity and abundance. - Coordinate clean-out data with existing fisheries sampling data for the Chinguacousy Park ponds.
2. Planning and design	
Ecosystem service assessment	- Work with the City of Brampton to determine and reassess long-term goals for Chinguacousy Park ponds. - Assess the feasibility and merits of mitigating these ponds in coordination with existing plans and objectives.
Assess mitigation potential	- All potential mitigation designs (e.g. online to offline conversion, sediment forebay quality controls) should be prioritized and merits for restoration detailed. - Prioritization of innovative mitigation designs should be emphasized
Implement mitigation efforts	- If applicable and planning is approved, mitigation design may be implemented. - Post-mitigation monitoring should be conducted to determine if mitigation objectives were met.
Peel Channels Study	- Incorporate project findings with results of Peel Channels Study. - Natural channel design at Maitland and Hilldale Parks (upstream of Chinguacousy Park) should be emphasized.
3. Riparian Habitat	
Enhancement planning	- If pond mitigation is not an option, determine and design appropriate planting initiatives that would coincide with the native fish community. - Existing recommendations (e.g. bioswales) should be incorporated into riparian design (MMM Group Ltd., 2009)
Implementation	- Establish native riparian to function with existing gabion walls on shoreline as a means of partially address quality concerns by creating riparian shading and improved infiltration. - Establish in-pond habitat to provide suitable conditions and partially reduce in-pond quality concerns.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for	

each project has been explored (partnerships/funding).
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Table 4-18: IPO 4.5 Alfred Kuehne Restoration Project

Implementation Project Opportunity	
Project Name	IPO 4.5 Alfred Kuehne Restoration Project
Priority Rationale	Spring Creek's extensive channelization issues will be addressed in the TRCA's upcoming Peel Channels Study. In advance of this, a channelized stretch located at Alfred Kuehne Boulevard has been selected to serve as both an opportunity to naturalize the degraded stream, but also provide some insight into planning of future naturalization projects within and around the Spring Creek subwatershed (Geomorphic Solutions, 2010).
Management Target(s)	Aquatic Habitat
Project Description	Support the implementation of the Alfred Kuehne Blvd Aquatic Restoration Project as a guide for servicing channelized streambed.
Related IPOs	Table 4-19
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Flow regime	- Begin monitoring efforts to determine baseline flow conditions downstream of the Alfred Kuehne project study area. - Monitor study area periodically, both prior to and 5-10 years following project implementation.
Fluvial geomorphology	In coordination with measurements of flow regime, conduct a fluvial geomorphic assessment of conditions at the study area to direct implementation objectives and determine the success of the restoration project immediately following implementation.
Aquatic community	Characterize the existing fish community to understand diversity and abundance prior to and proceeding plan implementation.
2. Natural Channel Works	
Study reassessment	Reassess the recommendations of the Alfred Kuehne Boulevard Aquatic Restoration Project report (Geomorphic Solutions, 2010).
Implementation	- Finalize naturalization design and implementation schedule of natural channel works. - Implement approved plans at the study area.
Post-naturalization assessment	Field reconnaissance should aim to identify the completion of the operation, any lingering concerns and whether the objectives of the project have been achieved.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-19: IPO 4.6 Naturalization Strategy for Channelized Streams

Implementation Project Opportunity	
Project Name	IPO 4.6 Naturalization Strategy for Channelized Streams
Priority Rationale	High velocity flows conveyed by channelized streambed limits the upstream migration of fish, prevents the establishment of in-stream vegetation that can be used for refuge, and induces downstream erosion. They degrade water quality, substrate and as most channels are approaching the end of their design life, they threaten infrastructure. The Peel Channels Study is an upcoming report with the primary objective of naturalizing concrete-lined or hardened streambed within Etobicoke Creek watercourses. Planning, potential project sites and recommendations identified by the report are slated for completion by 2012.
Management Target(s)	Aquatic Community, Aquatic Habitat, Surface Flow Regime
Project Description	In compliance with the Peel Channels Study, move towards the assessment and implementation of restored natural channel design in priority sections of hardened streambed.
Related IPOs	Table 4-9, Table 4-18, Table 4-25
For Project Ideas, please refer to Table 4-9: <i>IPO 2.3 Naturalization Strategy for Channelized Streams</i> in the Etobicoke West Branch.	
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-20: IPO 4.7 Priority Municipal Stormwater Retrofits

Implementation Project Opportunity	
Project Name	IPO 4.7 Priority Municipal Stormwater Retrofits
Priority Rationale	SWM practices have recently evolved to better incorporate long-term environmental impacts into their design (OMOE, 2003). Spring Creek was developed with quantity/quality SWM controls in the headwaters and quality SWM controls in the GTAA lands. However, most of the area between is entirely void of controls. A wide range of priority SWM projects within different types and qualities of aquatic habitat have been identified within this FMZ and therefore range in benefit (Aquafor Beech Ltd., 2003).
Management Target(s)	Water Chemistry
Project Description	Priority SWM controls and retrofit opportunities have been identified by the City of Mississauga and are indicated by stars in Figure 4-4 . These projects are to be supported through integrated and complementary restoration work.
Related IPOs	Table 4-12, Table 4-26, Table 4-27
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Quality sampling for SWM controls	- Sample water quality at locations up and downstream of SWM control locations, where applicable. - Ensure pre- and post-retrofit sampling is conducted to provide comparable data and measure whether the objectives for SWM retrofits are met from a fisheries perspective.
2. Stormwater Management	
Priority implementation	- Prioritize SWM retrofits and outfalls according to their perceived benefit, with emphasis on water quality concerns associated with fish communities. - Support municipal implementation of new SWM outfall ponds and existing retrofit opportunities (Aquafor Beech Ltd., 2003).
3. Analysis and Communication	
Reporting results	- Using pre- and post- data and post-retrofit assessments, determine the efficacy of SWM control implementation. - Complete a report that details mitigation results, whether objectives have been achieved and makes recommendations for future management of SWM controls.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-21: IPO 4.8 Priority Habitat Restoration Opportunities

Implementation Project Opportunity	
Project Name	IPO 4.7 Priority Habitat Restoration Opportunities
Identified Issue	The ROP has identified two high priority habitat restoration opportunities within the HLCA and lower section of Spring Creek, south of Queen Street. TNHSS locations further designate sections within Spring Creek as priority sites. Forest, wetland and riparian opportunities will complement existing wetland and high quality conditions, while also improving natural cover in reaches devoid of suitable aquatic species habitat.
Management Target	Terrestrial Natural Heritage
Project Description	Restoration of degraded habitat and enhancement of remaining high quality riparian zones is necessary to aid in creating conditions sustainable to present aquatic ecosystem.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Riparian Habitat	
ROP implementation	- Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. - Planning and design of implementation efforts should consist of improvements to canopy cover and riparian vegetation that promotes high quality spawning, feeding and refuge habitats.
Monitoring	Implementation sites should be periodically monitored to ensure the watering and successful establishment of vegetation at these locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.5 Little Etobicoke (FMZ 5)

The Little Etobicoke (FMZ 5) is a highly urbanized subwatershed (Figure 4-6), with industrial lands sectioned to the north of Eastgate Parkway and residential lands devoted to the south. Much of the existing valley land vegetation is mature, but the land use and presence of Highways 400 and 410 limit projects designed to link upland and valley-stream corridor habitats.

Like Spring Creek (FMZ 4), the Little Etobicoke has very high in-stream habitat degradation. With the creation of hardened or concrete channelized streambed and in-stream barriers (e.g. drop structures), the primary limiting factor preventing aquatic species sustainability here is high fragmentation. The entire watercourse upstream of Burnhamthorpe Road is channelized, an issue that will be brought forward and provided direction for via the “Peel Channels Study.” While some initiatives for channel renaturalization have been anticipated (Geomorphic Solutions, 2009), the extent of the channelization within FMZ 5 will continue to remain a primary challenge.

As a result of the channelization and in-stream barrier concerns, fish are already very restricted from accessing the upstream reaches of the Little Etobicoke. Improvements to in-stream habitat will require extensive and integrated channel works to ensure this limited habitat is useful to aquatic species. In the interim, regeneration efforts that focus on upstream water quality will reveal more significant benefits towards higher quality downstream conditions. As a highly urbanized subwatershed with little implementation of stormwater management erosion, quality and quantity controls, its water quality is not expected to be strong. Although no regional water quality stations directly monitor this FMZ, the poor biodiversity here serves as an indicator of the poor conditions. The extent of water quality improvement projects should prioritize residential and industrial awareness programs, while supporting municipal stormwater management retrofits, as have been already prioritized by the City of Mississauga (TRCA, 2010a).

Poor upstream conditions in the Little Etobicoke do not indicate that the entirety of this FMZ is void of life. One of the most unique features here is the presence of northern watersnake (*Nerodia sipedon*) near the streams confluence with the Lower Etobicoke. In part due to the forested valley slopes and limited trail access, this species is still able to persist here. The higher quality habitat here and the presence of nearby residential neighbourhoods have the capacity to spark community interest in their subwatershed. It is important to implement local outreach and education campaigns to ensure the continued survival of watersnakes, a species that no longer persists in any other watershed within the TRCA’s jurisdiction.

In addition to the “Peel Channels Study,” other planned programs and strategies will complement the IPOs designated for FMZ 5. The TRCA, in partnership with the City of Mississauga, is expected to mitigate erosion and infrastructure concerns via channel restoration efforts from Eastgate Park south to Willowbank Trail. Further, existing priority habitat restoration sites have been selected through development of the TNHSS and ROP strategies. The Pearson Eco Business Zone has been one on-going regeneration initiative that may further enhance some of the fisheries objectives outlined for this subwatershed.

4.1.5.1 Implementation Project Opportunities FMZ 5

Five IPOs have been identified for the Little Etobicoke, with their approximate locations indicated in Figure 4-6. A description of each project and direction for potential project components can be found in

Table 4-22, Table 4-23, Table 4-24, Table 4-25, and Table 4-26.

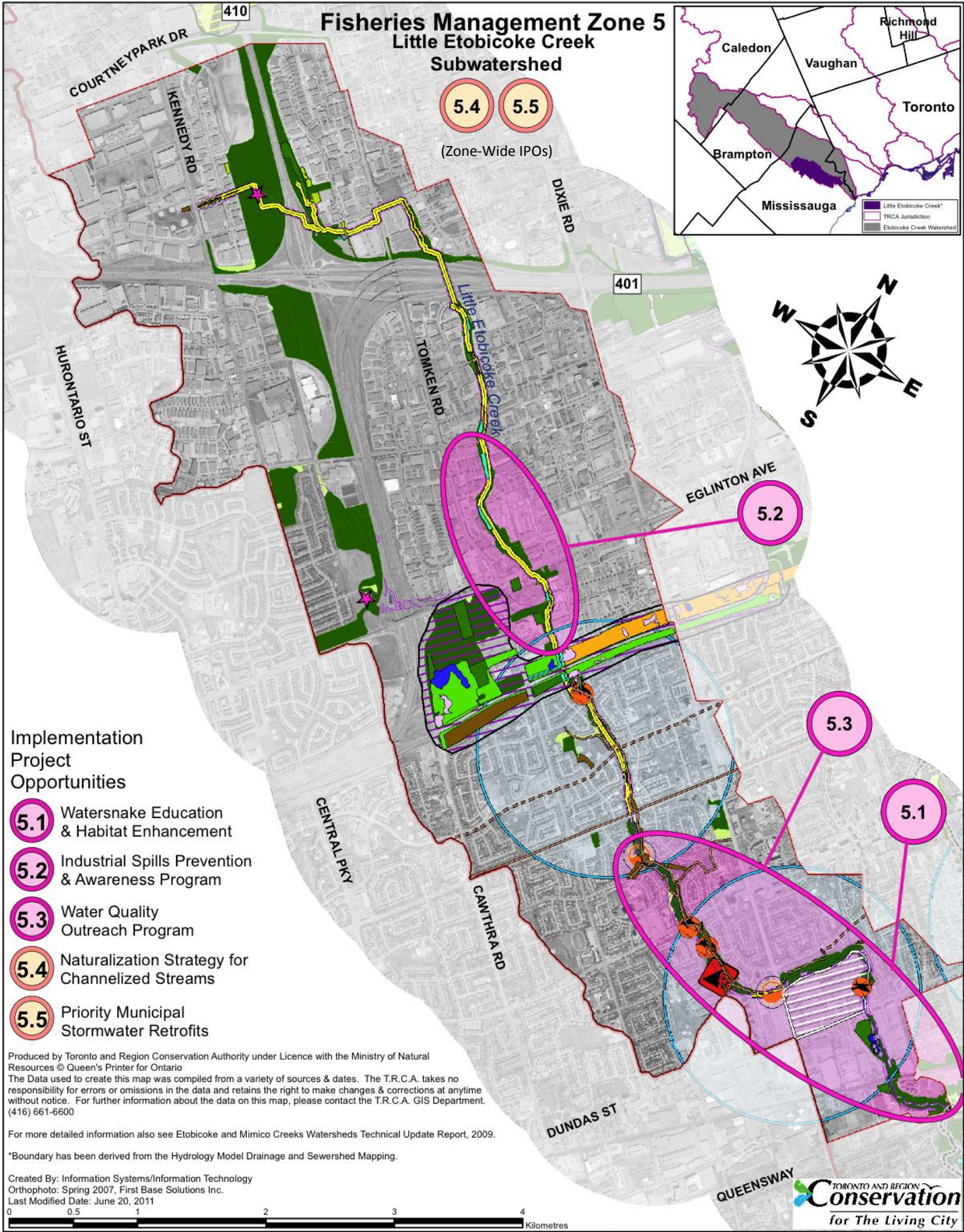


Figure 4-6: FMZ 5 Little Etobicoke IPO Locations

FMZ 5 - Opportunities and Challenges

- Among the worst habitat fragmentation has been identified in this subwatershed as a result of extensive channelization and in-stream fish barriers.
- Water quality is expectedly poor in most of the subwatershed.
- The only identified watersnake population within the TRCA's jurisdiction is located in downstream habitat near Dundas Street.
- Priority municipal stormwater retrofits have been identified within this subwatershed.
- Priority habitat restoration opportunities exist, as identified through TRCA's Terrestrial Natural Heritage System Strategy and Riparian Opportunities Plan.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Table 4-22: IPO 5.1 Watersnake Education and Habitat Enhancement

Implementation Project Opportunity	
Project Name	IPO 5.1 Watersnake Education and Habitat Enhancement
Priority Rationale	Poor existing conditions have limited the short-term opportunities to recover historical fish communities. The presence of the northern watersnake provides an ideal opportunity to continue to promote the ecological health of the subwatershed, but through a species indicator other than fish. By focusing on maintaining this unique characteristic of this FMZ, we can by consequence contribute to the sustainability of fish species as well.
Management Target(s)	Aquatic Community, Aquatic Habitat
Project Description	Education in residential areas where a fear around watersnakes exists should be provided. The importance of this species can be promoted with emphasis on its interaction with other species and its function as an indicator of aquatic ecosystem health. Verifying and enhancing prime watersnake habitat will facilitate these objectives.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Riparian Habitat	
Habitat planning	• Sample locations within the lower reaches of the Little Etobicoke for watersnake presence. • Determine strategic locations prime for watersnake inhabitation and types of restoration work that would complement its occupancy near the stream, while simultaneously minimizing its occupancy in residential and public lands.
Habitat enhancement	• Improve habitat connectivity, with emphasis on vegetation preferred by both watersnake and native fish species. • Install hibernacula as refuge for watersnakes and to deter their interaction with the public.
2. Public Education and Stewardship	
Watersnake education	• Provide an opportunity for public education through pamphlets or nature walks. • Emphasize the importance of watersnakes in relation to other species (i.e. fish), as an indicator of the health of the ecosystem, and in relation to current efforts being made to prevent public encounters.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-23: IPO 5.2 Industrial Spills Prevention Awareness Program

Implementation Project Opportunity	
Project Name	IPO 5.2 Industrial Spills Prevention Awareness Program
Priority Rationale	A large portion of industrial land-use in the upper subwatershed contributes to the Little Etobicoke headwaters that eventually are received by the Lower Etobicoke and ultimately Lake Ontario. Poor water quality identified within the Lower Etobicoke may in part be attributed to this subcatchment. Overcoming the poor fish biodiversity found within the Little Etobicoke requires addressing long-term issues in channelization and barrier removal. Until then, addressing water quality in industrial areas that are significantly prone to chemical spills is a high priority.
Management Target(s)	Water Chemistry
Project Description	The industrial area north of Eastgate Parkway provides an opportunity to begin preliminary steps towards improved water quality through the implementation of spills prevention programs, and education about the relevance of the program with relation to aquatic ecosystem health.
Related IPOs	Table 4-24
Making contact as soon as possible following a spill and supplying photographs can help OMOE assess and respond as required to the occurrence. The OMOE Spills Action Centre phone number is 416-325-3000.	
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Water quality sampling	- Strategically select easy, spatially-relevant locations for water quality sampling within or near the targeted industrial zone. - Sampling should be conducted before and after the initiation of water quality and spills prevention programs.
2. Industrial Education and Stewardship	
Presentation	- Prepare a presentation directed at industrial and commercial businesses. - Provide educational resources about SWM, water quality and the potential implications of ignoring these issues in relation to aquatic ecosystems and human wellness.
Spills prevention workshop	Provide industrial and commercial businesses with the tools and programs that describe methods for managing spills prior to (preventative) and following their occurrence.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-24: IPO 5.3 Water Quality Outreach Program

Implementation Project Opportunity	
Project Name	IPO 5.3 Water Quality Outreach Program
Priority Rationale	A large portion of residential land-use in the lower subwatershed partially supplies the Lower Etobicoke and exits to Lake Ontario. Poor quality identified in the Lower Etobicoke may in part be attributed to this catchment. Overcoming the poor fish biodiversity found within the Little Etobicoke requires addressing long-term issues in channelization and barrier removal. Until then, addressing water quality concerns in and around reaches that still retain some habitat quality (e.g. residential) is a high priority.
Management Target(s)	Water Chemistry
Project Description	The residential neighbourhood south of Eastgate Parkway provides an opportunity to begin preliminary steps towards improved water quality through the implementation of Trout Unlimited Canada's Yellow Fish Road Program and by informing the public about the consequences of pollution, with emphasis on stream ecosystems, and practical strategies for reducing pollution.
Related IPOs	Table 4-11, Table 4-23
Making contact as soon as possible following a spill and supplying photographs can help OMOE assess and respond as required to the occurrence. The OMOE Spills Action Centre phone number is 416-325-3000.	
For Project Ideas, please refer to Table 4-11: <i>IPO 3.1 Water Quality Outreach Program</i> in Tributary 3.	
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-25: IPO 5.4 Naturalization Strategy for Channelized Streams

Implementation Project Opportunity	
Project Name	IPO 5.4 Naturalization Strategy for Channelized Streams
Priority Rationale	High velocity flows conveyed by channelized streambed limits the upstream migration of fish, prevents the establishment of in-stream vegetation that can be used for refuge, and induces downstream erosion. They degrade water quality, substrate and as most channels are approaching the end of their design life, they threaten infrastructure. The Peel Channels Study is an upcoming report with the primary objective of naturalizing concrete-lined or hardened streambed within Etobicoke Creek watercourses. Planning, potential project sites and recommendations identified by the report are slated for completion by 2012.
Management Target(s)	Aquatic Community, Aquatic Habitat, Surface Flow Regime
Project Description	In compliance with the Peel Channels Study, move towards the assessment and implementation of restored natural channel design in priority sections of hardened streambed.
Related IPOs	Table 4-9, Table 4-19
For Project Ideas, please refer to Table 4-9: <i>IPO 2.3 Naturalization Strategy for Channelized Streams</i> in the Etobicoke West Branch.	
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-26: IPO 5.5 Priority Municipal Stormwater Retrofits

Implementation Project Opportunity	
Project Name	IPO 5.5 Priority Municipal Stormwater Retrofits
Priority Rationale	SWM practices have recently evolved to better incorporate long-term environmental impacts into their design (OMOE, 2003). Within the Little Etobicoke, quantity and quality SWM controls are currently limited to a small section of industrial land in the upper limits. Water quality here is decidedly poor. Although data sampling has been limited here, indicators of poor quality exist, including poor aquatic fish biodiversity. Municipally-driven SWM projects are further identified within this FMZ (TRCA, 2010a).
Management Target(s)	Water Chemistry
Project Description	Priority SWM controls and retrofit opportunities have been identified by the City of Mississauga and are indicated by stars in Figure 4-6 . These projects are to be supported through integrated and complementary restoration work.
Related IPOs	Table 4-12, Table 4-20, Table 4-27
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Quality sampling for SWM controls	- Sample water quality at locations up and downstream of SWM control locations, where applicable. - Ensure pre- and post-retrofit sampling is conducted to provide comparable data and measure whether the objectives for SWM retrofits are met from a fisheries perspective.
2. Stormwater Management	
Priority implementation	- Prioritize SWM retrofits and outfalls according to their perceived benefit, with emphasis on water quality concerns associated with fish communities. - Support municipal implementation of new SWM outfall ponds and existing retrofit opportunities (Aquafor Beech Ltd., 2003). - Ensure that both the feasibility of SWM designs and the potential for cumulative impacts are incorporated in SWM planning and implementation.
3. Analysis and Communication	
Reporting results	- Using pre- and post- data and post-retrofit assessments, determine the efficacy of SWM control implementation. - Complete a report that details mitigation results, whether objectives have been achieved and makes recommendations for future management of SWM controls.
4. Water Quality	
Public outreach programs	- Facilitate water quality improvements at municipal SWM controls by implementing public-centered outreach programs. - Refer to Table 4-23: IPO 5.2 Industrial Spills Prevention Awareness Program, and Table 4-24: IPO 5.3 Water Quality Outreach Program for details.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.6 Etobicoke Main Branch (FMZ 6)

The Etobicoke Main Branch (FMZ 6) receives flow from the Etobicoke West Branch (FMZ 2), Tributary 3 (FMZ 3), and Spring Creek (FMZ 4) and in turn carries it to the Lower Etobicoke (**Figure 4-7**). As the center of Etobicoke Creek, the Main Branch is also occupied within the bounds of extensive commercial and industrial land use, including a large proportion of the GTAA lands to the north.

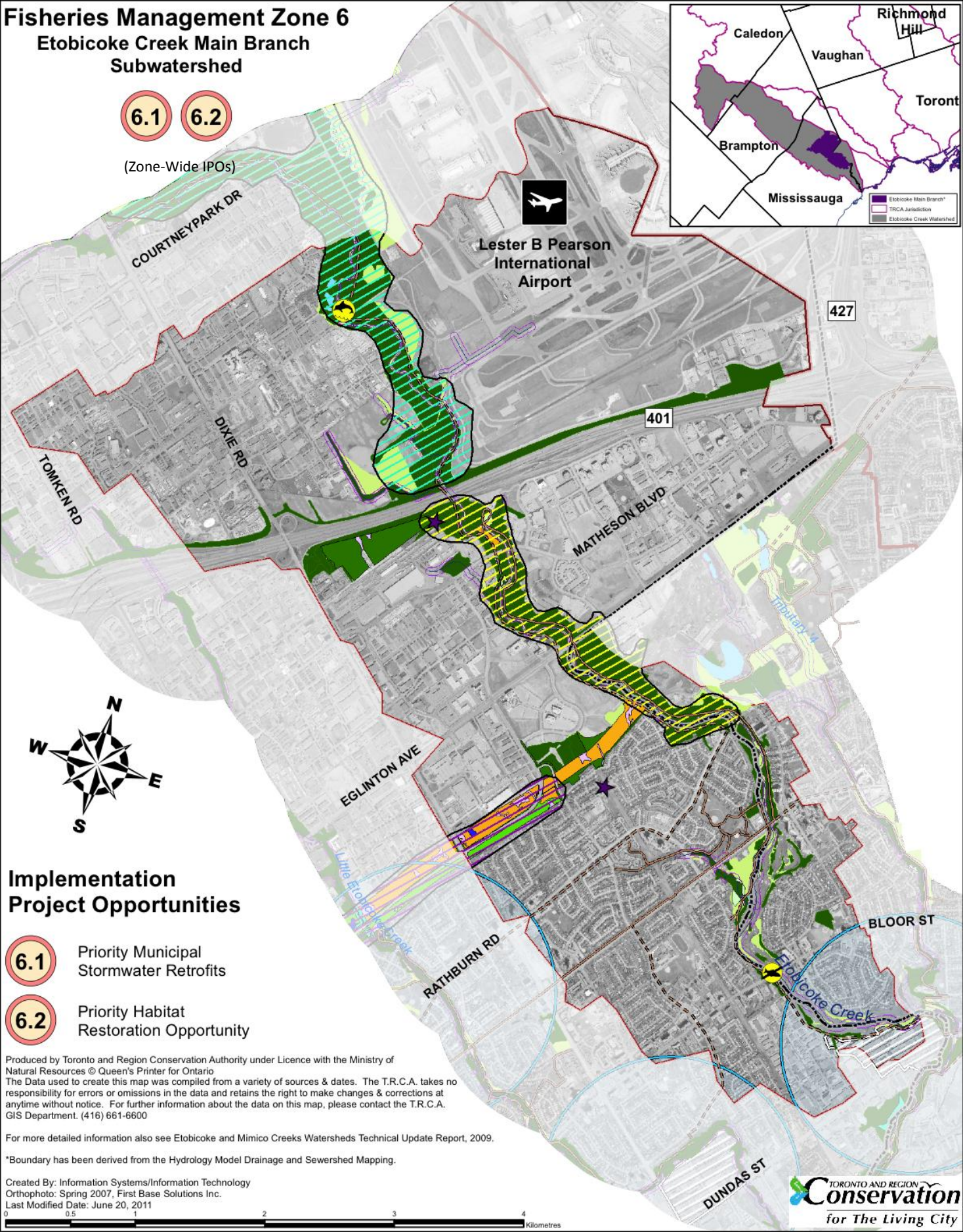
As a result of present land use in the Main Branch, the opportunity for focussed fisheries management here is reduced. The two priority objectives are therefore scoped on enhancing and regenerating riparian conditions, while also improving stormwater management controls, which are mostly lacking (TRCA, 2010a). With much of this catchment developed prior to the implementation of best management practices, stormwater management controls are limited to the GTAA lands. Elsewhere, controls are absent and water quality is expected to be poor, although PWQMN and RWMP stations are absent here (TRCA, 2010a).

The major redeeming factor that may dilute issues surrounding poor water quality is the high supply of groundwater provided along this FMZ. The Scarborough Aquifer is believed to feed groundwater to the southern reach from Burnhamthorpe Road to Dundas Street. This contribution means that the Main Branch is the subwatershed supplying the highest proportion of baseflow to Etobicoke Creek (TRCA, 2010a). By ensuring surface water quality and riparian conditions are maintained, particularly via tree canopy cover, a multitude of benefits will be seen in groundwater reaches such as this. Despite being mostly comprised of commercial and industrial lands, FMZ 6 still supports many opportunities for habitat recovery. The TNHSS and ROP have both prioritized locations that would ensure benefit to both the terrestrial and aquatic systems.

Although stormwater management and riparian projects are the only IPOs designated for the Main Branch, other opportunities to improve this warmwater system can be identified through the minimal habitat fragmentation and absence of streambed channelization. Although channelization is absent, watercourse piping occurs in some smaller tributaries and can induce rapid fluctuations in flow. Municipal effort could focus on daylighting or otherwise improving conveyance methods. Further, municipal efforts are already intended to address infrastructure works through road, erosion and channel controls. Regeneration partnerships and rehabilitation projects covered the Pearson Eco Business Zone and South Etobicoke Creek Valley and Trail Rehabilitation are also expected to complement existing fisheries projects.

4.1.6.1 Implementation Project Opportunities FMZ 6

Two IPOs have been identified for the Etobicoke Main Branch, with their approximate locations indicated in Figure 4-7. A description of each project and direction for potential project components can be found in Table 4-27 and Table 4-28.



FMZ 6 - Opportunities and Challenges

- Biodiversity and IBI ratings are “poor.”
- Highest proportion of baseflow is contributed to the Etobicoke Creek through the Main Branch.
- Priority municipal stormwater retrofits have been identified within this subwatershed.
- Priority habitat restoration opportunities exist, as identified through TRCA’s Terrestrial Natural Heritage System Strategy and Riparian Opportunities Plan.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Figure 4-7: FMZ 6 Etobicoke Main Branch IPO Locations

Table 4-27: IPO 6.1 Priority Municipal Stormwater Retrofits

Implementation Project Opportunity	
Project Name	IPO 6.1 Priority Municipal Stormwater Retrofits
Priority Rationale	SWM practices have recently evolved to better incorporate long-term environmental impacts into their design (OMOE, 2003). The Main Branch was developed with mostly quantity and quality SWM controls in the GTAA lands and therefore a priority exists to improve control in downstream reaches. Like most of the lower subwatersheds, water quality is not expected to be very high, but there have also been sediment loading issues identified within this FMZ and there is still some potential for riparian opportunities that would function in concert with municipal SWM retrofit objectives identified by the City of Mississauga (TRCA, 2010a).
Management Target(s)	Water Chemistry
Project Description	Priority SWM controls and retrofit opportunities have been identified by the City of Mississauga and are indicated by stars in Figure 4-7 . These projects are to be supported through integrated and complementary restoration work.
Related IPOs	Table 4-12, Table 4-20, Table 4-26
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Quality sampling for SWM controls	• Sample water quality at locations up and downstream of SWM control locations, where applicable. • Ensure pre- and post-retrofit sampling is conducted to provide comparable data and measure whether the objectives for SWM retrofits are met from a fisheries perspective.
2. Stormwater Management	
Priority implementation	• Support municipal implementation of new SWM outfall ponds and existing retrofit opportunities. • Emphasis should be put on SWM controls that can manage high sediment loads.
3. Analysis and Communication	
Reporting results	• Using pre- and post- data and post-retrofit assessments, determine the efficacy of SWM control implementation. • Complete a report that details mitigation results, whether objectives have been achieved and makes recommendations for future management of SWM controls.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-28: IPO 6.2 Priority Habitat Restoration Opportunity

Implementation Project Opportunity	
Project Name	IPO 6.2 Priority Habitat Restoration Opportunities
Priority Rational	Most of the Main Branch within the vicinity of GTAA lands has been identified by the ROP as a location for high priority habitat restoration, where natural cover can be increased and upland connectivity improved. TNHSS has further identified most of the habitat north and south of Highway 401 as being strong terrestrial recovery opportunities. Since in-stream fish habitat has strong improvement potential due to its lack of channelized streambed, addressing forest and riparian opportunities in this FMZ is an important consideration for improving infiltration and water quality.
Management Target(s)	Terrestrial Natural Heritage
Project Description	Restoration of degraded habitat and enhancement of remaining high quality riparian zones is necessary to aid in maintaining conditions sustainable to the present aquatic ecosystem.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Riparian Habitat	
ROP implementation	- Coordinate identified TNHSS opportunities with ROP-identified priority sites to ensure quality, quantity, distribution and connectivity of natural cover. - Planning and design of implementation efforts should consist of improvements to canopy cover and riparian vegetation that promotes fish spawning and feeding as well as water quality control.
Monitoring	Implementation sites should be periodically monitored to ensure the watering and successful establishment of vegetation at these locations.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.7 Tributary 4 (FMZ 7)

Tributary 4 (FMZ 7) is the smallest subwatershed within Etobicoke Creek and possesses lands that are mostly comprised of residential and natural cover (Figure 4-1). Included in its land use is a large portion of open space and meadow devoted to Centennial Park.

As having headwater tributaries within Centennial Park, FMZ 7 is made up of low-order streams, suggesting that water quality is of relatively higher quality. However important the natural features of Centennial Park are, fisheries concerns and opportunities to enhance aquatic conditions are still identified here. There are minor in-stream barrier issues identified within the vicinity of Centennial Park (TRCA, 2010a), and a generally natural stream-bed throughout FMZ 7. Although these conditions are preferable to highly altered watercourses, they also create some aquatic invasive species (AIS) risk. FMZ 7 is proximal to Lake Ontario, and the upstream migration of AIS can cause competition with native fish species, especially as lower barriers are mitigated or direct introductions are made in the online ponds located within Centennial Park. Common carp (*Cyprinus carpio*) and koi (*C. carpio haematopterus*) have been previously identified south of the Queensway, and more recently within the online ponds at the park (refer to ECRC030 in TRCA (2010a)). These specific AIS create problems by damaging aquatic vegetation, which in-turn can create turbid conditions. Good public access within Centennial Park, in combination with an associated trail system, both provide opportunity to implement education and community stewardship projects that relate to AIS concerns.

The online ponds within Centennial Park not only threaten the aquatic conditions through AIS, but may also be associated with thermal instability identified in the tributary (TRCA, 2006a). Online ponds are a known contributor to fluctuations in thermal regime (Jones *et al.*, 2010; Herb *et al.*, 2009), but no existing data sampling has been conducted to detect the temperature conditions within Tributary 4. Since this FMZ possesses mostly low-order streams, unlike some other subwatersheds, thermal contributions must be due to the present conditions here. As a result, the Centennial Park ponds provide an important opportunity to better identify the cause of thermal issues. Implementing temperature gauges within the vicinity of Centennial Park ponds may provide insight into the connection these ponds have with present aquatic system function.

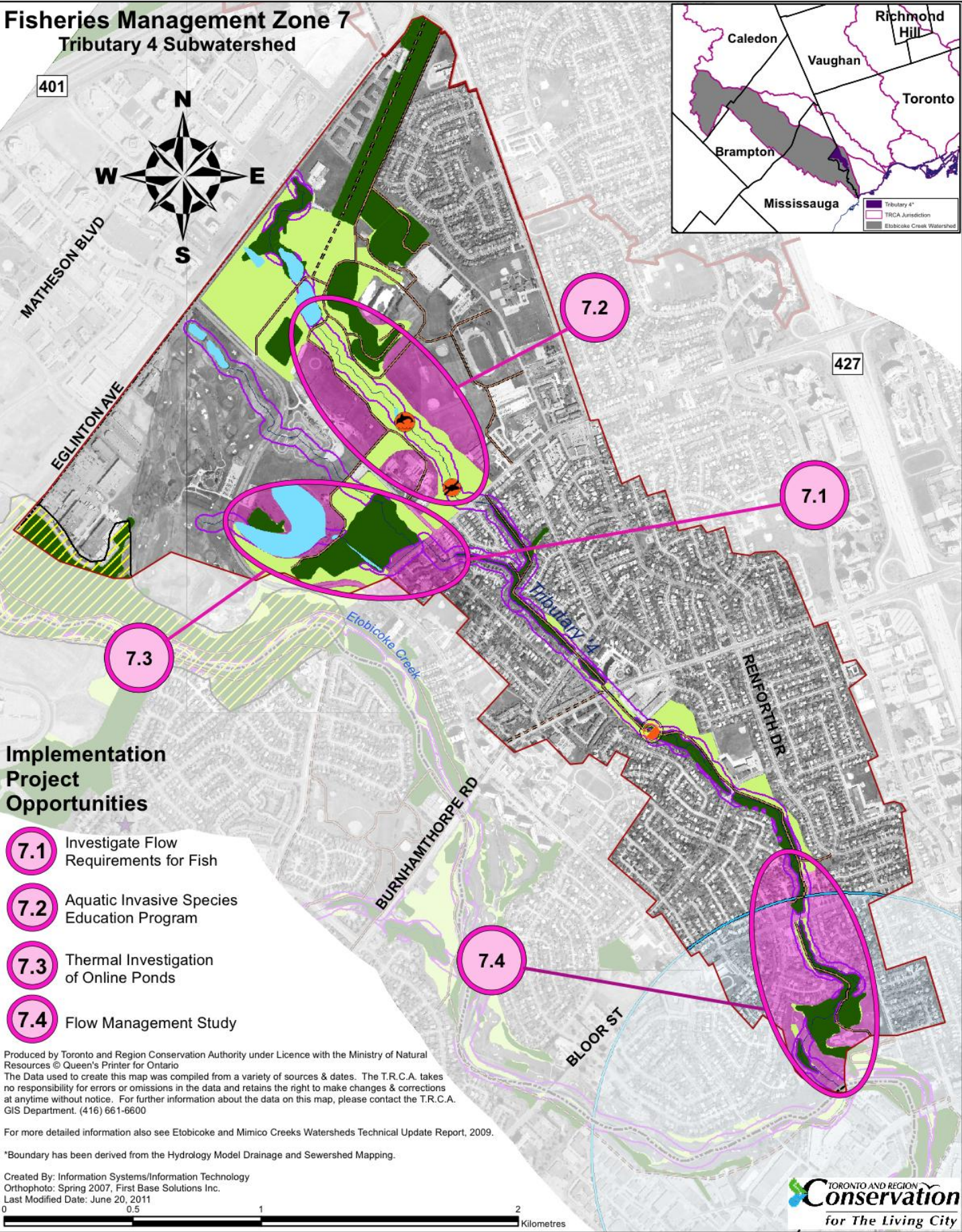
While this tributary is at a lower risk to further aquatic habitat degradation, relative to other subwatersheds, it was also developed without stormwater management controls in place, meaning the system is susceptible to water quality issues and rapid fluctuations in flow. No municipal stormwater retrofit opportunities have been identified for this location, however a high-sensitivity downstream reach is susceptible to rapid alterations in channel morphology through erosion - i.e. Neilson Park, north of Dundas Street (Parish Geomorphic Ltd., 2005; TRCA, 2010a).

Since the original Etobicoke Creek FMP, high sensitivity to water-taking has been another issue identified here (TRCA, 2010a). Like the Etobicoke Headwaters, it is critical to ensure that

withdrawals do not impact the remaining species found within the low-order streams of Tributary 4.

4.1.7.1 Implementation Project Opportunities FMZ 7

Four IPOs have been identified for Tributary 4, with their approximate locations indicated in Figure 4-8. A description of each project and direction for potential project components can be found in Table 4-29, Table 4-30, Table 4-31, and Table 4-32.



FMZ 7 - Opportunities and Challenges

- Biodiversity and IBI ratings are “poor.”
- Centennial Park in the headwaters provides many opportunities to stimulate community interest.
- Aquatic invasive species have been identified as high up as Centennial Park.
- Thermal instability within the stream has been identified downstream of the park.
- Erosion at Neilson Park has both aquatic and liability concerns associated with it.
- Seasonally sensitive tributaries have been identified as a result of water-taking during baseflow conditions.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Figure 4-8: FMZ 7 Tributary 4 IPO Locations

Table 4-29: IPO 7.1 Investigate Flow Requirements for Fish

Implementation Project Opportunity	
Project Name	IPO 7.1 Investigate Flow Requirements for Fish
Priority Rationale	Significant surface water withdrawals have been identified by the Surface Water Vulnerability Assessment (TRCA, 2010b) for a large section of Tributary 4 running through Centennial Park. Greater than 25% of available baseflow is taken from this reach during water-taking activity, putting it in a state of high vulnerability during low flow summer conditions. Seasonal sensitivity caused by dry summer conditions within the headwaters of Tributary 4 limits the use of habitat by fish and interrupts downstream benefits.
Management Target(s)	Surface Water Regime, Aquatic Community
Project Description	Determine in-stream flow requirements for fish species and habitat at reaches that are sensitive to surface withdrawals by water-takers, as identified by the Surface Water Vulnerability Assessment. An analysis of flow requirements may provide a resource for executing water allocation decisions at these sensitive reaches for the purpose of maintaining water balance and preventing seasonal habitat loss.
Related IPOs	Table 4-1, Table 4-7
For Project Ideas, please refer to Table 4-1: IPO 1.1 Investigate Flow Requirements for Fish in the Etobicoke Headwaters.	
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-30: IPO 7.2 Aquatic Invasive Species Education Program

Implementation Project Opportunity	
Project Name	IPO 7.2 Aquatic Invasive Species Education Program
Priority Rationale	Common carp and koi have been identified south of the Queensway and more recently, south of Eglinton Avenue at an online pond created by a limited-passage weir (refer to barrier ECRC030 in the <i>Technical Update</i>). Their destruction of local habitat creates interspecific competition that can pose a threat to the success of native aquatic fish communities.
Management Target(s)	Aquatic Communities, Aquatic Habitat
Project Description	AIS identification and education opportunities within the vicinity and downstream of Centennial Park will provide direction for management strategies and volunteer opportunities within Tributary 4.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Identifying AIS locations	- Verifying the presence of common carp and koi to ensure efforts are scoped to significant at-risk locations. - Use volunteer-based identification and reporting programs to accumulate monitoring data of AIS presence.
2. Public Education and Stewardship	
Developing signage	- Descriptive signs should be created to visually depict the appearance of carp and describe their destructive nature, both in the context of local habitat and ultimately, competing native species. - Preventing the transfer of AIS between streams and online ponds, either through angling or other means, should be emphasized.
Guided walks	As a high-traffic area, existing trails and walkways should be investigated for the implementation of guided tours that reiterate the goals of signage and highlight the importance of maintaining existing native communities.
3. Coordination	
AIS prevention or removal	Work with the City of Toronto in assessing the feasibility of weir mitigation within Centennial Park, or otherwise investigate the potential to integrate pond maintenance efforts with carp removal.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-31: IPO 7.3 Thermal Investigation of Online Ponds

Implementation Project Opportunity	
Project Name	IPO 7.3 Thermal Impact of Online Ponds
Priority Rationale	It is established that online ponds have the potential to increase the temperature of effluent streams (Herb <i>et al.</i> 2009, Jones and Hunt 2010). Within the Tributary 4 headwaters, online ponds may be influencing the current thermal instability identified at a downstream monitoring site near Bloor Street. As a small subwatershed with predominantly low-order streams, and some potential for improved natural cover, filling the thermal regime knowledge gap will provide insight into potential mitigation efforts that could enhance the natural conditions needed for aquatic species sustainability.
Management Target(s)	Thermal Regime
Project Description	Monitoring stream temperature directly upstream and downstream of online ponds will help characterize the thermal impact of these water bodies, particularly in relation to major storm or rain events.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Temperature gauges	- Employ seasonal stream gauges for multi-year monitoring of water temperature. - Gauges should monitor upstream and downstream conditions where possible; however, gauge locations should take into account the potential affect of temperature alterations that result from water-taking (refer to Table 4-29: IPO 7.1 Investigate Flow Requirements for Fish). - Determine the temperature stability and whether it reaches the maximum threshold for target aquatic species.
2. Riparian Habitat	
Natural cover enhancement	- Interim efforts for preventing thermal instability should focus on natural cover design. - The riparian zone of reaches upstream and downstream of ponds should be targeted for habitat enhancement in order to increase shading, infiltration and counter thermal instability. - Riparian surrounding ponds should further reflect improvements to thermal regime.
Natural cover monitoring	The success of planted vegetation within the riparian zone should be periodically assessed and maintained (e.g. watering) to improve likelihood of survival.
3. Management	
Assess mitigation potential	- Thermal regime characterization should assess the long-term goal of working with the City of Toronto to mitigate the online ponds. - All potential mitigation designs should be prioritized and merits for restoration detailed.
Implement mitigation efforts	- The approved mitigation design may be implemented. - Post-mitigation monitoring should be conducted to determine if mitigation objectives were met.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-32: IPO 7.4 Flow Management Study

Implementation Project Opportunity	
Project Name	IPO 7.4 Flow Management Study
Priority Rationale	Erosion issues have been identified in the vicinity of Neilson Park (refer to stations R1 and GET-2 in Parish Geomorphic Ltd. (2005) and TRCA (2010a), respectively). This location has undergone a number of changes, including channel straightening and structural controls (i.e. gabion baskets). Erosion at this site is also associated with tree root exposure, accumulation of woody debris and general low-flow volumes. The location and conditions provide the opportunity to conduct a pilot study that may provide insight into erosion prevention in other streams within or outside of the Etobicoke Creek watershed.
Management Target(s)	Sediment, Surface Flow Regime
Project Description	Explore and implement innovative engineered designs for erosion control to control flows and prevent the destruction of habitat. Flow management projects should aim to prevent continued habitat degradation, in addition to safe-guarding against cost and safety liability concerns that arise as a result of degraded channels and downstream infrastructure.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Fluvial geomorphology	- Conduct a fluvial geomorphic assessment of present conditions within the study site, with emphasis on flow and erosion rates. - Should be conducted pre- and post-implementation, in addition to intermittent flow monitoring for 5-10 years after implementation.
2. Flow Management	
Planning and design	- Determine appropriate approaches for erosion control at this location. - Emphasis should be made on the use of new and innovative erosion control technologies, specific to the current levels of erosion identified at the study site.
Implementation	Engineer approved designs at the study location.
3. Analysis and Communications	
Reporting	- Complete a report that assesses the implemented alterations, success, long-term results and the achievement of objectives. - Make recommendations to investigate the application of designs to other erosion hazard sites.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

4.1.8 Lower Etobicoke (FMZ 8)

The mouth, or estuary, of Etobicoke Creek joins with Lake Ontario within the Lower Etobicoke subwatershed (Figure 4-9). Though the zone has some industrial land, it is largely comprised of low to medium density residential areas and open space, parkland, and meadow near the estuary of the river. A range of regeneration and mitigation projects have recently been identified for areas south of the QEW, including Toronto Golf Club (TGC) Dam mitigation and Marie Curtis Park regeneration.

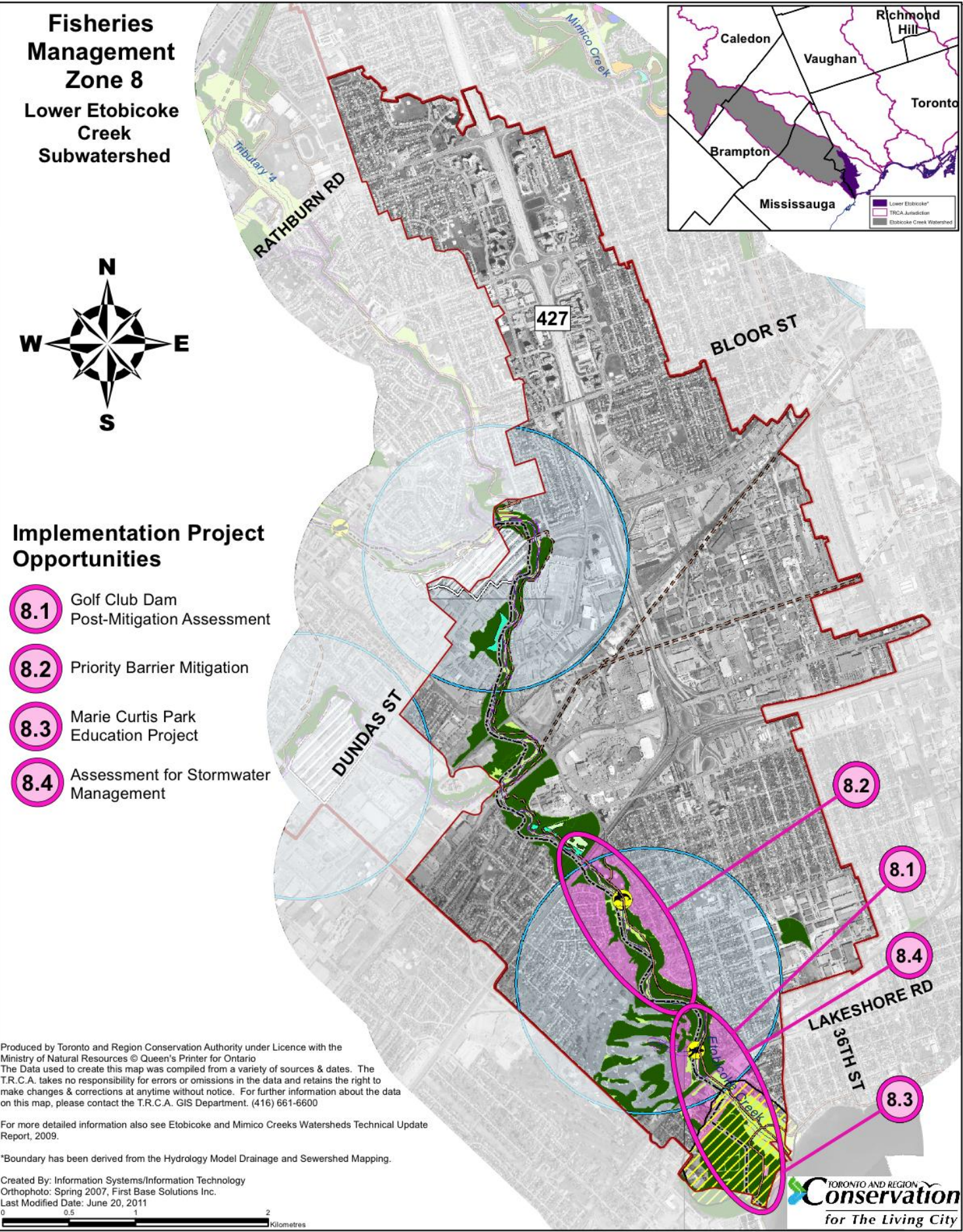
Marie Curtis Park, located at the creek estuary, provides the primary opportunity for fisheries implementation projects within FMZ 8. As of May 2011, the implementation of restoration plans has begun. The location of the park and its current regeneration potential, including increased trails, serve as prime drivers for increased community participation opportunities related to preventing new introductions of AIS, recreational angling, and aquatic system education in general.

Warmwater and estuarine habitats comprise the only in-stream conditions for fish inhabitation. The meeting point between the Lake and river has generally provided strong diversity. Even so, from 2004 to 2007, the IBI rating at the mouth of the creek has improved, though it remains poor near the Queensway (TRCA, 2010a). This poorer aquatic community may be attributed to the Toronto Golf Club (TGC) Dam, which has been serving as a no-passage barrier to non-jumping fish under seasonal flow conditions since its installation many decades ago. With the induction of a water intake pipe from Lake Ontario, the TGC no longer depends on the dam for water withdrawals and plans to mitigate the dam are underway. Looking at the entire watershed, the passage from Lake Ontario to the Etobicoke Headwaters (FMZ 1) is limited by few major barriers. The TGC dam serves as the first no-passage barrier upstream from the Lake, and therefore provides a crucial link to understanding what aquatic species have so far been limited from migration. With the future mitigation of the dam, the threat of AIS invasion, particularly that of round goby (*Neogobius melanostomus*), is one viable concern. Although the major barriers upstream of the dam may continue to limit AIS passage, it is important that prior to their mitigation, the fish community is tracked.

Since the Lower Etobicoke was not developed with SWM controls, it is subject to both rapid flow fluctuations and water quality issues locally and cumulatively from the entire watershed. At this point in time, the high levels of chlorides, phosphorus and *E. coli*, identified at a PWQMN station near the QEW, are not expected to meet 2025 targets set out in the Etobicoke Mimico Watershed Report Card (TRCA, 2006b). The City of Mississauga and Toronto have not identified priority SWM retrofits in this area; however opportunities to at least retrofit and divert direct road drainage at bridge crossings away from the creek should be considered.

4.1.8.1 Implementation Project Opportunities FMZ 8

Four IPOs have been identified for the Lower Etobicoke, with their approximate locations indicated in Figure 4-9. A description of each project and direction for potential project components can be found in Table 4-33, Table 4-34, Table 4-35, and Table 4-36.



FMZ 8 - Opportunities and Challenges

- Biodiversity and IBI rating is “fair” at the mouth of Etobicoke Creek.
- Marie Curtis Park at the mouth of the creek is subject to restoration efforts as of 2011, promoting increased community interactions here.
- Toronto Golf Club Dam is the first no-passage fish barrier limiting upstream access and its mitigation is currently anticipated.
- FMZ 8 has not been developed with stormwater management controls in place.

Implementation Project Opportunities listed do not necessarily represent an exhaustive list of potential restoration, monitoring, research, education or public awareness work.

Figure 4-9: FMZ 8 Lower Etobicoke IPO Locations

Table 4-33: IPO 8.1 Golf Club Dam Post-Mitigation Assessment

Implementation Project Opportunity	
Project Name	IPO 8.1 Golf Club Dam Post-Mitigation Assessment
Priority Rationale	The Toronto Golf Club Dam (TGC) Dam is currently described as a no-passage barrier for both native and invasive species. While its anticipated and upcoming mitigation is expected to permit the upstream migration of species, mitigation further poses an aquatic invasive species (AIS) risk.
Management Target(s)	Aquatic Community, Aquatic Habitat
Project Description	Assessing the impact of TGC Dam mitigation by characterizing the fish community and determining capacity for passage.
Related IPOs	Table 4-34
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Aquatic Species Barrier	
Field assessment	- Visually assess the results of the TGC Dam mitigation through field visitation. - Identify pending issues and make recommendations, if applicable.
2. Data Monitoring and Sampling	
Identifying locations	- Identify suitable in-stream locations to conduct fish community sampling. - May take into consideration the next no-passage barrier located upstream (refer to ECLOW011 in the <i>Technical Update</i>) as a location for determining passage success and biodiversity; refer to Table 4-34: IPO 8.2 Priority Barrier Management for details.
Aquatic native species	- Determine success of upstream migration by native species through fisheries sampling. - May incorporate volunteer identification programs. - Where applicable, integrate educational sampling that publicly illustrates the successes and challenges of restoration work and urbanization in general.
Aquatic Invasive Species (AIS)	- Determine success of upstream migration by AIS. - Make recommendations for AIS control opportunities, either through seasonal barriers or maintenance of existing barriers.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-34: IPO 8.2 Priority Barrier Management

Implementation Project Opportunity	
Project Name	IPO 8.2 Priority Barrier Management
Priority Rationale	High priority weir (refer to ECLOW011 in <i>Technical Update</i>) is the next major fish barrier upstream of the TGC Dam (refer to Table 4-33: IPO 8.1 Golf Club Dam Post-Mitigation Assessment), blocking connectivity to upstream habitat and headwaters for non-jumping species.
Management Target(s)	Aquatic Community, Aquatic Habitat
Project Description	Reassess fish passage and investigate restoration in anticipation for barrier management plans following the mitigation of the TGC Dam.
Related IPOs	Table 4-33
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Aquatic Species Passage	
Re-assessment	Apply Table 4-33: IPO 8.1 Golf Club Dam Post-Mitigation Assessment to characterize whether this weir serves as an AIS barrier.
2. Flow Regime	
Stream flow assessment	- Determine the existing stream flow regime (e.g. installation of stream gauges) in preparation for future mitigation. - Use flow assessment as a basis for conducting weir redesign, renaturalization and developing pre-mitigation considerations.
3. Barrier Mitigation	
Barrier maintenance	Maintain barrier as a potential, temporary block to the migration of AIS following the mitigation of the downstream TGC Dam until aquatic species monitoring studies have been completed.
Investigation	- Assess effective weir mitigation potential, including removal or bypass opportunities in anticipation that ECLOW011 is of high priority to be addressed following TGC Dam removal. - Agency consultation and approvals will be required prior to mitigation work.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-35: IPO 8.3 Marie Curtis Park Education Project

Implementation Project Opportunity	
Project Name	IPO 8.3 Marie Curtis Park Education Project
Priority Rationale	Marie Curtis Park provides public access to the mouth of the Etobicoke Creek. Recently, in May 2011, reconstruction of the park features began in order to improve aesthetics, practical function and public use. The improved community interaction here provides an important opportunity for educating the public about the aquatic system, including AIS like round goby (<i>N. melanostomus</i>), sea lamprey (<i>Petromyzon marinus</i>) and common carp (<i>C. carpio</i>).
Management Target(s)	Aquatic Community, Aquatic Habitat, Anthropogenic
Project Description	High value community participation opportunities exist due to the planned reconstruction of Marie Curtis Park. Through education and enhancements in vegetation, benefits may be seen directly in the park, and indirectly provide people with the opportunity to be environmentally savvy outside of the park.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Public Education and Stewardship	
Recreational angling	- Engage angling associations for feedback on the general suitability of angling at Marie Curtis Park, as well as suitable locations for angling nodes. - Reassess locations of angling nodes, as suggested in the Marie Curtis Park Master Plan and incorporate suggestions from angling associations. - Create stewardship signage that address ethical angling practices and install at strategic locations along angling nodes.
AIS education	- Incorporate environmental volunteer programs in the development of signage for the education of AIS and importance of maintaining native communities. - Install signage at high traffic areas and in association with angling nodes.
Educational walks	- Educational walks should be conducted through the park to provide insight into the issues of AIS, with emphasis on the importance of retaining native species communities. - May incorporate visitation to TGC Dam (post-mitigation; refer to Table 4-33: IPO 8.1 Golf Club Dam Post-Mitigation Assessment) as an illustration of aquatic species and regulation of AIS.
2. Riparian Restoration	
Vegetative buffers	- The close proximity of the parking lots to the river will cause thermal and water quality contributions directly into the system. - The east parking lot is planned to be moved inland, however the west parking lot will remain in its present location. Efforts should be focused to the West lot. - Through public stewardship, plant a riparian buffer to combat present risks to the system and educate the public about quality control and urban affects on the aquatic ecosystem.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

Table 4-36: IPO 8.4 Assessment of Stormwater Management

Implementation Project Opportunity	
Project Name	IPO 8.4 Assessment of Stormwater Management
Priority Rationale	Much of the lower subwatersheds of Etobicoke Creek were developed without SWM controls in place. The bridge permitting passage of Lakeshore Road over Etobicoke Creek provides numerous opportunities for the design and implementation of quality and quantity control measures. Currently, water from the road passes directly into the stream without the interference of end-of-pipe controls. With the downstream reconstruction of Marie Curtis Park, there is an opportunity to revise plans for the upper portion of the park to incorporate SWM designs.
Management Target(s)	Water Chemistry, Thermal Regime
Project Description	Provide treatment to stormwater prior to reaching the stream through innovative SWM control designs that incorporate the upstream portion of Marie Curtis Park.
Proposed Project Components	Proposed Project Planning and Design Considerations
1. Data Monitoring and Sampling	
Water quality sampling	• Monitor the current in-stream quality upstream and downstream of Lakeshore Road. • Conduct prior to and following the implementation of SWM controls.
2. Stormwater Management	
Design	• Assess the capacity for implementing SWM controls that direct water from the road to off stream locations rather than directly into the stream. • Emphasis on innovative SWM technologies and designs that may prevent thermal issues and improve quality control. • Assess the incorporation of wetland features as a means of quality control.
Implementation	• Implement approved SWM control designs.
3. Analysis and Communications	
Reporting results	• Use monitoring data to finalize a report documenting the outcome of the SWM implementation.
* IPO inclusion in this Detailed Implementation Chapter does not preclude the implementation of other projects or activities that may help achieve FMP objectives in the Etobicoke Creek Watershed. Also, IPOs identified here still require approvals and/or permits from appropriate agencies. Further planning and design for each project component are required, including funding, land structure/owner authorization, cost estimates and technical feasibility. Projects should be discussed well in advance of implementation with the Etobicoke- Mimico Watersheds Coalition, appropriate agency staff and/or qualified environmental consultants (if necessary) to ensure that technical requirements and permits are identified/established, that proposals are consistent with relevant standards and FMP objectives, and that potential assistance for each project has been explored (partnerships/funding).	

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