

## ***LOWER SPENCER CREEK SUBWATERSHED***

### ***STEWARDSHIP ACTION PLAN 2010***



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# LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

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## GEOGRAPHIC LOCATION

Lower Spencer Creek subwatershed is 8.68 km<sup>2</sup> in area and is comprised of five catchment basins. In descending order from the headwaters to the outlet these are: Sydenham Road, University Gardens, McMaster University, Cootes Paradise and Princess Point (**Map LS-1**). This subwatershed lies within the former municipal boundaries of Dundas Hamilton and Flamborough, and within three City of Hamilton Wards, specifically Wards 13, 1 and 15.

The boundaries of the Lower Spencer Creek subwatershed and its associated catchments have recently been updated through the Source Protection Planning process. The naming convention from the 1997 Spencer Creek Management Plan has been retained so that reference between previous reports is possible. However, as a result of the refined delineation an additional catchment, Princess Point, has been identified.

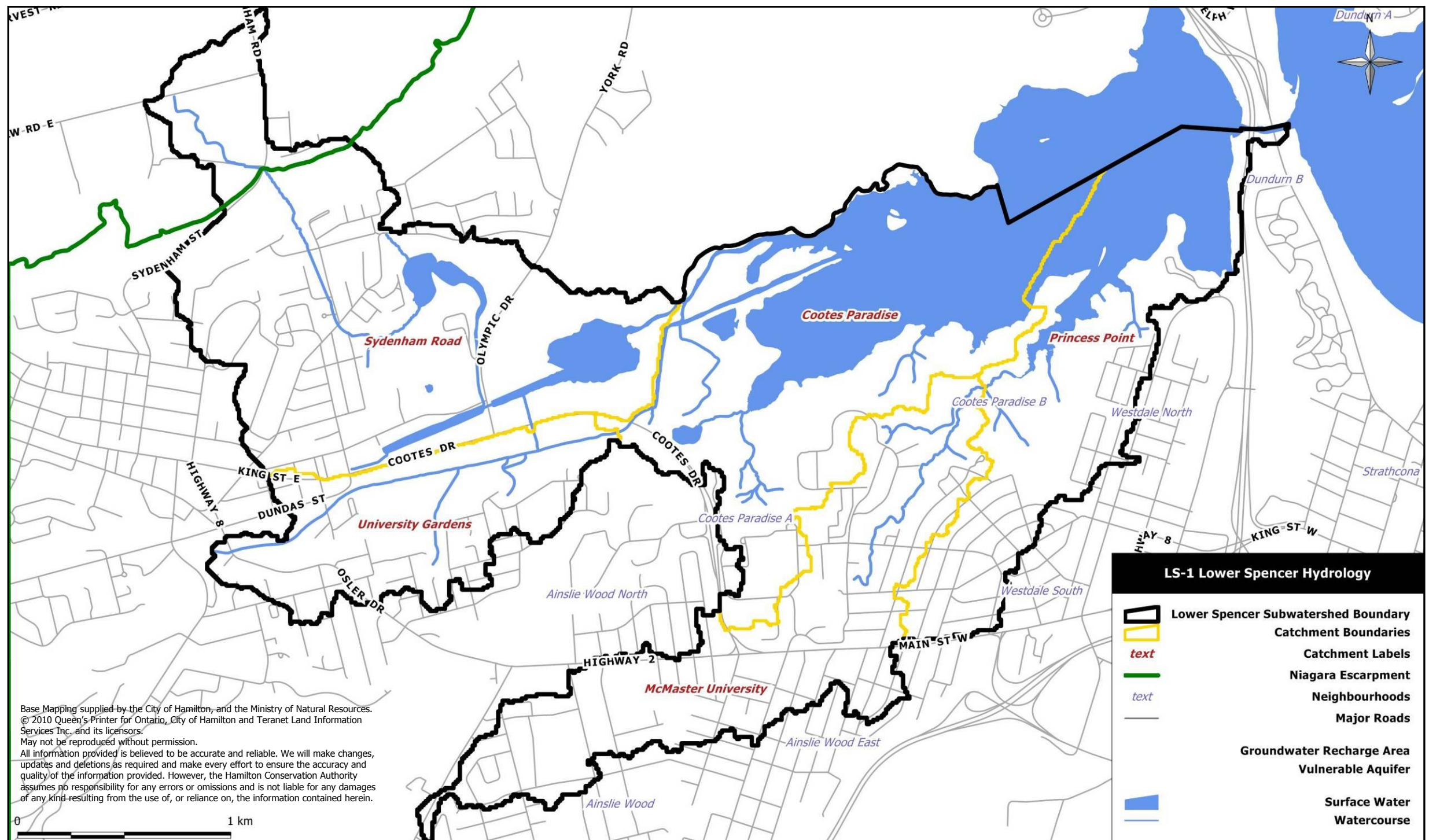
The northernmost point of the Lower Spencer Creek subwatershed originates above the Niagara Escarpment north west of Sydenham Road and leads down into the former Town of Dundas. The western subwatershed boundary accommodates the confluences of numerous upstream tributaries into Lower Spencer Creek. The irregular shape of the western subwatershed boundary allows that the subwatershed originates in the Dundas Driving Park, Ainslie Wood, Ainslie Wood West and Ainslie Wood East neighbourhoods. Moving eastward, the subwatershed includes portions of the Westdale North and Westdale South neighbourhoods, west of Longwood Drive and north of King Street West respectively.

The southernmost subwatershed boundary lies south of Main Street West, between Wilson Street East and Newton Avenue, tapering northward to the eastern boundary of the subwatershed and terminus of the creek system. The eastern boundary of the subwatershed occurs at the Royal Botanical Gardens Fishway, where Cootes Paradise Marsh outlets into Hamilton Harbour, flowing under Highway 403 and York Boulevard. The subwatershed incorporates the majority of the Cootes Paradise Marsh.

Highway 403 crosses the outlet of Lower Spencer Creek at the easternmost point of the subwatershed. Major transportation routes found within this subwatershed are Main Street West, Osler Drive, Cootes Drive, York Road and Olympic Drive.







# LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

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## HYDROLOGY

### Surface Water

Lower Spencer is the final subwatershed in the Spencer Creek system before it outlets into Cootes Paradise Marsh and ultimately Hamilton Harbour. Within the Lower Spencer Creek subwatershed the main branch of Spencer Creek is a 6<sup>th</sup> order stream as it drains 13 subwatersheds from the upper reaches of the system; a drainage area of 278 km<sup>2</sup>. Cootes Paradise Marsh is a 250 hectare, shallow area of both marsh habitat and open water. It is vital spawning, nursery and adult habitat for warm water fish communities. It is also critical habitat for a variety of flora and fauna, including migratory birds.

Lower Spencer Creek subwatershed has a drainage area of 8.68 km<sup>2</sup>. The length of Lower Spencer Creek is approximately 3.5 km from the confluence of Middle Spencer Creek to the outlet into the Desjardins Canal at Cootes Paradise, with the combined length of Lower Spencer Creek and all of its tributaries being 16.63 km.

The headwaters of Lower Spencer Creek originate above the Niagara Escarpment north west of Sydenham Road where it flows over Dymont Falls into the former Town of Dundas to connect with the stream network; however the majority of the flow in the creek system is the result of input from the confluences of Mid-Spencer, Spring and Ancaster Creeks into the Lower Spencer Creek system. The confluence of these tributaries occurs near the intersection of Governor’s Road and Main Street.

The subwatershed originates in the Dundas Driving Park, Ainslie Wood, Ainslie Wood West and Ainslie Wood East neighbourhoods; it then tapers in shape including portions of the Westdale North and Westdale South neighbourhoods, west of Longwood Drive and north of King Street West respectively.

The subwatershed also incorporates the majority of the Cootes Paradise Marsh. Lower Spencer Creek outlets into the Desjardins Canal as it enters the western end of Cootes Paradise. The canal was constructed between the years 1827 to 1837 to improve access to Lake Ontario and the Great Lakes system from the Town of Dundas. The remaining channel can be seen north of Cootes Drive in east Dundas and in the shallows of West Pond and the western end of Cootes Paradise.

The terminus of the creek system occurs at the Royal Botanical Gardens (RBG) Fishway, where Cootes Paradise Marsh outlets into Hamilton Harbour, flowing under Highway 403 and York Boulevard.

The land use of Lower Spencer Creek subwatershed is predominately urban. Urban runoff captured by stormsewers outlet into Lower Spencer Creek contributing to the overall input into Lower Spencer Creek, Cootes Paradise and Hamilton Harbour. The Dundas Water Pollution Control Plant discharges into Cootes Paradise at the Desjardins Canal. It contributes an annual daily average of 14, 155 m3 of effluent for a total contribution of 5,180,730m3 to Cootes Paradise annually.

The plant currently treats wastewater from the former municipality of Dundas and some portions of Waterdown, serving a total population of 20, 300. The highest flow occurs in March with a daily average of 18,269 m3/d which declines steadily throughout the year, with a minimum average daily flow of 10, 968 m3/d in November. The plant’s current capacity is 18,184 m3/d to serve a population of 25,000; indicating a potential need for expansion in the future. Currently, wastewater is being diverted to the Woodward Avenue Water Pollution Control Plant when the Dundas Plant is over capacity (HHSWP, 2008).

A preliminary surface water model output generated in the Halton Hamilton Source Water Protection (HHSWP) 2008 Draft Tier 1 Water Budget Report identified high volume recharge areas on Royal Botanical Gardens property north of West Pond in Cootes Paradise and west of Olympic Drive on City of Hamilton lands. At the time of this report the surface water model and Tier 1 Water Budget Report are currently being updated.

The control of water levels through the St. Lawrence Seaway for the shipping industry in the Great Lakes is observable in Hamilton Harbour and Cootes Paradise Marsh. This stabilization of the natural hydrology of the system creates unique management conditions as marsh ecosystems require fluctuating water levels for vegetation regeneration.

Fluctuating water levels in Lower Spencer Creek have also been observed but are believed to be caused by conditions or practices upstream. The cause of these fluctuating water levels is currently being investigated by the Conservation Authority and Ministry of the Environment.

There are no Hamilton Conservation Authority or Source Water Protection water level gauge stations in the Lower Spencer Creek subwatershed.

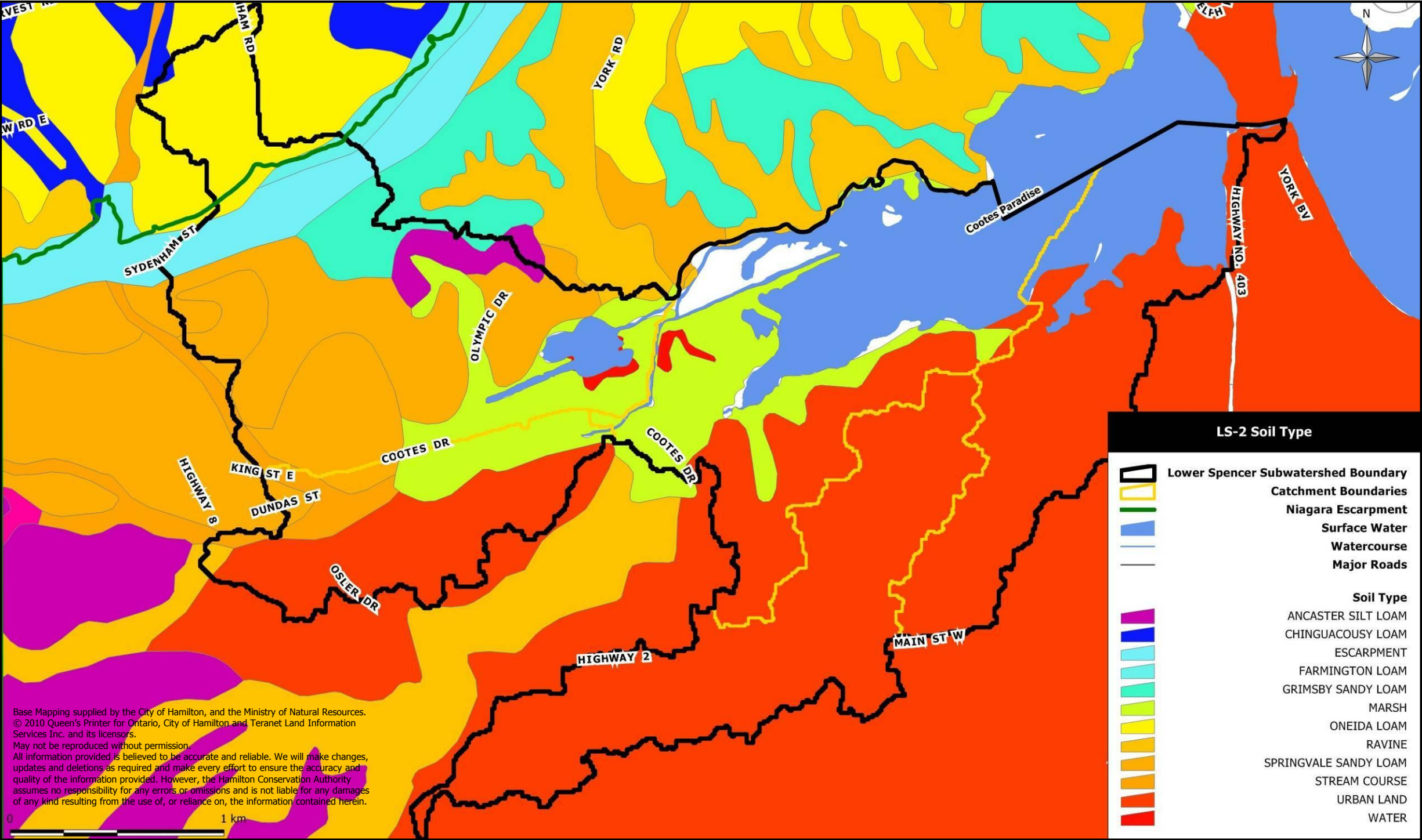
### Groundwater

The HHSWP 2008 Draft Tier 1 Water Budget Report identified no significant ground water recharge areas in Lower Spencer Creek subwatershed. However, the majority of the subwatershed has been identified as a highly vulnerable aquifer excluding the area above the Escarpment and a small tributary and associated drainage basin north of McMaster University, between Cootes Drive and Churchill Park.

The 2008 Draft Tier 1 Water Budget Report also assessed the intensity of groundwater capture and the potential for groundwater contamination. Annual and monthly Water Quantity Stress Assessments did not yield a significant or moderate stress result with respect to groundwater quantity in the Lower Spencer Creek subwatershed. Therefore no Tier 2 report is recommended for this subwatershed. At the time of this report, the groundwater model and Tier 1 Water Budget Report are currently being updated.

There are no Provincial Groundwater Monitoring Network wells in the Lower Spencer Creek Subwatershed.







# LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

## SOILS AND PHYSIOGRAPHY

The soil parent materials in the Spencer Creek subwatershed are thought to have predominately been deposited during the Wisconsin glacialation and are frequently related to underlying or adjacent bedrock formations (HHSWP, 2006).

The Niagara Escarpment is a prominent feature in the Spencer Creek Watershed. It extends in a westerly direction from Stoney Creek at the southeast end of Hamilton to a point west of Dundas from where it then runs east-northeast to Waterdown. The configuration of the Escarpment is greatly influenced by the Dundas Valley. The Dundas Valley is a major re-entrant bedrock valley in the Niagara Escarpment that extends inland for approximately 12km from the western end of Lake Ontario (SNC Lavalin et al., 2004). It is believed that the Dundas Valley was formed through erosion of the escarpment by an ancient pre-glacial river that flowed into the area from the northwest.

The east-west trending Dundas Valley is approximately 12km long, 4km wide and over 200m deep. The Dundas bedrock valley is a deep narrow central bedrock gorge within the re-entrant valley that runs west to east from Brantford through Dundas and to Lake Ontario. It is largely filled with glacial and post glacial deposits. The bedrock valley narrows west of the Lower Spencer Creek subwatershed but widens in Dundas following the trend of the escarpment (Hamilton Naturalists Club, 2003).

Along the axis of the Dundas Valley, the ground surface slopes easterly from approximately 260 masl through Dundas to about 75 masl at the Lake Ontario Shoreline. A small number of creeks are incised into the slope of the valley. Along the flanks of the valley, the ground surface elevation decreases from approximately 190 masl on the north slope and 120 masl on the south slope toward the centre of the valley to the shoreline (SNC Lavalin et al., 2004).

Lacustrine deposits of the Iroquois Plain are found along the Lake Ontario Shoreline. As the Ontario Lobe of the glacier receded from the Lake Ontario Basin, Lake Iroquois was formed. Lake Iroquois occupied an area significantly larger than the current shores of Lake Ontario. In Hamilton the Iroquois Plain is a relatively narrow plain located between the shore of Lake Ontario and the Niagara Escarpment. Sand and gravel bars such as the one that separates Hamilton Harbour from Lake Ontario are also present. Alluvial fan gravels are observed at the outlet of the Dundas Valley (Chapman and Putnam, 1984).

The present wetland of Cootes Paradise was created by a gradual, long-term rise in the level of Lake Ontario. The higher lake levels have partially inundated the dissected topography west of

the Hamilton barrier beach, resulting in the formation of a drowned valley landscape. Cootes Paradise exhibits many characteristics of the Iroquois Plain. Rolling hills and ravines that surround the central wetland were created by the erosion and deposition of sand and gravel. The shoreline of the post-glacial lake forms a bluff that encircles Cootes Paradise and the surrounding area (Hamilton Naturalists Club, 2003).

The soil characteristics of the Lower Spencer Creek subwatershed are shown on **Map LS-2**. Six soils complexes have been identified within the Lower Spencer Creek subwatershed, as summarized in **Table LS-1**. Soil characteristics vary throughout the subwatershed; however the majority of the soils are well drained. The sandy and loamy soils of the subwatershed have relatively large spaces between soil particles, water percolates quickly through these openings. The erosion potential ranges from very low to high (Canadian Department of Agriculture, et. al., 1965).

Erosion and sedimentation has historically been observed in Lower Spencer Creek. In the Spencer Creek Story, 1965, the author states “upstream the water is clear, in Dundas, especially below Head Street it is dirty looking. By the time it reaches Thorpe Street it is just plain dirty water. As a result the Desjardins Canal has become a reservoir for the silt that has been carried down the stream by the fast flowing water. The rate of flow slows down in the canal and the marsh and the silt sinks to the bottom.”

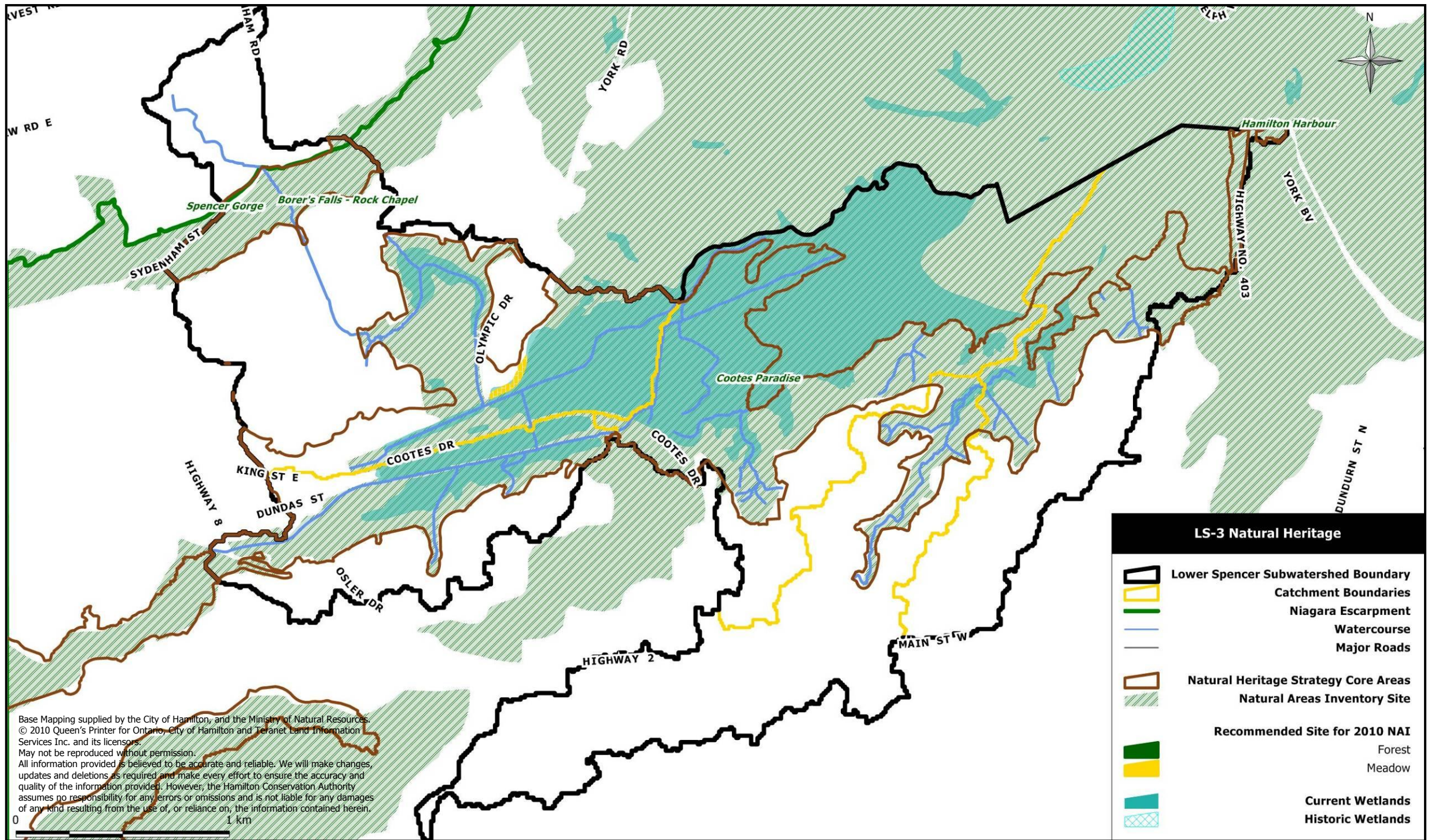
**Table LS-1:** Soil and Erosion Potential in the Lower Spencer Creek Subwatershed

Soil Type	Natural Drainage	Erosion Factor*	Topography (slope)	Erosion Potential**
Cl - Chinguacousy Loam	Imperfectly drained	3	2-5%	Low
Fl - Farmington Loam	Well drained	1	2-5%	Moderate
Gi - Grimsby Sandy Loam	Well drained	4	6-9%	Moderate
OI - Oneida Loam	Well drained	2	6-9%	High
Sp - Springvale Sandy Loam	Well drained	4	6-9%	Moderate
An - Ancaster Silt Loam	Well drained	2	38%	Moderate

\* Based on the Region of Hamilton-Wentworth Soil Summary Sheet

\*\* Based on the Ontario Environmental Farm Plan Workbook, Ontario Farm Environmental Coalition







# LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

## NATURAL HISTORY & SIGNIFICANT SPECIES

The Niagara Escarpment, a UNESCO World Biosphere Reserve, passes through the Sydenham Road catchment of this subwatershed. Additionally, this subwatershed reaches into five municipally designated environmentally significant areas (ESA's): Cootes Paradise, Hamilton Harbour, Dundas Valley, Borer's Falls – Rock Chapel and Spencer Gorge. These natural areas are critical habitat and migratory corridors for terrestrial and aquatic species. Biophysical attributes of these areas were assessed in the Hamilton Natural Areas Inventory Nature Counts Project, Dwyer et al., 2003).

Natural vegetation covers 2.4 km<sup>2</sup> or 28% of Lower Spencer Creek subwatershed. RBG and HCA own most of these natural areas as they collectively own 3.3 km<sup>2</sup> or 38% of the lands within the subwatershed. The current natural land cover statistics for the area are noted within **Table LS-2**. Based on the digital data provided for this analysis, forest cover accounts for 17.4% of this subwatershed, while meadow cover is 2% of the land base. Stream length of Lower Spencer Creek and all its tributaries is 16.63 km, excluding the historic Desjardins Canal where it is submerged in the West Pond and western end of Cootes Paradise.

Historical wetlands mapping did not show any wetlands lost before 1967 or between 1967 and 1982 identified in this subwatershed, however historical documents cite Cootes Paradise as a being a vital and prolific marsh habitat throughout the 19<sup>th</sup> century and early into the 20<sup>th</sup> century when the common carp was accidentally introduced into the marsh and alterations to the marsh were made to accommodate shipping and industrialization.

**Map LS-3** illustrates that current wetlands cover 1.79 km<sup>2</sup> or 21% of the Lower Spencer Creek subwatershed. 94% or 1.69 km<sup>2</sup> of these wetlands are designated as Provincially Significant by the OMNR. Ontario's wetlands are evaluated through the OMNR Wetland Evaluation System (1993) for their biological, social, and hydrological components and special features. A wetland that is scored high in all four categories will receive a higher class ranking, with Class 1 being the highest.

The Cootes Paradise Marsh ESA is currently a Class 1 PSW. It is a 250 hectare, shallow area of both marsh habitat and open water. It is vital spawning, nursery and adult habitat for warm water fish communities. It is also critical habitat for a variety of flora and fauna, including migratory birds. These lands are owned, protected and have restored by RBG since 1992, resulting from recommendations made in the Hamilton Harbour Remedial Action Plan. Cootes Paradise is now the largest remaining Great Lakes coastal freshwater marsh in Lake Ontario (Dwyer et al., 2003).

Historical information was not recorded for forest or meadow cover. It is known that land use throughout the 20<sup>th</sup> century altered the natural heritage systems within this southern Ontario and that 90% of the original upland woodlands were converted to non-forest land uses by 1920 (Larsen et al., 1999). However over the past eighty years many natural areas have regenerated. The Dundas Valley and Niagara Escarpment corridor are the predominant regenerated natural upland habitats.

Lower Spencer Creek occurs in a unique region where the Great Lakes - St. Lawrence and Deciduous forest regions interface. As a result the flora and fauna communities are very diverse and include many species that are at or near the northern or southern extent of their geographic range. (Rowe, 1972)

The Dundas Valley ESA is located in the western end of the re-entrant valley and extends into the former Town of Dundas and Lower Spencer Creek subwatershed. The core of this area consists of varied, relatively undisturbed, broadleaf and mixed upland woods consisting mainly of beech, maple, oak and hickory. The periphery consists of a patchwork of natural, successional and disturbed habitats that occur within the valley and along the outer valley slopes. This large natural area serves an important hydrological function of maintaining surface water quality in valley streams by limiting gully erosion on the erosion prone slopes and by providing in-stream cover. (Dwyer, 2003)

**Table LS- 2:** Natural Land Cover Statistics

Forest Cover (km <sup>2</sup> )	Wetland Cover (km <sup>2</sup> )	Meadow Cover (km <sup>2</sup> )	Stream Length (km)
1.51	1.79	0.18	16.63

# LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

## NATURAL HISTORY & SIGNIFICANT SPECIES

Numerous fisheries and benthic macroinvertebrates monitoring stations have been sampled in Lower Spencer Creek between 1970 and 2009. Prior to the introduction of the HCA Aquatic Resources Monitoring Program (ARMP) in 2004, the data collected was sporadic. The ARMP now provides for routine monitoring of fish, fish habitat and benthic macroinvertebrates throughout the HCA watersheds. The parameters monitored allow for an assessment of ecological health.

The ARMP now provides that two ecological monitoring stations in the Lower Spencer Creek subwatershed will be monitored in Year 2 of a three year cycle. The monitoring stations are in the Cootes Paradise and University Gardens catchments. The first year of fisheries data from the three year cycle are listed in the catchment datasheets in the remainder of this document. The first year of benthic data is not currently available due to the incomplete status of the Ontario Benthos Biomonitoring Network on-line database. However, all other available data for these and other historic monitoring stations are included in Appendix B.

Although the ARMP includes a number of annual monitoring stations throughout HCA's watersheds, there are no annual stations in the Lower Spencer Creek subwatershed. The 2009 ARMP Report recommends the inclusion of an annual monitoring station in each subwatershed of Spencer Creek to build a more comprehensive dataset.

Since 1999, HCA has monitored aquatic benthic macroinvertebrates within its watersheds, using the BioMAP protocol, to assess water quality conditions. A water quality trend analysis using this data was completed in 2003. During this period benthic monitoring in the Lower Spencer Creek subwatershed was limited to one station in downtown Dundas. The reach of creek was historically channelized, maintaining relatively shallow depths over a cobble and gravel substrate. Flow through this section is typically fast as a result of the steep gradient through this reach. Stressed water quality conditions have been evident as a result of a number of water quality impediments, including nutrient enrichment \, municipal storm discharge and suspended solids loads. Despite these impairments, this reach has maintained relatively unimpaired water quality conditions, specifically in 1999, 2002 and 2003. Benthic collections have historically displayed higher densities of pollution tolerant species; however, recent samples have displayed improved water quality with greater abundances of pollution sensitive species (Griffiths, 2003). Although this reach of creek tolerates the stress imposed by the surrounding urban environment very well, recent benthic collections suggest that this reach has little ability to absorb much more stress (HHSWP, 2006).

Historical alterations to the Lower Spencer Creek system and Cootes Paradise have led to the decline in the productivity of the fishery. Recent rehabilitation efforts lead by the Hamilton Harbour Remedial Action Plan have substantially improved the quality of the fishery in both Hamilton Harbour and Cootes Paradise.

Below the Escarpment, where groundwater discharge from the fractured bedrock serve to moderate temperatures, cold to coolwater conditions re-emerge in Lower Spencer Creek and the other lower subwatersheds. In Lower Spencer Creek, the maximum daily water temperatures have been found to rarely exceed 24oC, averaging between 18oC and 23oC (HRCA, 1998)

Migratory steelhead (lake-run rainbow trout) and Chinook salmon runs have been documented in Lower Spencer Creek, with rainbow trout runs extending as far as the escarpment in the upstream Ancaster, Sulphur and Tiffany Creek subwatersheds (HRCA, 2000, HCA: 2002, 2005). These introduced salmonid species both rely on larger, gravelly Great Lake tributaries with cold to cool thermal regimes for spawning (Scott and Crossman, 1973).





# LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

## NATURAL HISTORY & SIGNIFICANT SPECIES

Significant species found within the natural areas of this subwatershed are noted within Appendix C. The majority of these species are rare or uncommon within the City of Hamilton and where a species has been designated as a species at risk by the OMNR it is indicated in the appendix.

Certain species have been classified by COSEWIC, the Committee on the Status of Endangered Wildlife in Canada and COSSARO the Committee on the Status of Species at Risk in Ontario as being at risk. Each species on the list is given a status depending on the degree of risk: Extinct, Extirpated, Endangered, Threatened and Special Concern. The species listed below have been designated by COSEWIC under the Species at Risk Act and COSSARO under the Ontario Endangered Species Act and can be found within the Lower Spencer Creek subwatershed.

The COSEWIC and COSSARO statuses do not always coincide for each species, therefore some species will be on more than one list.

Significant fish species, those that are Schedule 1 species under the Species at Risk Act, in this system include Bigmouth Buffalo, Northern brook lamprey and Silver shiner. A designation of Schedule 1 means that these species are on the official list of wildlife species at risk in Canada. Once a species is listed on Schedule 1, protection and recovery measures are developed and implemented.

It will be important to create awareness and undertake habitat restoration activities related to preserving and restoring ecological linkages in order to support these at risk species. Many of these species have recovery strategies in place or in development. Species with recovery strategies and the status of those strategies are listed below. A Conservation Action Plan centered upon the management of resources to aid in the recovery of species at risk in this area is currently being developed by Carolinian Canada and local partners agencies.

### Not at Risk

- American Coot
- Common Mudpuppy
- Four Toed Salamander
- Pickereel Frog
- Sedge Wren
- Western Chorus Frog
- Sharp Shinned Hawk
- Brown Snake
- Northern Leopard Frog
- Eastern Screech-Owl
- False Mermaid
- Red-tailed Hawk
- Southern Flying Squirrel
- Black Tern
- Caspian Tern
- Common Tern
- Double-crested Cormorant
- Cooper’s Hawk
- Eastern Bluebird
- Northern Harrier

### Special Concern

- Eastern Milksnake
- Black Tern
- Monarch
- Broad Beech Fern
- Cerulean Warbler
- Northern Map Turtle
- Northern Ribbon Snake
- Ribbon Snake
- Louisiana Waterthrush
- Snapping Turtle
- Golden-winged Warbler
- Woodland Vole
- Yellow-breasted Chat

### Threatened

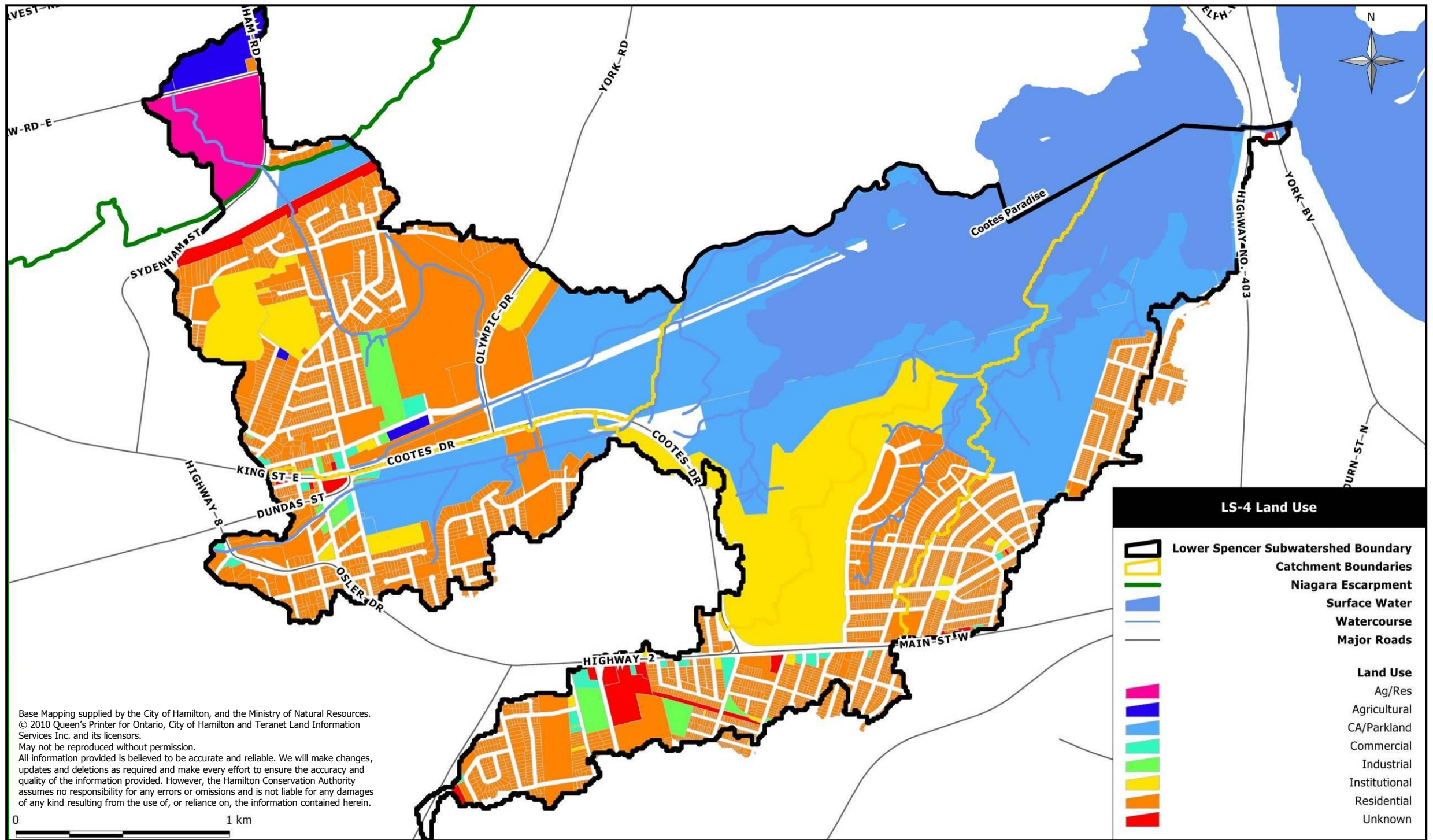
- Blanding’s Turtle
- Common Musk Turtle
- Eastern Spiny Softshell
- Hop-tree
- Chimney Swift
- Golden-winged Warbler
- Hooded Warbler
- Jefferson Salamander
- Least Bittern
- Whip-poor-will
- White Wood Aster

### Endangered

- Prothonotary Warbler
- Bashful Bulrush
- American Columbo
- Loggerhead Shrike
- Red Mulberry
- American Chestnut
- Butternut
- Ginseng
- Hoary Mountain Mint
- Acadian Flycatcher
- Flowering Dogwood

### Species with Recovery Strategies

Species	Recovery Strategy Status
American Chestnut	Completed and available
American Ginseng	Drafted not available
Butternut	Completed and available
Red Mulberry	Completed and available
Eastern Flowering Dogwood	Not available
Spiny Softshell Turtle	Complete (P*)
Acadian Flycatcher	Completed and available
Hoary Mountain-mint	Completed and available
Prothonotary Warbler	Completed and available
Blanding’s Turtle	Draft not available
Hooded Warbler	Complete and available
Common Hop-tree	Draft available
Least Bittern	Draft not available
P* is part of a multi-species or ecosystem based strategy	



LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

CULTURAL HISTORY

Settlement of the Dundas area began after the American War of Independence when Loyalists crossed the Niagara River and moved up Lake Ontario to its western end (Spencer Creek Conservation Authority, 1965). Because Dundas was accessible by flat bottom boats and because of its convenient location between the western farm productions and the only road that opened up access to the interior of the province, the village became the commercial and industrial center at the head of Lake Ontario in the early part of the 1800's (Spencer Creek Conservation Authority, 1965).

From the coming of the first settlers, the water power of Spencer Creek was a magnet that attracted men with the knowledge and desire to harness it and convert its energy into a modest source of wealth. Modest because Spencer Creek is not a large stream, and because the mills near its source could be only small ones. However, as the various tributaries added their flow to the Spencer the amount of water increased and the mills could be made larger. Consequently, those in Dundas were quite a respectable size. The largest mills on Spencer Creek were built in Dundas. In fact, had it not been for the creek it is doubtful that Dundas would have developed as a town (Spencer Creek Conservation Authority, 1965).

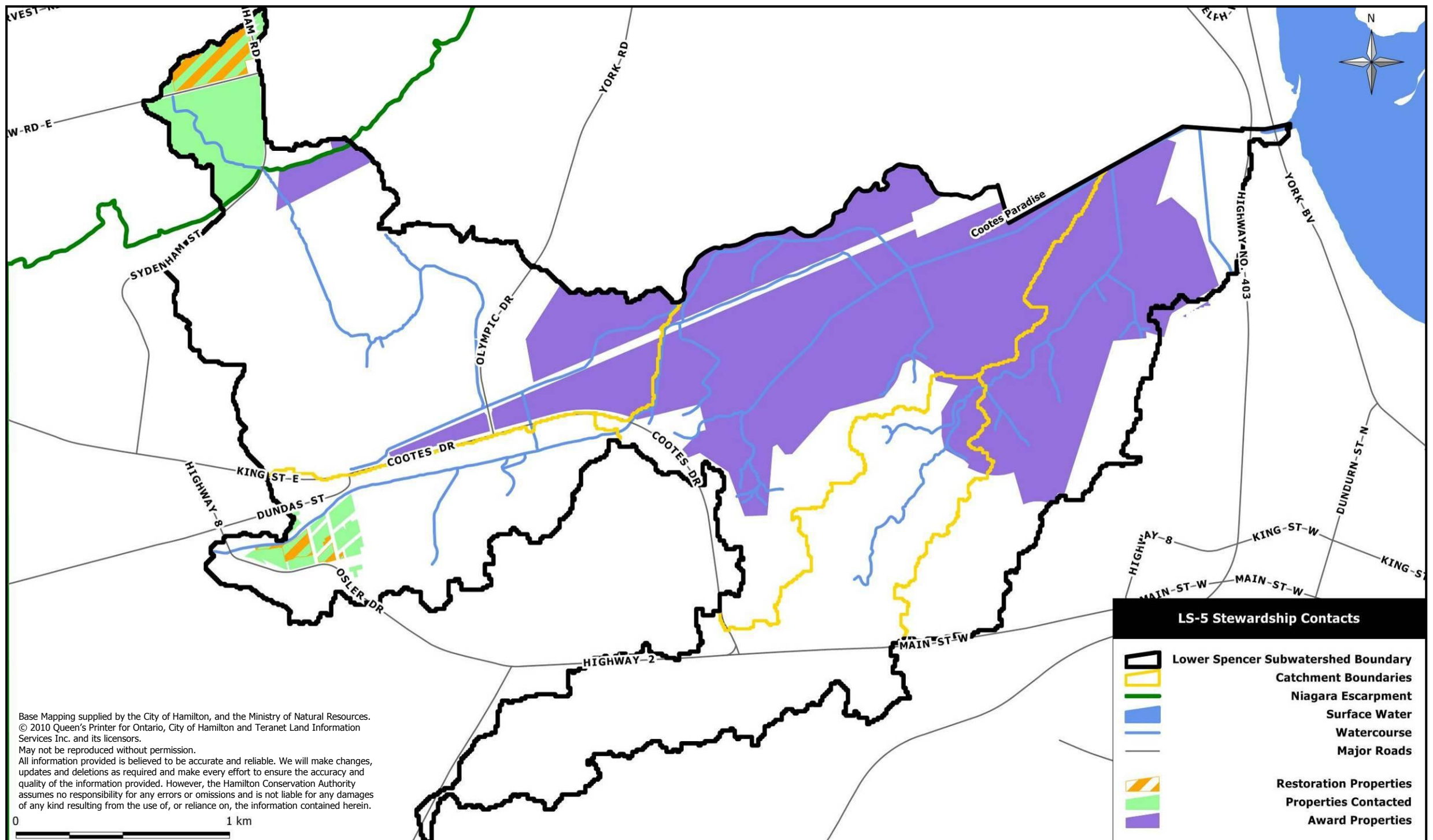
Currently, the approximate population of the Lower Spencer Creek subwatershed is 8500 persons with a population density of about 1150 persons per square. Current land use within the Lower Spencer Creek subwatershed is predominantly open space/parkland with residential being the secondary land uses (**Table LS-3**).

The significant open space in this subwatershed centers on the Cootes Paradise ESA. Residential land use is largely concentrated in the portions of the subwatershed that fall within the boundaries of the former Towns of Dundas and City of Hamilton proper. McMaster University occupies the majority of the institutional lands within the subwatershed however, a considerable portion of their lands are open space/parkland. Commercial lands are centered in the downtown Dundas and Westdale areas. Agricultural land is concentrated above the escarpment (**Map LS-4**).

Table LS-3: Land Use Statistics

Area (km <sup>2</sup> )	Agricultural (km <sup>2</sup> )	Commercial (km <sup>2</sup> )	Industrial (km <sup>2</sup> )	Institutional (km <sup>2</sup> )	Open Space (km <sup>2</sup> )	Residential (km <sup>2</sup> )	Utility (km <sup>2</sup> )	Impervious Surfacing (%) 1997 Study Data	Impervious Surfacing (%) 1997 Study Predicted Increase	Impervious Surfacing (%) Current Estimation Based on the Urban Boundary
8.68	0.28	0.06	0.12	0.93	3.27	2.63	0.26	61	0	68







LOWER SPENCER CREEK SUBWATERSHED CHARACTERIZATION

STEWARDSHIP HISTORY

Although there are many properties that do not incorporate a portion of a natural feature, there are 251 properties that do contain forest, wetland, meadow or riparian / aquatic habitat (**Table LS-4**). Of these landowners, 31 (or 12%) have been contacted by the Hamilton-Halton Watershed Stewardship Program (HHWSP), and 8 (or 3%) of those have become Watershed Stewards (**Table LS-4**). Therefore, there is considerable potential to reach the remaining 88% of landowners with natural features to create awareness regarding Beneficial Management Practices (BMP's) for natural areas. Through this contact there is also great potential to engage more landowners in the Watershed Steward Program. Watershed Stewards are landowners who have agreed to protect and maintain the natural features that fall within their property. In addition to landowners who have natural features on their properties, landowners who do not have natural features on their properties can also act as Watershed Stewards as they can be advocates of stewardship messaging in other capacities. There is also a significant opportunity in this subwatershed to contact all landowners without natural areas to create awareness regarding urban BMP's as they relate to urban wildlife, water conservation and storm water management practices.

Currently, the majority of the lands under agreement through the Watershed Steward Program are owned by Royal Botanical Gardens. Therefore, landowner contact would be best focused in the Sydenham Road, University Gardens and McMaster University catchments where the greatest concentration of forest and wetland habitat occurs.

Table LS-4: Stewardship Statistics

Approximate Population	Population Density (persons / km <sup>2</sup> )	Total # of Properties with Forest, Wetland, Meadow or Watercourse	# of Landowners with Forest, Wetland, Meadow or Watercourse & Contacted by HCA Stewardship	# of HCA Stewardship Watershed Stewards with Forest, Wetland, Meadow or Watercourse	Total # of Landowners in Subwatershed Contacted by HCA Stewardship	Total # HCA Stewardship Watershed Stewards in Subwatershed
8500	1150	251	31	8	44	15

Table LS-5: Environment Canada's How Much Habitat is Enough Guidelines

PARAMETER	% Wetlands	% Stream Naturally Vegetated	Total Suspended Sediments	% Impervious Surfacing	Fish communities	% Forest Cover	Size of largest Forest patch km <sup>2</sup>	% Forest Cover 100m & 200m from Forest edge
GUIDELINE	6	75% with 30m buffer on either side	Below 25 mg/L	< 10	Based on historical data / watershed characteristics	30	2km <sup>2</sup> & min 500m wide	10% < 100m from forest edge
SUBWATERSHED STATUS	21	28	n/a	61	warmwater	17.4	0.86	100m – 2% 200m – 0%

Environment Canada has provided guidelines for forest, wetland and riparian habitat for subwatersheds and in turn a preliminary analysis has been completed using the guidelines set out by this agency. **Table LS-5** displays the status of the Lower Spencer Creek subwatershed when compared to these Federal guidelines.

Due to the urbanization of this subwatershed and the inevitable increase in impervious surfacing, BMP's relating to storm water management must be encouraged and exemplified by partner agencies in an effort to prevent sedimentation and contamination within the system. This is especially important in the Sydenham Road, University Gardens and McMaster University catchments as these are the most densely populated areas.

Although it appears as though this subwatershed has a large amount of forest cover it still does not meet Environment Canada's How Much Habitat is Enough Guidelines. Forest cover would need to be increased by about 1km<sup>2</sup> to meet this guideline, with an emphasis being placed on forest patch shape. Additionally, it should be determined whether or not the percentage of forest cover from the forest edge supports interior forest breeding birds and other wildlife populations.

In this subwatershed there is potential to naturalize an additional 26 hectares by enhancing utility corridors to serve as terrestrial habitat. It is important to work with our large landowners to restore terrestrial and aquatic habitat in the subwatershed. Additionally, it is equally important to work with our ward councilors to generate support for local stewardship initiatives with the public and private sectors as well as our development industry.

# STRESSES & STEWARDSHIP ACTIONS

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There are thirty six types of *stresses* identified as negatively impacting the Lower Spencer Creek subwatershed. An inventory count of the number of each type of stress observed in each catchment basin of the subwatershed is listed in **Table LS- 7**. The two most prevalent stresses identified in the Lower Spencer Creek Subwatershed are Stormsewer Outfalls and Habitat Fragmentation. **Table LS-8** outlines *Stewardship Actions* that have been developed to mitigate the impacts of these and the remaining stresses listed in **Table LS-7**.

Specific locations where these stresses are occurring are mapped and inventoried in the subsequent catchment datasheets. Within the Lower Spencer Creek subwatershed, 51 specific locations where stresses are occurring have been identified; however, this inventory is not exhaustive and therefore implementation of *Stewardship Actions* should be undertaken on a subwatershed scale to ensure that all occurrences of stresses are mitigated.

In summary, stormwater management in the urbanized catchments of this subwatershed is of primary concern. Stormwater management relates directly to the health of the local fishery as it increases the potential for erosion and contamination in the creek system. The Bay Area Restoration Council offers the Yellow Fish Road program in an effort to raise awareness about stormsewer systems and the potential for stormwater runoff contamination. An effort to implement the recommendations in the City of Hamilton Stormwater Master Plan should be made to mitigate the impacts of stormwater on the creek system.

Anecdotal reports and ecological monitoring have identified sediment loading and subsequent nutrient loading as a concern in this subwatershed. The Hamilton-Harbour Remedial Action Plan 2009 draft document, Identifying Non Point Sediment Sources, identifies a site downstream of the culvert at Sydenham Road for priority remediation. Sites in upstream subwatersheds that contribute to the sedimentation and nutrient loading observed in Lower Spencer Creek have also been identified in the document. An assessment and remediation plan for this culvert and downstream reach of creek should be developed by the Spencer Creek Stewardship Action Plans Implementation Team.

Habitat Fragmentation has been identified in three locations within this subwatershed, one location in the Cootes Paradise catchment pertaining to available lands for reforestation and two locations in the Sydenham Road catchment pertaining to both aquatic and terrestrial migration barriers including a disconnect between large tracts of land in the area.

The terrestrial migration barrier occurs at the King Street East and York Road area where the natural cover narrows within the Town of Dundas as it transitions from Cootes Paradise into the Dundas Valley. Strategic acquisitions and management of lands in this area can mitigate this migration barrier. The Cootes to Escarpment Park System and Dundas Valley 50 Year Vision documents both recommend actions to preserve and enhance ecological connectivity in this area including the development of a “Gateway” or connection of parkland in this area.

With local partners, the Hamilton Conservation Authority is currently developing a proposal for the Dundas Gateway Naturalization Project Plan, a linking of the public park lands between Cootes Paradise and the Dundas Valley. The HCA recently acquired a property in this area. Restoration of the site will contribute to this aim. A proposal for a commercial development of a substantial property within the “Gateway” is currently under review. Numerous conservation vision documents including those referred to within this section of the Action Plan, as well as the proposal for the Hamilton Urban Eco Park, a movement for the development of this area as an urban park system, recommend that these lands would be more valuable if mandated for habitat restoration.

Also within the ‘Gateway’, the aquatic migration barrier occurs at a hickenbottom drop inlet structure where the Desjardins Canal passes under Olympic Drive. Aquatic wildlife are unable to negotiate this barrier; a retrofit of the structure would open up approximately 500m of upstream habitat. Numerous waterfowl species have been observed in this segment of the Canal. Given the close proximity of the Canal to brownfields, namely abandoned greenhouses and the former municipal land fill, it is believed that the sediment in the channel bed of the canal may be contaminated. An effort to assess the level of the contamination of the sediment should be undertaken and a subsequent restoration plan developed.

Following an industrial incident in 2007 where contaminated runoff entered the creek system upstream causing a mass fish kill, a multi-agency barrier remediation project, as recommended in the Hamilton Harbour Fisheries Management Plan, is currently being undertaken as a mitigation effort to restore the overall productivity of the fishery within this system.

CATCHMENT SUMMARIES

This section of the plan identifies the occurrences of stresses within each catchment of Lower Spencer Creek subwatershed. A summary of these stresses and an indication of the stewardship actions available to mitigate the impacts of the stresses are outlined in the data sheets following each catchment map.

Recent ecological monitoring data for each catchment is also outlined following each catchment map. In total, 51 stresses were identified for the Lower Spencer Creek Subwatershed and inventory counts are presented in **Table LS-7**.

TABLE LS-7: Stresses Inventory by Catchment

STRESS	MAP CODE	NO. IN SUBWATERSHED	NO. IN EACH CATCHMENT				
			University Gardens	Cootes Paradise	Sydenham Road	Princess Point	McMaster University
Abandoned Groundwater Wells	GW						
Buried Stream	BS						
Channelization	CH	1		1			
Combined Sewer Overflow	CSO						
Dam	DM	1	1				
Debris Jam	DJ	2	1	1			
Detachment from Nature	DT						
Development	DV						
Encroachment	EN	2			2		
Erosion	ER	1			1		
Faulty Septic System	SS						
Fluctuating Water Level	WL	1	1				
Habitat Fragmentation	HF	3		1	2		
Illegal Fill Placement	FP						
Inadequate Stormwater Management	SW						
Increased Impervious Surface	IS						
Insufficient Riparian Buffer	RB						
Invasive/Introduced Species	IV	2		2			
Landfill Leachate	LL	1			1		
Land Maintenance Practices	LM	2	1		1		
Litter	LI	1			1		
Migration Barrier	MB	1			1		
Nutrient Loading	NL	2			2		
Online Pond	OP						
Outdoor Recreation Related Impacts	OR	2		2			
Perched Culvert	CP						
Pesticide Use	PS						
Plowed Watercourse	PW						
Runoff Contamination via Transportation Corridors	TC						
Sediment Loading	SL						
Site Clearing Prior to Development	SC						
Stormsewer Outfall	SO	29	10	3	13	2	1
Transportation Corridor Expansion	TE						
Water Taking	WT						
Wildlife Collision	WC						
Wildlife Overpopulation	WO						

\*The stresses identified within this plan are not exhaustive and therefore there may be stresses occurring within this subwatershed that are not noted within this plan.

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
<b>Abandoned Groundwater Wells</b> <b>Map Code: GW</b>  <b>Definition: Groundwater wells that are no longer in use, often are in a state of disrepair and can be direct conduits for contaminants into groundwater aquifers.</b>	Conduct a direct mailing to all property owners identified in the HCA OGS Groundwater Study database as having abandoned groundwater wells on-site promoting the City of Hamilton Well Decommissioning Program.			Agriculture and Agri-Food Canada - Water Wells, Best Management Practices Pg 52	CITY / HCA / GV	HHWSP	2011-2015
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact promote the importance of decommissioning abandoned groundwater wells to protect drinking water and prevent human and wildlife injury.			Ontario Water Resources Act Regulation 903: Water Wells  OMAFRA Best Management Practices Series – Water Wells	CITY / HCA / GV	HHWSP	2011-2015
			Work with landowners to decommission abandoned groundwater wells.		CITY / HCA / GV	HHWSP	2011-2015
<b>Buried Streams</b> <b>Map Code: BS</b>  <b>Definition: The structural alteration of a stream channel, involves piping the creek system underground, eliminating aquatic habitat.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy creeks and the benefits of maintaining our creeks and streams in their natural state.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107  HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55  Fisheries Act, Section 37	HCA / HWSC / HHWSP / RAP / WPN / DFO	HHWSP / HWSC	2011-2015
		Consider adopting principles from the TRCA and CVC Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines into HCA policies to address ambiguity in the DFO Risk Management Framework		City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158	HCA / HHHBA / DFO	HCA (Ecology)	2011-2012
		Undertake a feasibility and prioritization study for “daylighting” buried streams in the study area.			HCA / CITY / DFO / MNR / HHWSP / RAP	CITY	2011-2012
			Work with landowners to undertake daylighting projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.	Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines	HHWSP / HCA / DFO / CITY / HWSC	HHWSP	2013-2015
<b>Channelization</b> <b>Map Code: CH</b>  <b>Definition: The structural alteration of a stream channel, usually involves straightening of meanders and increasing gradient which increases velocity and erosion potential.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy creeks and the benefits of maintaining our creeks and streams in their natural state.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107  HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55	HCA / HWSC / HHWSP / RAP / WPN / CITY / RBG /	HHWSP / HWSC	2011-2015
		Undertake a feasibility and prioritization study for restoring channelized creeks to those with a natural design.			HCA / CITY / DFO / MNR / HHWSP / RAP	CITY	2011-2012



TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work with landowners to undertake natural channel design projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.	Fisheries Act, Section 37  City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158	HHWSP / HCA / DFO / CITY / HWSC	HHWSP	2013-2015
			Work with landowners downstream of channelized sites to rehabilitate the riparian zone to reduce flow velocities, erosion and sedimentation.		CITY / DFO / HHWSP / HCA / RBG / HWSC /	HHWSP	2011-2015
<b>Combined Sewer Overflows</b> <b>Map Code: CSO</b>  <b>Definition: a sewer system that collects sanitary sewage and stormwater runoff in a single pipe system.</b>			Reduce stormwater load to meet the MOE volumetric target of a 90% overflow capture rate.	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation WQ-1c Page 39	CITY / BARC / RAP/ HCA	CITY	2011-2015
			Work toward achieving the final net loading targets for CSO's outlined in the RAP.		CITY / BARC / RAP/ HCA	CITY	2011-2015
<b>Dams</b> <b>Map Code: DM</b>  <b>Definition: a barrier to obstruct the flow of water, usually one of earth or masonry, built across a stream or river.</b> <b>(*Also includes weirs formerly map code WR)</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the detrimental effects of dams as fish barriers and to promote the removal/retrofitting of dams.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107	HCA / HWSC / HHWSP / MNR / DFO	HHWSP / HWSC	2011-2015
	Conduct a direct mailing to property owners with dams identified in the CA Dam Inventory Project to offer financial and technical assistance for the retrofitting or removal of dams.			HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55	HCA / HWSC / DFO / MNR	HHWSP	2011-2012
			Implement the watershed management recommendations for Spencer Creek as outlined in the Hamilton Harbour Fisheries Management Plan to restore migration corridors to meet Fish Management Objectives for coldwater and warmwater systems	Fisheries Act, Section 37  Hamilton Conservation Authority Dam Inventory Project  In-stream Barrier Assessment for the Hamilton Harbour AOC.  Hamilton Harbour Fisheries Management Plan	HCA / HWSC / HHWSP / MNR / DFO / CITY	HCA (Ecology) / DFO	2011-2015
			Work to remove or retrofit water control structures on public lands.		HCA / HWSC / HHWSP / MNR / DFO / CITY	HCA (Ecology) / MNR	2011-2015
			Work with landowners to remove/retrofit dams as prioritized in the Barrier Mitigation Plan of the In-stream Barrier Assessment for the Hamilton Harbour AOC.		HCA / HWSC / HHWSP / MNR / DFO / CITY	HHWSP	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
<b>Debris Jams</b> <b>Map Code: DJ</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding proper debris jam removal so as to not disrupt aquatic habitat.			In-stream Barrier Assessment for the Hamilton Harbour AOC.	HHWSP /HCA/ HWSC / CITY / MNR / DFO / BARC	HHWSP / HWSC	2011-2015
			Work with landowners to remove debris jams using proper sediment and erosion control practices.	Hamilton Harbour Fisheries Management Plan	HHWSP /HCA/ HWSC / CITY / MNR / DFO / BARC	HHWSP / HWSC	2011-2015
			Incorporate debris jam removal into the City of Hamilton Extreme Park Makeover Program.		HHWSP /HCA/ HWSC / CITY / MNR / DFO / BARC	CITY	2011-2015
<b>Detachment from Nature</b> <b>Map Code: DT</b>  <b>Definition: The condition of people disassociating their existence from nature.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote BMP's and the ecological significance of natural features.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations PAA-2, PAA-3, EPI -1, EPI-2, EPI-5 Pages 129-138	BARC / CITY / GV / HCA / HHWSP / HWSC / WPN / DU	HHWSP / HWSC / BARC	2011-2015
	Erect creek crossing & ecological corridor signage along roadways.				HCA / CITY / RAP / WPN / BARC	CITY / WPN	2011-2015
	Implement education outreach programs for school-aged children, including: Yellow Fish Road, Stream of Dreams, Mini Marsh, Envirothon, Children's Water Festival, Eco-House Tours, etc.			Royal Botanical Gardens Back to Nature: Towards a Ontario Strategy for Bringing Children and Nature Together - Event and Workshop Report	BARC / HCA / CITY / GV / RBG	BARC / GV / HCA / CITY / RBG	2011-2015
	Support the formation and activities of "Friends of" groups aimed at protecting and rehabilitating natural features.				BARC / DFO / HWSC / BTC	HHWSP / HCA / CITY	2011-2015
	Encourage municipalities and trail managers to coordinate trail plans that improve access between urban centres and provide links to parks and rural areas			Evergreen Schoolground Greening Resources: Getting Started	HHWSP / HWSC	HCA / CITY / RBG	2011-2012
		Assess landowner willingness to participate in and/or support water quality improvement and habitat restoration projects.			CITY / HCA / HWSC	HHWSP	2011-2012
		Engage citizen groups to conduct local subwatershed monitoring & reporting projects, including: water quality, base flow, litter hot spots, etc.			HHWSP / CITY / HCA / GV / BARC/ HWSC / RBG	HHWSP / CITY / HCA / GV / BARC/ HWSC / RBG /	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work with schools and School Boards to undertake implement the School Grounds Naturally Program; undertaking school yard naturalization projects.		HHWSP / HCA / CITY / HWSC	HHWSP	2011-2015
			Work with citizen groups to undertake restoration projects on public and private lands, including "Friends of" work days, Adopt a Creek, Fishing Clubs, etc.		HHWSP / HCA / CITY / HWSC / BARC / RBG / /BTC	HHWSP / BARC	2011-2015
<b>Development</b> <b>Map Code: DV</b>  <b>Definition: The process of developing populated settlements: including housing and supporting infrastructure.</b>	Host annual training sessions for City staff & developers to create awareness regarding the incorporation of Low Impact Development practices into planning applications (i.e. pervious pavement, green rooftops, storm water management, road-salt alternatives, snow-piling, erosion & sediment control measures, compliance & enforcement, etc.)			Credit Valley Conservation and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Manual	DFO / Green Venture / MTO / HHHBA	HCA (P&E) / CITY	2011-2015
	Apply Yellow Fish Road to all catchbasins on streets and in parking areas to educate private landowners post-development.				CITY / HCA / HWSC / HHWSP	BARC	2011-2015
		Revise conflicting municipal by-laws regarding development practices and guidelines to facilitate increased use of Low Impact Development technologies.			CITY / GV / HHHBA / DFO	CITY / HCA	2011-2012
		Continue to review planning and development applications to ensure minimal impacts to aquatic and terrestrial habitat.			CITY / DFO / MNR	HCA (P&E)	2011-2015
			Work to undertake in-stream rehabilitation projects on sites identified in the Stewardship Action Plans as suitable for the DFO Habitat compensation Program.		CITY / DFO / MNR / HHHBA	HCA	2011-2015
<b>Encroachment</b> <b>Map Code: EN</b>  <b>Definition: The act of undertaking practices on another person's property, i.e. erecting structures, planting gardens, disposal of waste.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, signage & direct landowner contact to promote healthy creeks to create awareness regarding how encroachment negatively impacts habitat.			HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55, 60	HHWSP / HHHBA / HWSC	HCA / RBG / CITY	2011-2015
	Comment on the re-drafting of the City of Hamilton Litter, Yard Waste and Property Maintenance by-law No. 03-118 to include language regarding preventing encroachment into natural areas.			City of Hamilton Draft Private Tree and Woodland Conservation By-law  City of Hamilton	CITY / HHWSP / HCA / BARC / RBG / GV / HWSC / BTC	HCA / CITY / RBG	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
	Host erosion and sediment control training sessions for City staff, developers, contractors and landscapers to create awareness regarding recommended E&SC methods.			By-law No. 03-117 Illegal Dumping	CITY / HCA / HHWSP / HWSC / LO / HHHBA	HCA (P&E)	2011-2015
	Conduct a direct mailing of an encroachment education brochure to landowners adjacent to Conservation Authority, RBG and City natural areas.				HWSC	HCA / RBG / HHWSP / CITY	2011-2015
	Install property demarcation posts (with agency logos) at regular intervals along property boundaries to prevent encroachment into natural areas.				HHWSP	HCA / RBG / CITY	2011-2015
		Engage citizen groups to monitor & report areas affected by encroachment that are in need of restoration.			CITY / HHWSP / HCA / BARC / RBG / GV / HWSC / BTC	HCA / CITY / RBG	2011-2015
			Work with citizen groups to remove encroaching material on public and private lands, including "Friends of" work days, Adopt a Creek, Fishing Clubs, etc.		HHWSP / HCA / CITY / HWSC / BARC / GV / RBG / HNC	CITY / HHWSP / RBG / HCA	2011-2015
<b>Erosion</b> <b>Map Code: ER</b>  <b>Definition: The process of soil being scoured or washed away by flowing water.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy creeks and the importance of riparian buffers and agricultural BMP's.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-2, ULM-3, FW-4 Pages 69, 70, 107	CITY / DFO / HCA / HHHBA / OSCIA	HHWSP / HWSC	2011-2015
	Create demonstration sites on public lands that highlight streambank stabilization and natural channel design projects.			HCA Planning and Regulation Policies and Guidelines Pages 68-69	CITY / HCA / DFO / HWSC / RBG / OSCIA	HHWSP	2011-2015
	Conduct a direct mailing to landowners where erosion has been identified through the City of Hamilton GRIDS Plan.			Fisheries Act, Section 35	HCA / CITY / OSCIA / HWSC	HHWSP	2011-2015
		Select erosion sites as identified in the City of Hamilton GRIDS Plan for the upcoming HCA Erosion and Sediment Control Pilot Project.		City of Hamilton Stormwater Master Plan	HHWSP / HWSC / CITY / DFO	HCA	2011-2012
		Expand the City of Hamilton Erosion Hot Spots identification project into rural areas		Class Environmental Assessment Report Pages 142, 159-160	HCA / DFO / MNR	CITY	2011-2015
			Work with landowners to undertake bank stabilization and erosion rehabilitation projects using bioengineering design principles.	Erosion and Sediment Control Guidelines for Urban Construction	HWSC / HCA / DFO / OSCIA /	HHWSP	2011-2015



TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Utilize enforcement scheme to enforce appropriate erosion control measures on development sites, including: seeding, avoiding steep slopes, etc.	OMAFRA Best Management Practices Series – No-Till Making It Work	CITY / DFO	HCA	2011-2015
			Work with City staff to install permeable conveyance systems (french drains) along roadsides as an alternative to the ditch system.		HCA / MTO / DFO	CITY	2011-2015
<b>Faulty Septic Systems</b> <b>Map Code: SS</b>  <b>Definition: Malfunctioning septic systems; including plugged distribution tiles, infrequent tank pumping, etc. lead to untreated sewage contaminating our ground and surface water.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the proper maintenance of existing septic systems.			Ontario New Home Warranty Program – A New Homeowner's Guide to Septic Systems	CITY / RAP / HCA	HHWSP / HWSC	2011-2015
	Create demonstration sites on public lands that highlight properly functioning septic systems.				HHWSP / GV / HHHBA	CITY / HCA	2011-2012
		Conduct an inventory to determine how many households in the Spencer Creek watershed are serviced by on-site treatment systems.			HHWSP / HCA / RAP / GV	CITY	2011-2012
		Analyze existing water quality data for high levels of bacteria, chlorides, nitrates and TKN to prioritize areas for education outreach and restoration.			HCA / MOE / RAP	CITY	2011-2012
		Undertake a risk analysis of the potential for old and/or degraded sewer lines to contaminate groundwater.			HCA / MOE / RAP	CITY	2011-2012
			Work with landowners to properly maintain their septic systems or upgrade faulty septic systems.		CITY / HCA / HWSC / GV	HHWSP	2011-2015
<b>Fluctuating Water Levels</b> <b>Map Code: WL</b>  <b>Definition: Irregular occurrences of high and low water levels in the creek system.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to explain the purpose and operation of Christie and Valens dams.				HHWSP / CITY / MNR	HCA	2011-2015
		Work to determine the cause of water level fluctuations and develop recommendations for altering practices to reduce or eliminate fluctuations.			HHWSP / CITY / MNR / DFO	HCA	2011-2012
			Work to implement alternative practices as per recommendation resulting from the inquiry into the cause of water level fluctuations in the system.		HHWSP / CITY / MNR / DFO	HCA	2012-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
<b>Habitat Fragmentation Map Code: HF</b>  <b>Definition: Disruption of large continuous tracts of habitat.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy ecosystems and the importance of habitat connectivity.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-12 Page 123	HCA / RBG / HNC / MNR / CITY / CC / DU	HHWSP / HWSC	2011-2015
	Encourage landowners to complete management plans for the natural features of their properties and to sustainably manage those features through the implementation of BMP's.			HCA Planning and Regulation Policies and Guidelines Pages 53-59	HCA / RBG / HNC / MNR / CITY / CC / DU	HHWSP / HWSC	2011-2015
	Create demonstration sites on public lands that highlight various types of terrestrial and aquatic habitat restoration projects.			City of Hamilton Draft Private Tree and Woodland Conservation By-law	HCA / RBG / HNC / MNR / CITY / CC / DU	HHWSP	2011-2015
	Comment on the re-drafting of the City of Hamilton Litter, Yard Waste and Property Maintenance by-law No. 03-118 to include language allowing naturalization of lawn space.			Cootes to Escarpment Park System – A Conservation and Land Management Strategy	HCA / RBG / HNC / HWSC / CITY	HHWSP	2011-2012
	Work to establish a Woodlot Owners Association for this area.			Nature Counts – City of Hamilton Natural Areas inventory	HCA / RBG / HNC / HWSC / CITY / MNR / TO	HWSC	2011-2012
		Protect and enhance natural corridors through parks and public lands master planning		City of Hamilton Natural Heritage Strategy	HHWSP / HWSC / MNR / HNC	HCA / CITY / RBG	2011-2015
		Map fisheries information throughout each subwatershed to identify areas at risk and prioritize areas for remediation.		City of Hamilton Natural Areas Acquisition Fund Strategy	HHWSP / HWSC / HCA / CITY / MNR	HCA	2011-2012
		Develop How Much Habitat is Enough targets for each subwatershed.		Dundas Valley 50 Year Vision	CITY / MNR / HHWSP / HWSC / RAP / RBG	HCA	2011-2012
		Continue to complete ecological surveys (using the Ecological Land Classification system) to ensure species at risk habitat or rare ecological areas are not disrupted.		Hamilton Harbour Fisheries Management Plan	HCA / MNR / HHWSP / HWSC / RAP / RBG	CITY	2011-2015
			Work with utility companies to implement integrated vegetation management practices along utility corridors as developed by Ontario Hydro.	OMAFRA Best Management Practices Series – Farm Forestry and Habitat Management	MNR / HHWSP / HWSC / RBG / HNC	HCA / CITY	2011-2015
			Work to secure Core and Linkage Areas identified in the Natural Heritage System using the Natural Heritage Acquisition Fund.	OMAFRA Best Management Practices Series – Fish and Wildlife Habitat Management	HCA / RBG / HHWSP / HNC / HWSC	CITY	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Protect and enhance natural corridors through parks and public lands by ensuring that naturalization and habitat creation are incorporated into the City's Extreme Park Makeover Program		HCA / BARC / RBG / HWSC / HHWSP / MNR	CITY	2011-2015
			Work with landowners to undertake habitat creation and enhancement projects which enhance core habitat by infilling areas within or linking existing forested areas		HCA / MNR / HWSC / BARC / CITY	HHWSP	2011-2015
			Actively manage public lands for wildlife habitat, including plantation plantings and rented agricultural lands.		CITY / HHWSP / MNR / TO	HCA	2012-2015
			Implement the actions outlined in the Dundas Valley 50 Year Vision, Cootes to Escarpment and City of Hamilton Natural Heritage Strategies relating to preserving and enhancing natural heritage systems.		CITY / RBG / HHWSP / HWSC / BARC	HCA	2011-2015
<b>Illegal Fill Placement</b> <b>Map Code: FP</b>  <b>Definition: The act of dumping fill material into or adjacent to natural areas.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the adverse effects of "fill" on natural systems and promote compliance with the HCA Regulations and the City's Site Alteration By-law.			HCA Planning and Regulation Policies and Guidelines Pages 61-62  City of Hamilton By-law No. 03-117 Illegal Dumping	CITY / HHWSP / DFO	HCA	2011-2015
			Work with landowners to rehabilitate fill sites as recommended by the HCA Inventory.		HCA / CITY / DFO / MNR	HHWSP	2011-2015
<b>Inadequate Stormwater Management</b> <b>Map Code: SWM</b>  <b>Definition: Inadequately managing stormwater to control water quality and flooding; often associated with the drainage of developed lands.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote stormwater management BMP's including: disconnected downspouts, roof gardens, rain barrels, biofilters, permeable pavement, rain gardens, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -6, ULM-9, ULM-11 Pages, 72, 75, 77  HCA Planning and	HHWSP / HCA / DFO / BARC / RAP / HHHBA	CITY / GV	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
	Promote City of Hamilton and Green Venture Programs to prevent the overloading of stormwater infrastructure; including the Wise Water Use Program, Protective Plumbing Program – Downspout Disconnection Program, Annual One-Day Rain Barrel Sale, Catch the Rain Rainbarrel Pilot Project, High Household Water Consumption Program, and EnerGuide for Low Income Households Program.			Regulation Policies and Guidelines Pages 74-77  Fisheries Act, Section 34  City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162	HHWSP / HCA / DFO / BARC / RAP / HHHBA	CITY / GV	2011-2015
		Work with developers to develop a premium ‘Efficiency Package’ for new homes that include LEED principles, LID technologies, Energy Star appliances, water conservation fixtures, etc. per the results of the Durham Region Pilot Project.			HHWSP / HCA / DFO / BARC / RAP / HHHBA	HCA	2011-2015
		Undertake a study to determine the percentage of landowners with connected downspouts.			CITY / HHWSP / BARC / GV	CITY	2011-2015
			Implement recommendations from the City of Hamilton Stormwater Master Plan.		HCA / RAP / BARC / HHWSP	CITY	2011-2015
			Work with landowners to disconnect downspouts and install rain barrels.		GV / HHHBA	CITY	2011-2015
			Retrofit existing stormwater management ponds to wet ponds where beneficial to water quality, aquatic habitat and erosion control.		HCA / RAP / DFO	CITY	2011-2015
			Offer financial incentives to replace driveways and decks with permeable pavement, interlocking brick, etc.		HCA / RAP / BARC / HHWSP / GV	CITY	2011-2015
			Retrofit outlet structures to decrease the velocity of stormwater as it flows into the creek system.		HCA / RAP / HHWSP / HWSC	CITY	2011-2015
<b>Increased Impervious Surfacing</b> <b>Map Code: IS</b>  <b>Definition: The decreased potential for rainwater infiltration into the soil as a result of increased paved/impermeable surfacing.</b>	Create demonstration sites in subdivisions that highlight development related BMP’s and new environmentally friendly technologies; e.g. permeable pavement, green roofs, on-site wastewater treatment, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -5b, ULM-6 Page 71, 72  HCA Planning and Regulation Policies and Guidelines Pages 74-77  Fisheries Act, Section 34	CITY / GV / HHWSP / HWSC / HHHBA	HCA	2011-2015
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the implementation of development related BMP’s and new environmentally friendly technologies when undertaking home renovations.				CITY / HCA / HHWSP / HWSC / HHHBA	GV	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
	Host training sessions for HCA and City staff, developers and consultants to promote the incorporation of development related BMP's into planning applications; e.g. permeable pavement, green roofs, on-site wastewater treatment, etc.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162	CITY / GV / HHWSP / HWSC / HHHBA	HCA	2011-2015
	Lobby the Provincial government to amend the building code to include and favour "green" technology; e.g. green roofs, multilevel parking, interlocking pavement, etc.				HHWSP / RAP / BARC / GV	CITY / HCA	2011-2015
		Measure impervious surfacing of commercial and industrial lands.			HCA / RAP	CITY	2011-2012
		Incorporate an impervious surfacing fee for large commercial/industrial lands to offset the cost of stormwater infrastructure and compensate rehabilitation efforts associated with stormwater infrastructure.			HCA / RAP	CITY	2012-2015
			Enhance groundwater recharge by ensuring that 70% of all land, post construction must remain pervious as a condition for development application approval		CITY / GV / HHWSP / HWSC / HHHBA	HCA	2011-2015
<b>Invasive/Introduced Species</b> <b>Map Code: IV</b>  <b>Definition: The establishment/proliferation of exotic species that have no natural control measures which compete with native species for resources and degrade the ecosystem.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the importance of controlling invasive species and planting native species.			HCA Planning and Regulation Policies and Guidelines Pages 53-56, 70-71	HHWSP / HCA / HWSC / CITY	HHWSP	2011-2015
	Host training sessions for City staff, landscapers, consultants and nurseries to create awareness regarding the detrimental effects of invasive species and to encourage the use of native species.			Action Plan for Addressing Terrestrial Invasive Species within the Great Lakes Basin  Invasive Alien Plant Species Found in the Carolinian Zone – Inventory and Management Options for <i>rare Charitable Research Reserve</i>	HHWSP / HCA / HWSC / CITY / HNC / LO	HCA	2011-2015
		Develop an Invasive Species Management Program which includes monitoring sites and management for specific species.			HCA / HHWSP / MNR / HWSC / CITY / HNC / RBG / CC	HCA	2011-2012
		Comment on the re-drafting of the City of Hamilton Litter, Yard Waste and Property Maintenance by-law No. 03-118 to include language regarding the prevention of the introduction of non native and invasive species.		Mistaken Identity – Invasive Plants and their native look-alikes.  City of Hamilton Natural Heritage Strategy	HCA / HWSC / RBG / HHWSP / GV / LO	CITY	2011-2012



TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
		Work with nurseries to develop a promotional program highlighting native species substitutable for commonly used non-native ornamental species.		Dundas Valley 50 Year Vision	CITY / HWSC / RBG / HCA / GV	HHWSP	2011-2013
			Ensure that native landscape design principles are incorporated into any development near an ESA or significant natural area.	Cootes to Escarpment Park System – A Conservation and Land Management Strategy	CITY / HHHBA / HHWSP	HCA	2011-2015
			Work with landowners to control invasive species and plant native species.		HCA / HWSC / CITY / GV	HHWSP	2011-2015
			Implement the actions in the Dundas Valley 50 Year Vision, Cootes to Escarpment and City of Hamilton Natural Heritage Strategies relating to preserving and enhancing biodiversity.		HHWSP / HWSC / CITY / RBG / BARC	HCA	2011-2015
<b>Insufficient Riparian Buffer</b> <b>Map Code: RB</b>  <b>Definition: Disruption of large continuous tracts of habitat along watercourses.</b>	Create demonstration sites in high traffic locations that highlight riparian buffers. i.e. golf courses, municipal parks, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-2 Page 69	HCA / HWSC / CITY	HHWSP	2011-2015
	Conduct a direct mailing to property owners identified as having insufficient riparian buffers, promoting funding and technical assistance available for establishing riparian buffers				HCA / HWSC / CITY / OSCIA	HHWSP	2011-2015
	Host workshops promoting the environmental and economic benefits of riparian buffers. i.e., preventing soil loss, preventing drifting snow, habitat creation, etc.			HCA Planning and Regulation Policies and Guidelines Pages 40, 55, 60	HCA / HWSC / CITY / OSCIA	HHWSP	2011-2015
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and the creation of larger riparian buffers.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 145-150,162-163	HCA / HWSC / CITY / OSCIA	HHWSP	2011-2015
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			City of Hamilton Natural Heritage Strategy	HCA / HWSC / CITY / OSCIA	HHWSP	2011-2015
		Work with City of Hamilton staff to amend the by-law requiring urban landowners to maintain low vegetation growth.		Dundas Valley 50 Year Vision	HCA / HWSC / HHWSP	CITY	2011-2015
		Update the riparian buffer mapping for Spencer Creek to assist with prioritization for direct mailings.		Cootes to Escarpment Park System – A Conservation and Land Management Strategy	CITY / HWSC / HHWSP	HCA	2011-2012

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work with landowners to naturalize and plant riparian buffers adhering to How Much Habitat is Enough guidelines of a15m width adjacent to warm water streams and a 30m width adjacent to cold and cool water streams.		HCA / HWSC / CITY / OSCIA	HHWSP	2011-2015
<b>Landfill Leachate</b> <b>Map Code: LL</b>  <b>Definition: rainwater filtering down through the landfill materials with the potential to contaminate groundwater aquifers.</b>		Develop a groundwater sampling program to determine if groundwater contamination is occurring as a result of landfill leachate.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-12 Page 77  HCA Planning and Regulation Policies and Guidelines Page 60	CITY / RAP / MOE	HCA	2011-2012
<b>Land Maintenance Practices</b> <b>Map Code: LM</b>  <b>Definition: Errant or excessive land maintenance practice which unnecessarily degrade wildlife habitat.</b>		Work with utility companies to develop protocols for recommended low impact land maintenance practices to be implemented throughout utility corridors.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-2, FW-4 and Pages 106-107	CITY / HHWSP / HWSC / RBG	HCA	2011-2012
			Work to naturalize infrequently used areas of municipal parks and Conservation areas.		HHWSP / HWSC / HNC	CITY / HCA	2011-2015
			Work with the City to ensure roadside maintenance is not done in excess of access standards.		HCA / HHWSP / HWSC / GV / HNC	CITY	2011-2015
<b>Litter</b> <b>Map Code: LI</b>  <b>Definition: The act of illegally disposing of waste into public/natural areas.</b>	Utilize literature, websites, public service announcements, & direct landowner contact to create awareness regarding the prevention and clean-up of litter.			City of Hamilton By-law No. 03-118 Litter, Yard Waste and Property Maintenance	HHWSP / HWSC / GV / BARC	CITY / HCA / RBG	2011-2015
	Promote the City of Hamilton's Team Up to Clean Up, Adopt a Park. Adopt a Road and Extreme Park Makeover Programs to assist community minded residents to undertake litter clean up projects.				HCA / RBG / GV / HWSC / HHWSP / BARC	CITY	2011-2015
		Undertake an inventory of illegal dumping sites throughout the subwatershed. Prioritize sites for the installation of deterrent mechanisms and the implementation of City litter related programs and Conservation Authority maintenance programs.			RBG	HCA / CITY	2011-2012
		Work to develop an Adopt a Park / Friends of Program for Conservation Authority lands.			CITY / HHWSP / HWSC	HCA	2011-2012

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work to replace all current recycle bins with ones that have lids.		GV	CITY	2011-2015
			Implement the ‘Pack it in – Pack it out” waste disposal policy at strategic city parks, Conservation Areas and RBG lands.		HHWSP	CITY / RBG / HCA	2011-2015
			Work with local residents to host litter clean up events on public lands; including City parks, Conservation Areas and RBG lands.		HHWSP / HWSC / BARC / GV	HCA / CITY / RBG	2011-2015
<b>Migration Barrier</b> <b>Map Code: MB</b>	Erect wildlife crossing signage where known migration corridors cross roadways and trails.			In-stream Barrier Assessment for the Hamilton Harbour AOC.	HHWSP / HNC / BARC / HWSC / WPN / RAP	HCA / CITY / RBG	2011-2015
			Work to retrofit any infrastructure that precludes the passage of wildlife into upstream habitat or the upper reaches of natural corridors. Possible retrofit options include: underpasses, fish ladders, by-pass channels etc.	Hamilton Harbour Fisheries Management Plan	HHWSP / HNC / BARC / HWSC / WPN / RAP	HCA / CITY / RBG	2011-2015
<b>Nutrient Loading</b> <b>Map Code: NL</b>  <b>Definition: Excessive nutrients being inputted into a watercourse; often resulting from the application of manure/fertilizer.</b> <i>(* Also includes Phosphorous Loading formerly map code PL)</i>	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-9, RM-7. Pages 116, 158	DFO / HCA / OMAFRA / OSCIA / HWSC	HHWSP	2011-2015
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and BMP’s related to nutrient management.				HCA / BARC / GV / RBG / OSCIA / MOE / OMAFRA / RAP	HHSWP	2011-2015
	Create demonstration sites on public lands that highlight nutrient management BMP projects.			Fisheries Act, Section 34	HCA / HWSC / OSICA / RAP	HHWSP	2011-2013
	Host a training workshop for local golf course practitioners to discuss BMP’s for golf course management, including Audubon Cooperative Sanctuary Program certification standards.			HCA Planning and Regulation Policies and Guidelines Page 72	HCA / HWSC / RAP / RCGA	HHWSP	2011-2013
		Establish a nutrient level monitoring program with strategic sampling sites that are land use dependent, to identify specific sources of nutrient loading.		Ministry of the Environment Water Management Policies and Guidelines – Provincial Water Quality Objectives Appendix A	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG	HCA	2011-2013
		Develop a plan to reduce nutrient levels to meet Provincial Water Quality Objectives as determined by the land use dependent nutrient level monitoring program.		OMAFRA Best Management Practices Series – Nutrient Management Planning	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG	HCA	2011-2013

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
		Develop a total phosphorous target based on the PWQO recommendation of 30µg/L for control of excessive plant growth, 20µg/L for control of Nuisance concentrations of algae or 10µg/L for high level of protection against aesthetic deterioration.		OMAFRA Best Management Practices Series – Manure Management	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG	HCA	2011-2012
		Develop a fertilizer use by-law under the Fertilizer Act, limiting the use of fertilizer for non essential purposes.			HCA / BARC / RAP / HHWSP / RBG	CITY	2011-2013
			Work with landowners to reduce nutrient loading by implementing agricultural and urban BMP's related to nutrient management.		CITY / OSCIA / OMAFRA / BARC / RAP / RBG / HCA	HHWSP	2011-2015
<b>On-line Ponds</b> <b>Map Code: OP</b>  <b>Definition: An in-stream structure designed to impound stream flow; leads to increased in-stream temperatures downstream and is often a barrier to fish migration.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and pond retrofit options.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-1, FW-4 Page 104, 107	DFO / HCA / OSCIA / OMAFRA / CITY	HHWSP	2011-2015
			Work with landowners to restore or retrofit on-line ponds.	Fisheries Act, Section 37  HCA Planning and Regulation Policies and Guidelines Page 63  In-stream Barrier Assessment for the Hamilton Harbour AOC	DFO / HCA / OSCIA / OMAFRA / CITY / HWSC	HHWSP	2011-2015
<b>Outdoor Recreation Related Impacts</b> <b>Map Code: OR</b>  <b>Definition: Recreational activities occurring in natural areas that inadvertently degrade the natural features of the area.</b>	Support the formation and activities of “Friends of” groups aimed at protecting and rehabilitating natural features.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-8, PAA-1, PAA-2, PAA-3 Pages 115, 126-130	HWSC / BARC / BTC	HHWSP / CITY / HCA / RBG	2011-2015
	Add “tread lightly” messaging to partner recreation oriented websites.				NHC	HCA / CITY / RBG / HNC / BTC	2011-2013
	Promote the City of Hamilton Adopt-a-Park and Extreme Park Makeover Programs.			The Conservation Lands of Ontario – Three Year Business Plan	HCA / RBG / HHWSP / HNC / BTC	CITY	2011-2015
	Install no trespassing signage on off trail areas.				HNC / BTC	HCA / RBG / CITY	2011-2015
	Erect signage explaining the environmental significance of natural areas, ownership of the lands and promoting user “etiquette” for the area.			A Joint Outdoor Tourism Marketing Strategy	HNC	HCA / CITY / RBG / BTC	2011-2013



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STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
		When undertaking master planning exercises, design trails to meet guidelines as set in HCA's Planning and Regulation Policies and Guidelines.		Niagara Escarpment Access Enhancement Plan  Dundas Valley 50 Year Vision Strategy  Cootes to Escarpment Conservation & Land Management Strategy	HCA / CITY / RBG	HCA / CITY / RBG	2011-2015
		Develop marketing strategies for sensitive lands that focus on sustainable use.			BTC / HNC	HCA / CITY / RBG	2011-2013
		Continue to monitor Category A and B waterfalls on public lands for signs of degradation.			HCA / CITY	HCA / CITY	2011-2015
		Refer to the Niagara Escarpment Access Enhancement Plan to design infrastructure for high traffic areas to guide users along approved trails.			HCA / CITY / RBG / BTC	HCA / CITY / RBG / BTC	2011-2015
		Consider designating days/areas for ATV and snowmobile use.			HHWSP / HNC	HCA / CITY / RBG	2011-2015
			Rotationally restrict access to degraded areas to allow for the regeneration of vegetation.		HNC / BTC	HCA / CITY / RBG	2011-2012
			Host annual clean up days for natural areas identified as having excessive amounts of litter.		HHWSP / HWSC / HNC / BARC / BTC	CITY / HCA / RBG	2011-2015
			Increase the amount of poison ivy caution signage along trails and in areas known to be degraded by trespassing.		HNC / BTC	HCA / CITY / RBG	2011-2015
			When conducting maintenance of existing trails, seek guidance from the HCA Planning and Engineering Department with respect to materials and design.		HHWSP / HNC / BTC	HCA / CITY / RBG	2011-2015
<b>Perched Culverts</b> <b>Map Code: CP</b>  <b>Definition: In-stream culverts that when improperly designed/installed, create barriers to water flow and fish migration.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and create awareness regarding the detrimental effects of perched and closed bottom culverts.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-1, FW-4 Pages 104, 107  Fisheries Act, Section 37  HCA Planning and Regulation Policies and Guidelines Page 41	DFO / HCA / CITY / MNR	HHWSP	2010-2014
	Host training sessions for HCA Lands and City staff to promote the proper design and installation of culverts.				DFO / HHWSP / MNR	CITY / HCA	2010-2014
		Undertake an inventory of perched and closed bottom culverts throughout the subwatershed. Prioritize culverts for mitigation or replacement.			DFO / HCA / HHWSP / MNR	CITY	2010-2014

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STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work with landowners to remove/retrofit perched and closed bottom culverts; begin with those prioritized in the Barrier Mitigation Plan of the In-stream Barrier Assessment for the Hamilton Harbour AOC.	In-stream Barrier Assessment for the Hamilton Harbour AOC	DFO / HCA / OSCIA / OMAFRA / CITY	HHWSP	2010-2014
<b>Pesticide Use</b> <b>Map Code: PS</b>  <b>Definition: The application of pesticides to control perceived pests.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the detrimental effects of pesticides and herbicides and to promote alternatives to traditional methods.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations TSSR-6, EPI-4 Pages 99, 137	HCA / OSCIA / OMAFRA / HHWSP / CITY / HCPI / LO	GV	2011-2015
	Host a training workshop for local golf course practitioners to discuss BMP's for golf course management, including Audubon Cooperative Sanctuary Program certification standards and the Ministry of the Environment Gold Course IPM Accreditation.			Fisheries Act, Section 34  City of Hamilton By -Law No. 07-282	LO / CITY / HWSC / HCPI / RCGA	HHWSP	2011-2012
	Promote the Municipal Pesticide Use By-law and Provincial Pesticide Ban.			Pesticides Act Ontario Regulation 63/09	HCPI / HWSC / HHWSP / OSCIA / OMAFRA	CITY / GV	2011-2015
	Create demonstration sites on public lands that highlight pesticide/herbicide free lawns, gardens, natural areas, crops, etc.			OMAFRA Best Management Practices Series – integrated Pest Management	CITY / GV / HCPI / HWSC / OSCIA / OMAFRA	HHWSP	2011-2015
	Promote the City of Hamilton's Turf King Hamilton Program which includes Integrated Pest Management principles, Natural Tips for Healthy Lawns and Gardens and alternative turf management techniques.			OMAFRA Best Management Practices Series – Pesticide Storage, Handling and Application	GV / HCPI / HWSC / HHWSP / OSCIA / OMAFRA	CITY	2011-2012
	Promote the Ministry of the Environment 'Add It Up Program – Going Pesticide Free' Program				CITY / HHWSP / HCPI / HWSC /	GV	2011-2015
		Undertake a study to determine the current level of pesticide/herbicide use in the subwatershed and develop targets for reduction.			GV / HCPI / HWSC / HHWSP / OSCIA / OMAFRA	CITY	2011-2012
			Work with landowners to implement Integrated Pest Management practices as alternatives to pesticide use.		CITY / HHWSP / HCPI / HWSC	GV	2011-2015

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STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
<b>Plowed Watercourses</b> <b>Map Code: PW</b>  <b>Definition: Headwater swales or small watercourses that are worked for agricultural production.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote drainage related BMP's; e.g. Water and Sediment Control Basins and grassed waterways.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-4 Pages 70, 71	DFO / HCA / OMAFRA / OSCIA / HWSC	HHWSP	2011-2015
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			Fisheries Act, Section 37	DFO / HCA / OMAFRA / OSCIA / HWSC	HHWSP	2011-2015
	Create demonstrations sites that highlight BMP's that promote good agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 44, 145-150	DFO / HCA / OMAFRA / OSCIA / HWSC	HHWSP	2011-2013
	Conduct a direct mailing to landowners where plowed watercourses have been identified to promote technical and financial assistance available for BMP projects related to agricultural drainage.			OMAFRA Best Management Practices Series – Soil Management	DFO / HCA / OSCIA / HWSC	HHWSP	2011-2015
			Work with landowners to install effective agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.		DFO / HCA / HWSC / RBG / RAP	HHWSP	2011-2015
<b>Runoff Contamination via Transportation Corridors</b> <b>Map Code: TC</b>  <b>Definition: Contamination resulting from stormwater runoff from major arterial roadways; often associated with the application of salts for de-icing and the residual precipitate created by automobile exhaust.</b>	Utilize literature, websites, public service announcements & direct landowner contact to promote the use of sidewalk salt alternatives.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-5b Page 71	CITY / DFO / HCA / MTO / GV	CITY	2011-2015
	Host training sessions for City Staff and Contractors using the Ministry of the Environment Snow Disposal and De-icing Operations in Ontario Guidelines.			Fisheries Act, Section 34	CITY / MTO	CITY	2011-2015
		Support planning for alternative and sustainable transportation strategies including Rapid Transit.		City of Hamilton 2003 Road Salt Management Plan	HCA / MTO / HHHBA / RAP	CITY	2011-2015
		Undertake a study to determine the most effective method of snow removal that will reduce contamination of watercourses.		Municipalities of Wellington County – 2005 Salt Management Plan	CITY / DFO / HCA / MTO	CITY	2011-2012
			Implement improved snow removal methods as recommended by the study to determine effective methods of snow removal which also reduce contamination of watercourses.		MTO	CITY	2012-2015
			Install vegetated filter strips and riparian buffers along medians and roadsides.		MTO / HCA	CITY	2011-2015

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STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
<b>Sediment Loading</b> <b>Map Code: SL</b>  <b>Definition: Organic and inorganic material that is entrained by the flow of water and is deposited in a creek system.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and BMP's related to preventing sedimentation.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-5, FW9 Pages 70, 71, 116	DFO / HWSC / HCA / MNR / OSCIA / OMAFRA / RAP	HHWSP	2011-2015
		Develop a total suspended solids target based on the PWQO turbidity recommendation of between 5-50 FTU (Formazin Turbidity Units)		Fisheries Act, Sections 34 and 36	DFO / HWSC / HHWSP / MNR / OSCIA / OMAFRA / RAP	HCA	2011-2012
			Work to achieve and maintain the total suspended solids target developed based on the PWQO turbidity recommendation of between 5-50 FTU (Formazin Turbidity Units)	Erosion and Sediment Control Guidelines for Urban Construction	DFO / HWSC / HHWSP / MNR / OSCIA / OMAFRA / RAP	HCA	2012-2015
			Monitor and enforce the proper installation and maintenance of sediment and erosion control measure on construction sites.	City of Hamilton By-law for Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the Removal of Topsoil	DFO / HWSC / HHWSP / MNR / OSCIA / OMAFRA / RAP	HCA	2011-2015
			Work with landowners to reduce sediment loading by implementing BMP projects; e.g. streambank stabilization, riparian buffers, natural channel design.	OMAFRA Best Management Practices Series – No-Till Making it Work	DFO / HWSC / HCA / MNR / OSCIA / OMAFRA	HHWSP	2011-2015
			Work with contractors to ensure that site clearing prior to development is phased out as the project phases unfold to reduce the area and length of time bare soil is exposed.	Ministry of the Environment Stormwater Management Design Guidelines	DFO / HWSC / MNR / OSCIA / OMAFRA / RAP / HHHBA	HCA	2011-2015
<b>Site Clearing Prior to Development</b> <b>Map Code: SC</b>  <b>Definition: The act of stripping or excavating the vegetation and topsoil from a site prior to construction works.</b>	Host training sessions for City staff, developers and consultants to promote City standards and guidelines related to site preparation prior to development.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-4 Page 71	DFO / MNR / RAP / HHHBA / CITY / HWSC/ HHWSP	HCA	2011-2013
	Promote the City of Hamilton By-law for Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the Removal of Topsoil			HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69	DFO / MNR / RAP / HHHBA / CITY / HWSC/ HHWSP	CITY	2011-2015
			Work with contractors to ensure that only necessary areas of development sites are cleared prior to development to eliminate the unnecessary destruction of habitat.	City of Hamilton Draft Private Tree and Woodland Conservation By-Law	DFO / MNR / HHHBA / CITY	HCA	2011-2015



TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work to mitigate non point sediment sources identified in the Watershed Planning Network Priority Remediation Report.	City of Hamilton By -Law No. 03-126 Site Alteration By-Law  Erosion and Sediment Control Guidelines for Urban Construction  City of Hamilton By-law for Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the Removal of Topsoil	DFO / MNR / CITY / HWSP / HHWSP	HCA	2011-2015
<b>Stormsewer Outfalls</b> <b>Map Code: SO</b>  <b>Definition: The point where a sewer system discharges into a watercourse during a storm event.</b>	Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scouting and girl guide groups and other children's groups, to create awareness regarding the impacts of stormwater on stream systems.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -6, ULM-9, ULM-11, RM-7 Pages, 72, 75, 77, 158  Fisheries Act, Section 34  City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 138, 158-159	HCA / RBG / GV / HWSC / HHWSP / CITY	BARC	2011-2015
	Promote the Municipal Sewer-Use By-law No. 06-228.				HCA / RBG / GV / HWSC / HHWSP	CITY	2011-2015
	Promote the City of Hamilton Public Works Stormwater Pollution Solutions for Urban and Rural Residents Outreach Program				HCA / RBG / GV / HWSC / HHWSP	CITY	2011-2015
		Undertake a water quality study evaluating water quality and temperature at a representative sampling of storm sewers to prioritize sewersheds to target for education outreach and remediation.			HCA / BARC / RAP / MOE	CITY	2011-2013
		Undertake a water temperature monitoring study at a representative sampling of storm sewers to determine the impact of storm flows on creek temperature.			CITY / BARC / RAP / MOE	HCA	2011-2013
		Work with Green Venture to develop a Stormwater Mitigation Program.			HCA / RAP / BARC / CITY	GV	2011-2013
			Work with City Staff to retrofit outfalls to incorporate erosion control measures such as plunge pools, rip rap, tree planting etc.		HCA / RAP / BARC / HWSC / DFO / HHWSP	CITY	2011-2015
			Work to implement the recommendations in the sewershed water quality study.		HCA / RAP / BARC / HWSC / DFO / HHWSP	CITY	2011-2015

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
			Work with landowners to establish riparian buffers and/or erosion protection downstream of storm sewer outfalls; e.g. riverstone.		HCA / RAP / BARC / HWSC / DFO / CITY	HHWSP	2011-2015
			Work with landowners to disconnect downspouts and to install rain barrels.		HCA / RAP / BARC / HWSC / HHWSP	CITY	2011-2015
<b>Transportation Corridor Expansion</b> <b>Map Code: TE</b>  <b>Definition: The process by which new roads are built or existing roads are widened.</b>	Host training sessions for City staff, developers and consultants to promote BMP's and new environmental technologies relating to transportation corridors; e.g. permeable pavement, wildlife under/overpasses, vegetated filter medians and rights of way, light coloured aggregate in hot mix, etc.		.	HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69  Ontario Provincial Standards for Roads and Public Works  Erosion and Sediment Control Guidelines for Urban Construction	HCA / MTO / HHHBA	CITY	2011-2015
		When planning for major road works, design transportation corridors using new technologies for environmental solutions.			HCA / MTO / HHHBA	CITY	2011-2015
			When repairing roads, utilize new technologies for road maintenance that are proven to have environmental benefits.		HCA / MTO / HHHBA	CITY	2011-2015
<b>Water Takings</b> <b>Map Code: WT</b>  <b>Definition: The process by which surface and groundwater are pumped out of the natural system; for the purposes of irrigation, aggregate extraction, etc.</b>	Host open houses when experiencing low water conditions to address landowner concerns and promote recommended reductions in rates and volumes of takings.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-12 Page 77  Ontario Water Resources Act O. Reg. 387/04  OMAFRA Best Management Practices Series – Irrigation Management	HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote BMP's relating to water conservation technology.				HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
	Encourage landowners with surface water takings to install groundwater systems.				HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
	Encourage landowners with water taking needs to establish an Irrigation Advisory Committee to schedule takings alternately.				HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
		Develop monitoring program to assess impacts of surface water takings on creek systems and aquatic wildlife during periods of low water, include recommendations for reducing impacts.			MNR / MOE	HCA	2011-2013

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
		Upon receipt of new Permit to Take Water applications, evaluate the taking against active permits in the area to determine the potential stress level related to multiple users on a given system.			MOE	HCA	2011-2015
			Work with landowners to implement BMP's related to water conservation.		HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
<b>Wildlife Collisions</b> <b>Map Code: WC</b>  <b>Definition: Incidences where animals are struck by vehicles or where animals collide with buildings, often occurring with buildings with large windows.</b>	Utilize literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding managing human-wildlife conflicts.			British Columbia Wildlife Collision Prevention Program Report	MNR / HCA / MTO / RBG / HWSC / HHWSP	CITY	2011-2015
	Erect additional wildlife caution signage that is species specific, along roadways at known points of frequent collisions.			City of Ottawa Wildlife/Vehicle Collision Prevention Program	MNR / HCA / MTO / RBG	CITY	2011-2013
		When planning major road works, consider the incorporation of wildlife over/underpasses, avoiding known migratory corridors and other wildlife accommodations in the design.			MNR / HCA / MTO / RBG	CITY	2011-2015
		Evaluate the effectiveness of the MTO roadside prairies and wildlife shrub corridors project in preventing wildlife collisions.			MNR / HCA / MTO	CITY	2011-2015
			Reduce the use of road salt or consider alternatives that do not attract wildlife.		MNR / HCA / MTO	CITY	2011-2013
			Produce and distribute window decals for large windows of homes and high rise buildings to prevent bird collisions.		CITY / HHWSP / HWSC / RBG	HCA	2011-2015
			Erect fencing and alternative nesting mounds at known sites for turtle nesting.		MNR / HCA / MTO / RBG	CITY	2011-2013
			Conduct temporary road closures at known wildlife crossings and nesting sites during peak migration and nesting times.		MNR / HCA / MTO / RBG	CITY	2011-2015
<b>Wildlife Overpopulation</b> <b>Map Code: WO</b>  <b>Definition: When a species population</b>	Conduct a direct mailing to landowners adjacent to natural areas densely populated with deer to create awareness regarding reasons not to feed or intentionally attract wildlife.			Strategy for Preventing and Managing Human-Deer Conflicts in Southern Ontario			

TABLE LS-8: STRESSES AND STEWARDSHIP ACTIONS

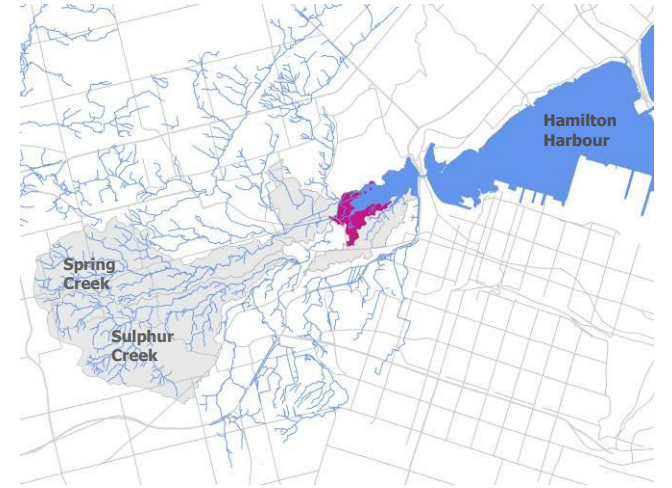
STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities				
exceeds the carrying capacity of its habitat.			Work to implement the recommendations for sustainable populations in the HCA/MNR Deer Management Strategy.				

Partner Agency Acronyms

BARC	Bay Area Restoration Council	HHHBA	Hamilton-Halton Home Builders Association
BTC	Bruce Trail Conservancy	HHWSP	Hamilton-Halton Watershed Stewardship Program
CC	Carolinian Canada	HNC	Hamilton Naturalists Club
CITY	City of Hamilton	HWSC	Hamilton-Wentworth Stewardship Council
DFO	Department of Fisheries and Oceans	MOE	Ministry of the Environment
DU	Ducks Unlimited	MNR	Ministry of Natural Resources
EH	Environment Hamilton	MTO	Ministry of Transportation
FSRT	Field and Stream Rescue Team	OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
GV	Green Venture	OSCIA	Ontario Soil and Crop Improvement Association
HCA	Hamilton Conservation Authority	WPN	Watershed Planning Network
HCPI	Hamilton Coalition on Pesticide Issues		





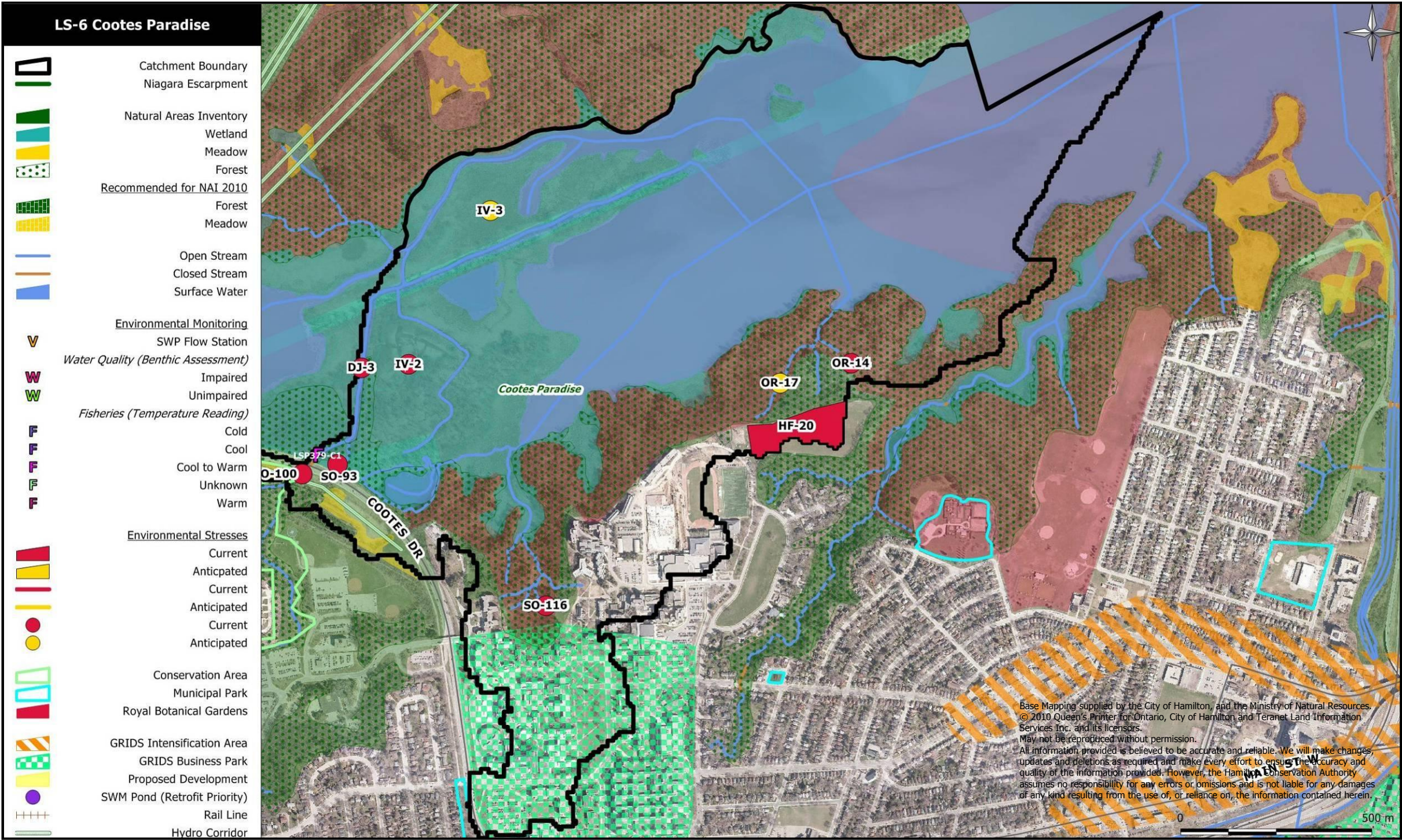


## COOTES PARADISE CATCHMENT

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### *DATA SHEETS*







COOTES PARADISE DATASHEET

Table LS-9: Stresses Identified in the Cootes Paradise Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
CH-9	Channelization	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
DJ-3	Debris Jam	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
HF-20	Habitat Fragmentation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
IV-2	Invasive Species	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
IV-3	Invasive Species	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
OR-14	Outdoor Recreation Related Impacts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
OR-17	Outdoor Recreation Related Impacts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-100	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-116	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-93	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
LSP379-C1	2008	Too deep to measure	n/a	n/a	n/a

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
LSP379-C1	2008	Too deep to measure

WATER QUALITY ASSESSMENT

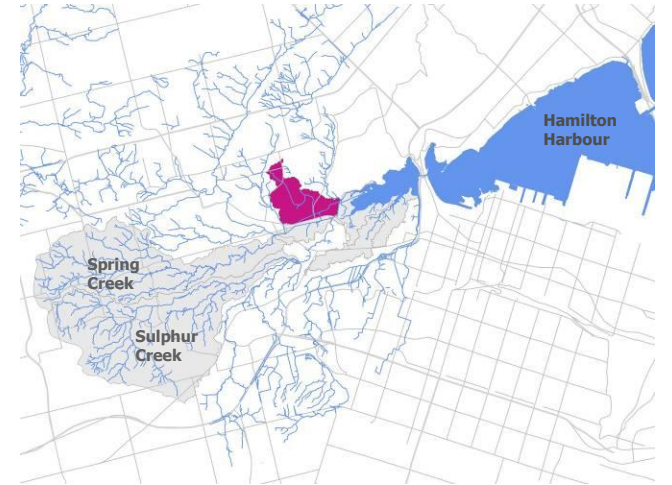
LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m³/s





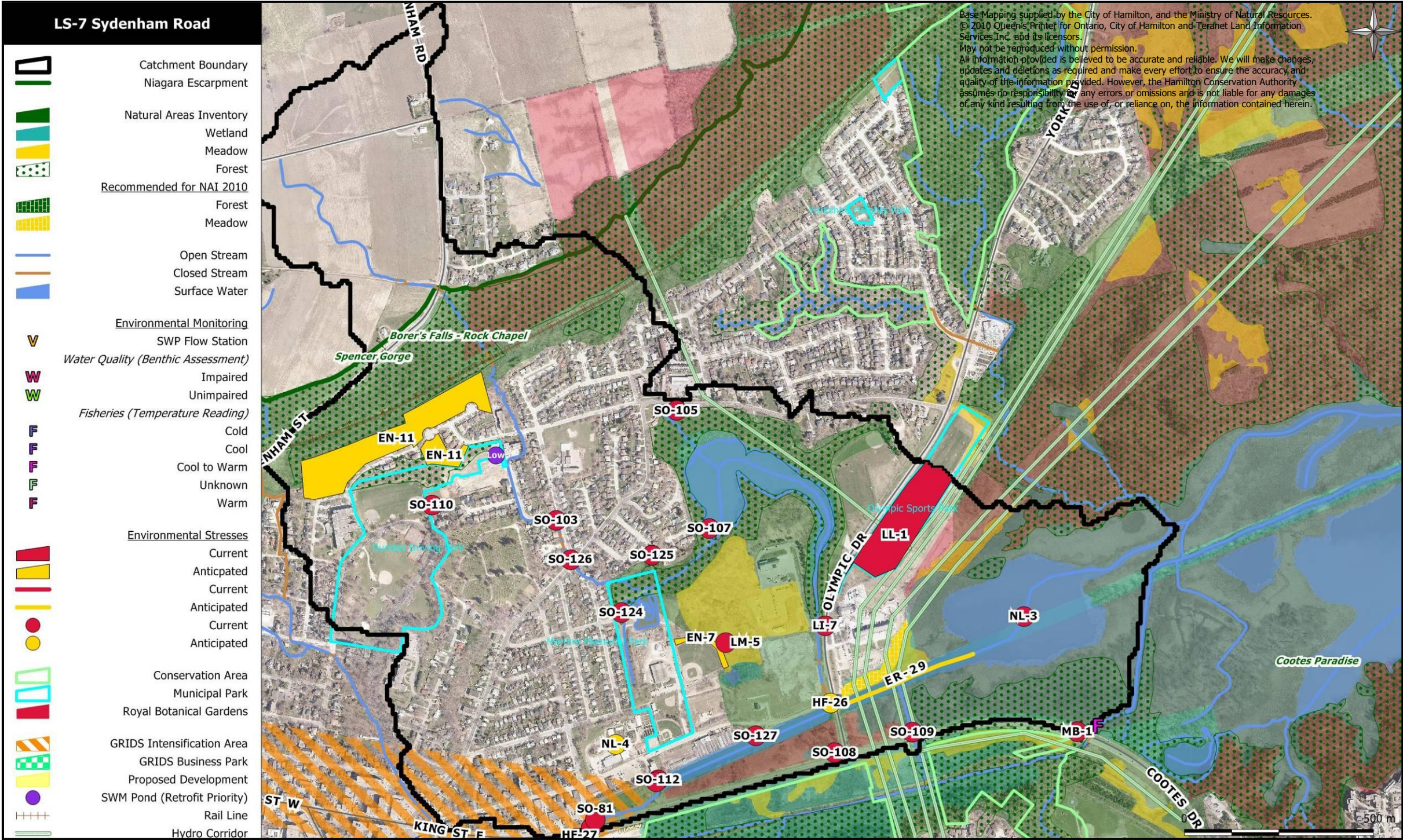


## SYDENHAM ROAD CATCHMENT

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### *DATA SHEETS*







**SYDENHAM ROAD DATA SHEET**

**Table LS-10:** Stresses Identified in the Sydenham Road Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
EN-11	Encroachment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
EN-7	Encroachment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
ER-29	Erosion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
HF-26	Habitat Fragmentation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
HF-27	Habitat Fragmentation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
LI-7	Litter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
LL-1	Landfill Leachate		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
LM-5	Land Maintenance Practices		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
MB-1	Migration Barrier	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NL-3	Nutrient Loading	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
NL-4	Nutrient Loading	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-103	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-105	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-107	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-108	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-109	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-110	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-112	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-113	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-124	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-125	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-126	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-127	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-81	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

**SYDENHAM ROAD DATA SHEET**

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION

BENTHICS ASSESSMENT

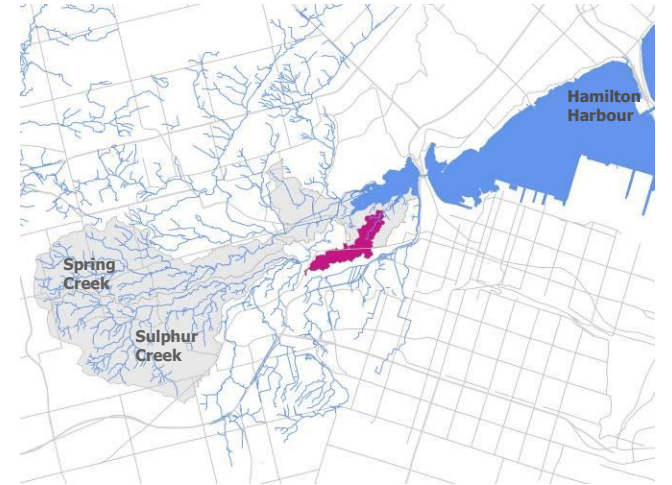
LOCATION	DATE	DESCRPTION

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m³/s

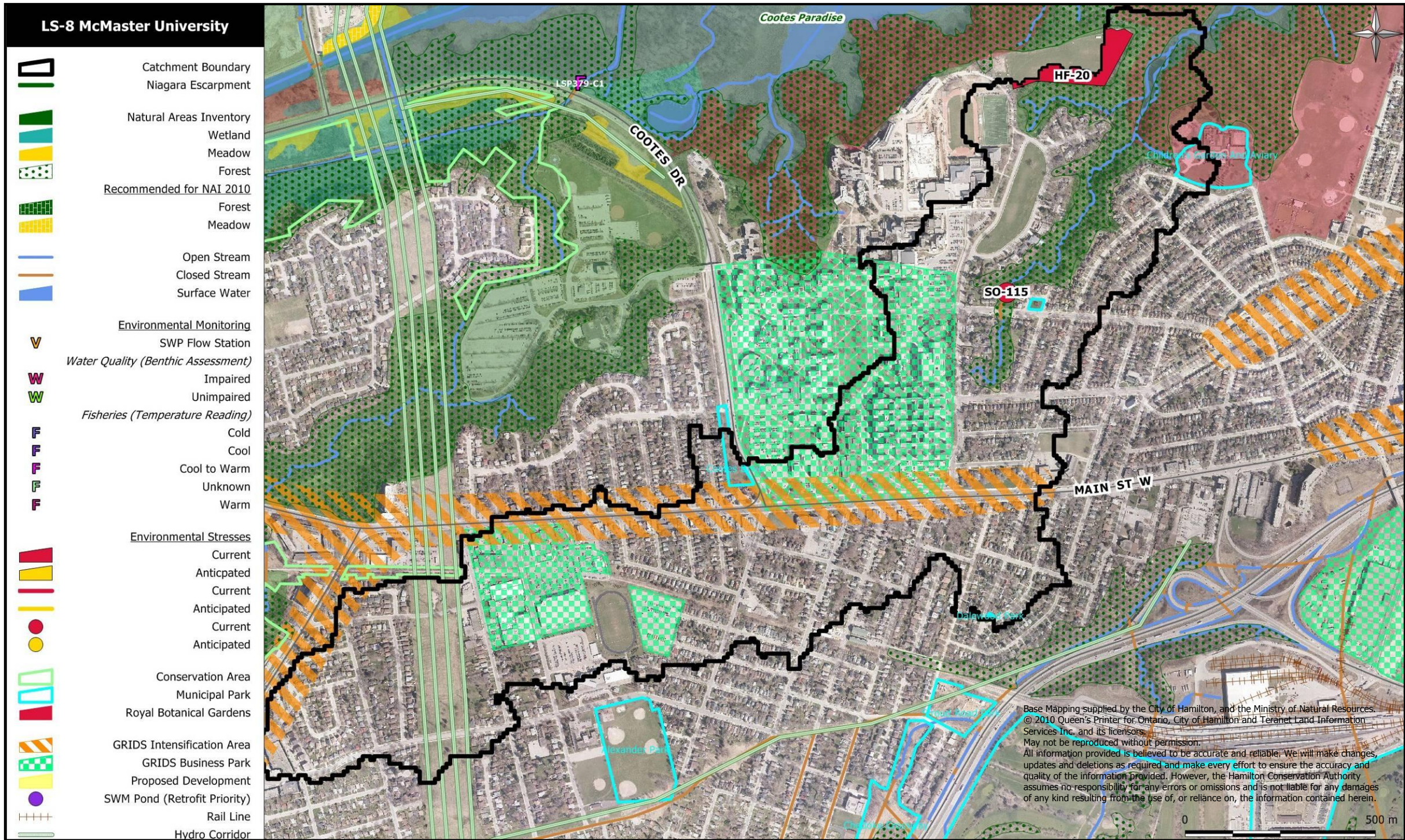


## MCMASTER UNIVERSITY CATCHMENT

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### *DATA SHEETS*







MCMASTER UNIVERSITY DATASHEET

Table LS-11: Stresses Identified in the McMaster University Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
HF-20	Habitat Fragmentation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SO-115	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION

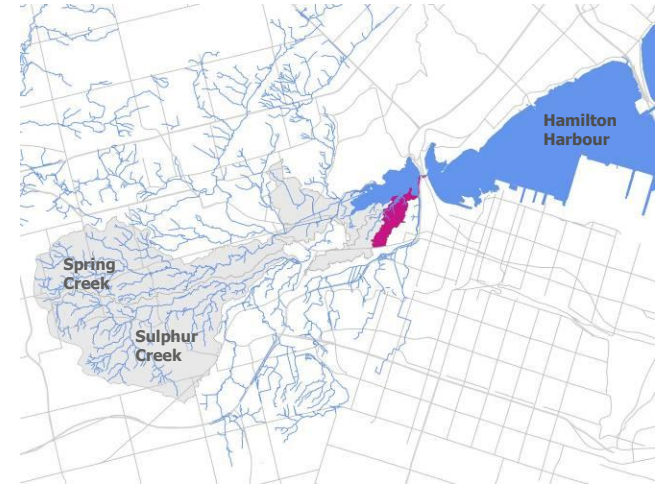
WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m <sup>3</sup> /s



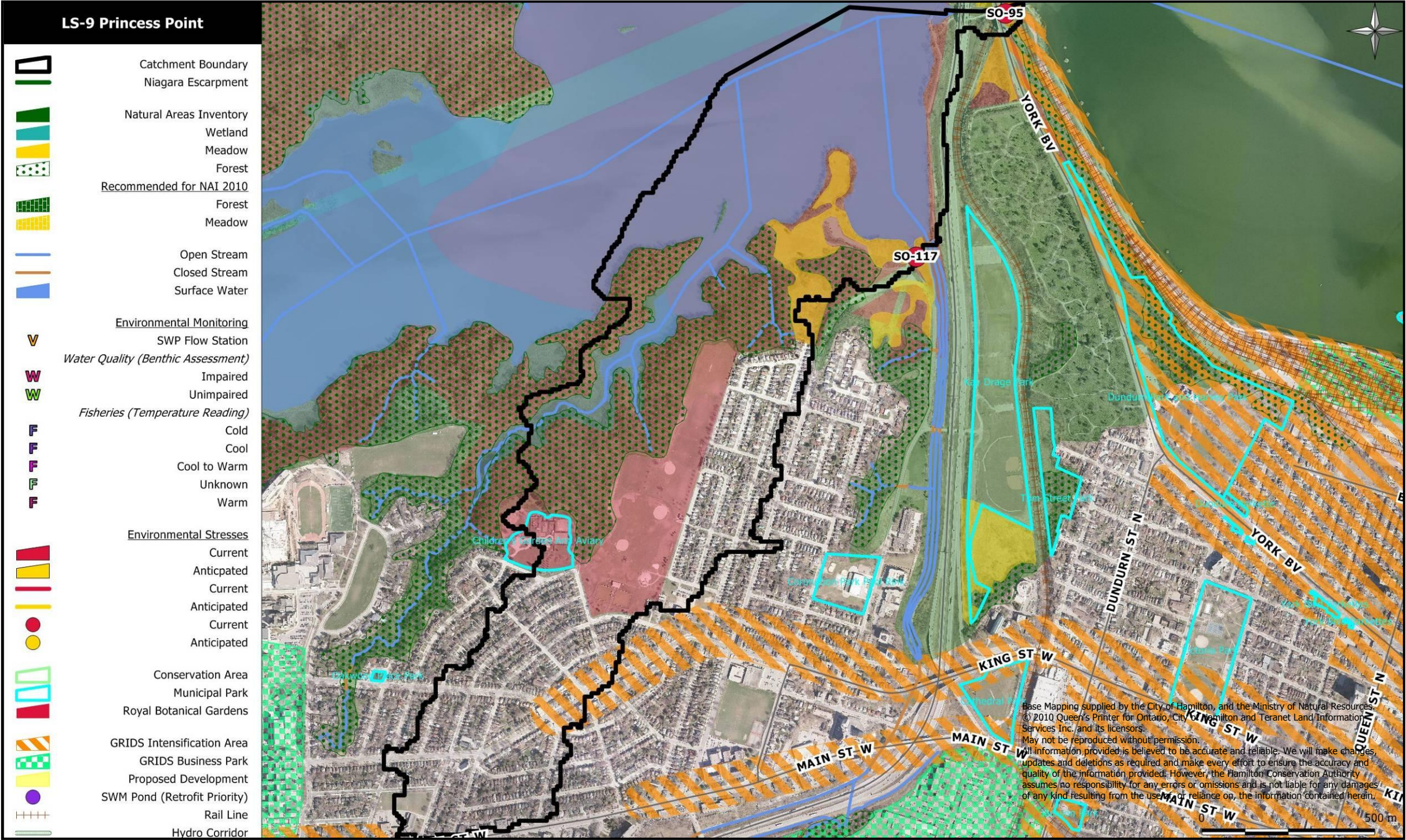


## PRINCESS POINT CATCHMENT

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### *DATA SHEETS*







PRINCESS POINT DATA SHEET

Table LS-12: Stresses Identified in the Princess Point Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
SO-117	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-95	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION

WATER QUALITY ASSESSMENT

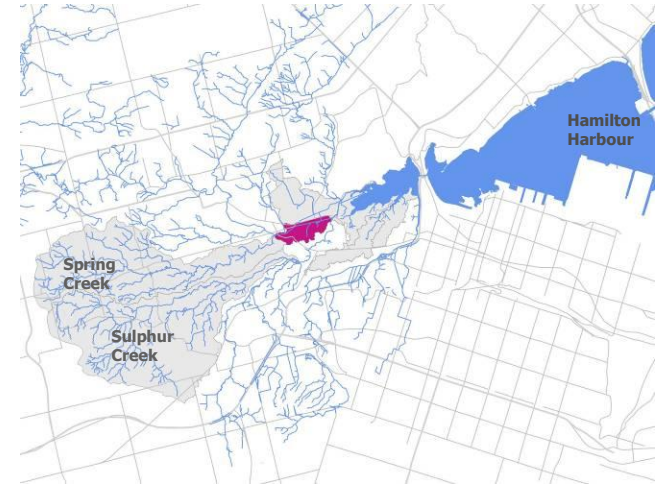
LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m³/s





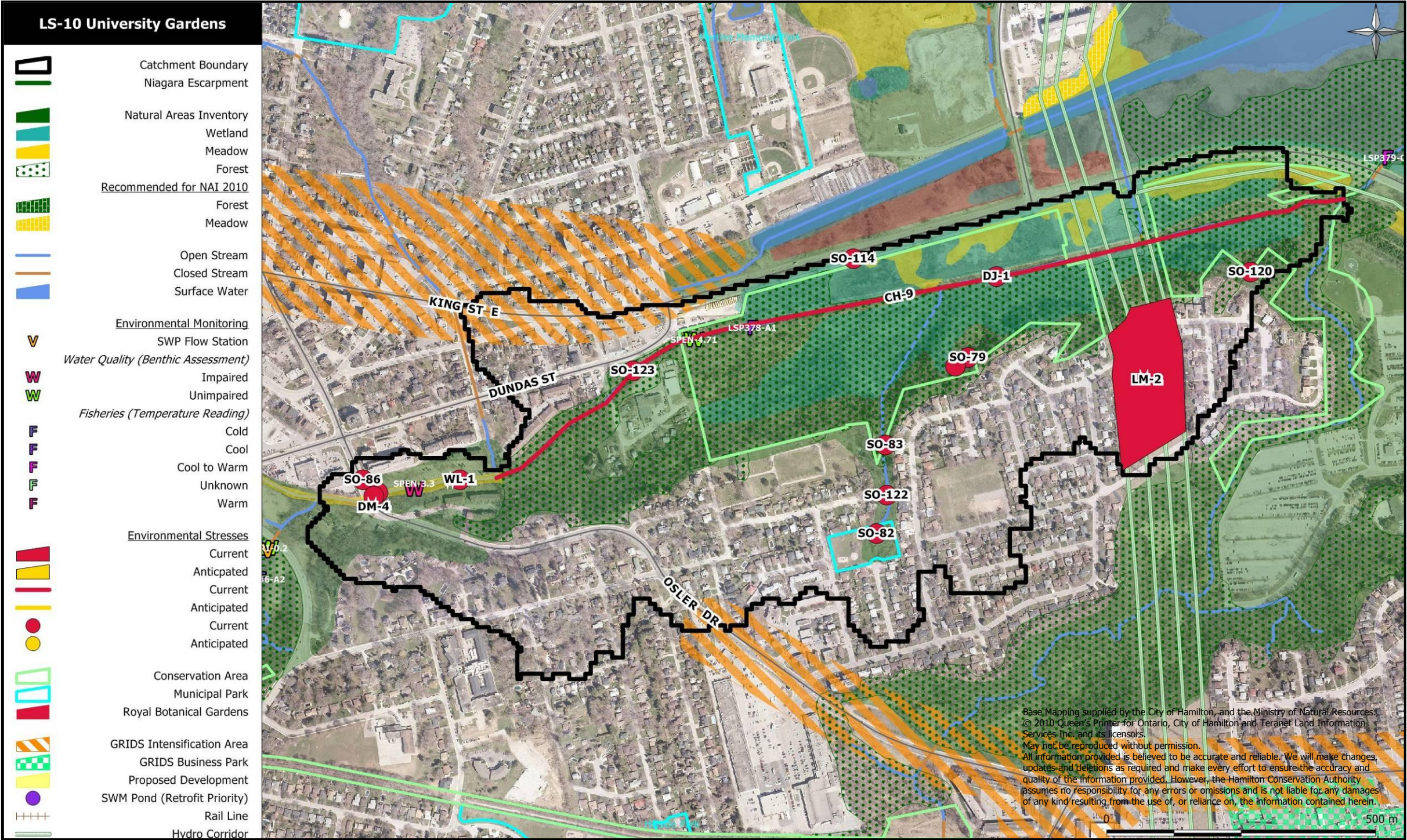


## UNIVERSITY GARDENS CATCHMENT

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### *DATA SHEETS*







UNIVERSITY GARDENS DATASHEET

Table LS-13: Stresses Identified in University Gardens Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
CH-9	Channelization	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
DJ-1	Debris Jam	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
DM-4	Dam	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
LM-2	Land Maintenance Practices		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SO-114	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-120	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-121	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-122	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-123	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-79	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-82	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
SO-83	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-86	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
SO-88	Stormsewer Outfall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WL-1	Fluctuating Water Levels	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

UNIVERSITY GARDENS DATASHEET

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
LSP378-A1	02-Sep-08	Blacknose dace	41	18.62	cold-cool
LSP378-A1	02-Sep-08	Bluntnose minnow	2		
LSP378-A1	02-Sep-08	Common shiner	6		
LSP378-A1	02-Sep-08	Fantail darter	24		
LSP378-A1	02-Sep-08	Johnny darter	15		
LSP378-A1	02-Sep-08	Largemouth bass	1		
LSP378-A1	02-Sep-08	Logperch	12		
LSP378-A1	02-Sep-08	Nocomis sp.	38		
LSP378-A1	02-Sep-08	Northern hog sucker	8		
LSP378-A1	02-Sep-08	Pumpkinseed	1		
LSP378-A1	02-Sep-08	Rainbow darter	29		
LSP378-A1	02-Sep-08	Rosyface shiner	6		
LSP378-A1	02-Sep-08	Round goby	2		
LSP378-A1	02-Sep-08	White sucker	2		
LSP378-A1	03-Sep-08	Blacknose dace	1		
LSP378-A1	03-Sep-08	Creek chub	3		
LSP378-A1	03-Sep-08	Emerald shiner	1		
LSP378-A1	03-Sep-08	Johnny darter	14		
LSP378-A1	03-Sep-08	Logperch	1		
LSP378-A1	03-Sep-08	Longnose dace	26		
LSP378-A1	03-Sep-08	Rainbow darter	7		

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
SPEN-4.71	Unimpaired	2002
SPEN-3.3	Impaired	1999
LSP378-A1	Unimpaired - Potentially Impaired	2008

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m <sup>3</sup> /s

