

# SULPHUR CREEK SUBWATERSHED STEWARDSHIP ACTION PLAN 2010



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#### **GEOGRAPHIC LOCATION**

Sulphur Creek subwatershed is 17.13 km² in area and is comprised of seven catchment basins. In descending order from the headwaters to the outlet these are: Slote Road, Rifle Range, Jerseyville Road, Mineral Spring Road, Hermitage Ruins, Sulphur Springs Road and Lower Sulphur Creek (Map SU-1). This subwatershed lies almost entirely within the former municipal boundary of the Town of Ancaster, with a small portion of Lower Sulphur Creek catchment falling within the former Town of Dundas. The subwatershed also falls within three City of Hamilton Wards, specifically Wards 12, 14 and 13.

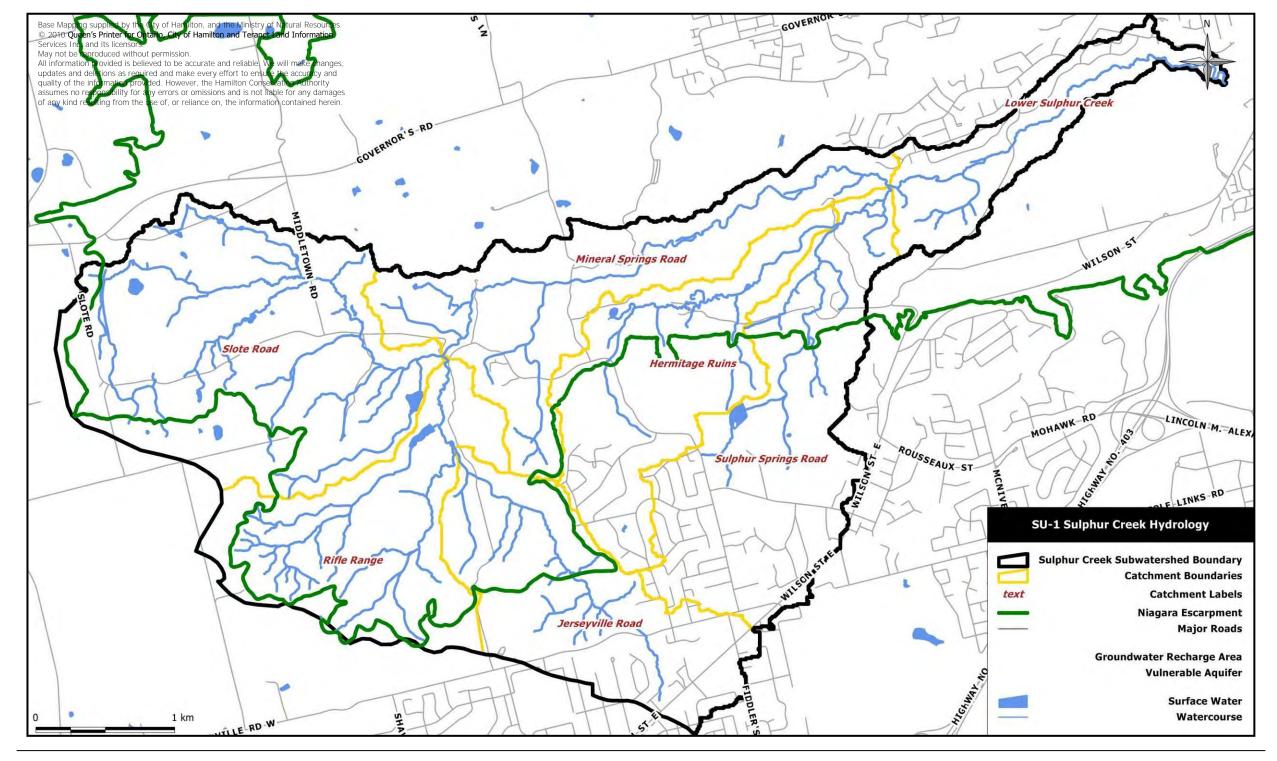
The boundaries of the Sulphur Creek subwatershed and its associated catchments have recently been updated through the Source Protection Planning process. The naming convention from the 1997 Spencer Creek Management Plan has been retained so that reference between previous reports is possible.

The western subwatershed boundary occurs at or very near the ridge of the Niagara Escarpment at Slote Road, where it makes a u-shaped bend around the western end of Lake Ontario, forming the Dundas Valley. The northern boundary of the Spring Creek subwatershed originates along the Dundas Valley floor as it leads down into the former Town of Dundas. The southernmost point of the subwatershed occurs at Wilson Street East and Fiddler"s Green Road where it then follows Wilson Street East and Old Dundas Road northeastward as it tapers to join Ancaster Creek – the subsequent subwatershed in the Spencer Creek system. Sulphur Creek joins Ancaster Creek at Main Street West and Osler Drive.

The western subwatershed boundary originates immediately east of Copetown, a historic settlement in this area. The historic hamlet of Mineral Springs is near the centre of the subwatershed.

No highways or major transportation routes pass through this subwatershed, however frequently traveled roads include Wilson Street East, Sulphur Springs Road, Mineral Springs Road and Old Dundas Road.





#### **HYDROLOGY**

# **Surface Water**

Sulphur Creek is one of 13 subwatersheds of Spencer Creek that drain a 278 km² area into Cootes Paradise Marsh and ultimately Hamilton Harbour. Sulphur Creek subwatershed has a drainage area of 17.13 km². The length of Sulphur Creek is approximately 9.4 km from the headwaters to the confluence with Ancaster Creek; however, the combined length of the creek and all of its tributaries is 62.04 km.

Sulphur Creek is a coldwater creek that originates on the margins of the Dundas Valley where it drains east to its confluence with Ancaster Creek. (HHSWP, 2006) These streams are very steep with average gradients in excess of 17m/km; therefore, the streams have high erosive forces, which lead to deep ravines, high ridges and dense surface drainage patterns (Maclaren Plansearch, 1990).

The Dundas Valley's significant natural cover serves an important hydrological function of maintaining surface water quality by limiting gullying on the erosion-prone slopes and by providing in-stream cover (Hamilton Naturalists Club, 2003)

Cold to coolwater conditions occur in Sulphur Creek as below the escarpment, groundwater discharge from the fractured bedrock serve to moderate water temperatures. Temperature studies completed in Spring and Sulphur Creeks generally indicate that daily temperature maxima rarely exceed 20oC during the summer months, except in the reaches that have been impacted by residential development (HRCA, 1997; HCA, 2002).

The Copetown Bog locally significant wetland is located along the regional topographic high that forms the watershed divide between the Sulphur Creek and Big Creek (a tributary of the Grand River) subwatersheds. Located at the head of the Dundas Valley, this wetland consists primarily of a mature kettle bog, shrub swamps and fen habitat, and is the only kettle bog community in the City of Hamilton. Included within this natural area are a raised peat bog, a fen community, and organic wetlands connected by coniferous plantations and upland meadows. This bog serves a significant hydrological function by maintaining surface water quality and regulating stream flow in Sulphur Creek (Dwyer et al., 2003).

A preliminary surface water model output generated in the Halton Hamilton Source Water Protection (HHSWP) 2008 Draft Tier 1 Water Budget Report identified a very small high volume recharge area in the headwaters of the Slote Road catchment. At the time of this report the surface water model and Tier 1 Water Budget Report are currently being updated.

The 2008 Draft Tier 1 Water Budget Report also assessed surface water stress levels in each subwatershed. The assessments did not yield a significant or moderate stress result with respect to surface water quantity in the Sulphur Creek subwatershed. Therefore no Tier 2 report is recommended for this subwatershed. At the time of this report, the surface water model and Tier 1 Water Budget Report are currently being updated.

The land use of Sulphur Creek subwatershed is predominately residential with the majority of the land retaining natural forest cover. Stormwater runoff from dense residential developments in the subwatershed is captured by stormsewers and directed into the creek system. This input into the system contributes to the overall load on the system and should be considered when planning new or upgraded stormwater management infrastructure.

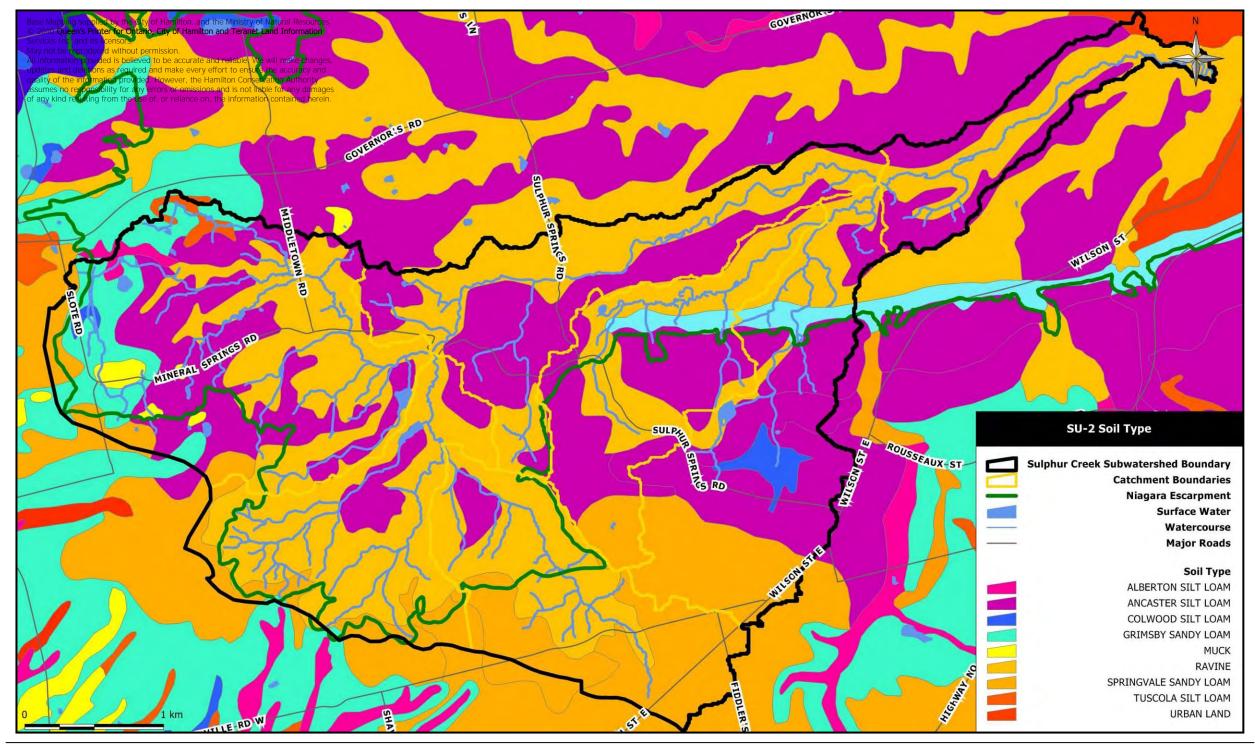
There are no Hamilton Conservation Authority water level gauge stations in the Sulphur Creek subwatershed; however, there is one Source Water Protection water flow gauge station within the subwatershed. Data collected between 2006 and 2008 at this station are included in the catchment datasheets throughout the remainder of this document.

#### Groundwater

The HHSWP 2008 Draft Tier 1 Water Budget Report identified significant ground water recharge areas in Sulphur Creek subwatershed. The Rifle Range catchment has been identified as a moderately significant recharge area, whereas the Jerseyville Road catchment and the headwaters of the Hermitage Ruins and Sulphur Springs Road catchments have been identified as highly significant recharge areas. Also, the majority of the Lower Sulphur Creek catchment has been identified as a highly vulnerable aquifer.

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 Sulphur 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 Sulphur Creek Subwatershed.



#### SOILS AND PHYSIOGRAPHY

The soil parent materials in the Spencer Creek subwatershed are thought to have predominately been deposited during the Wisconsian glaciation 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).

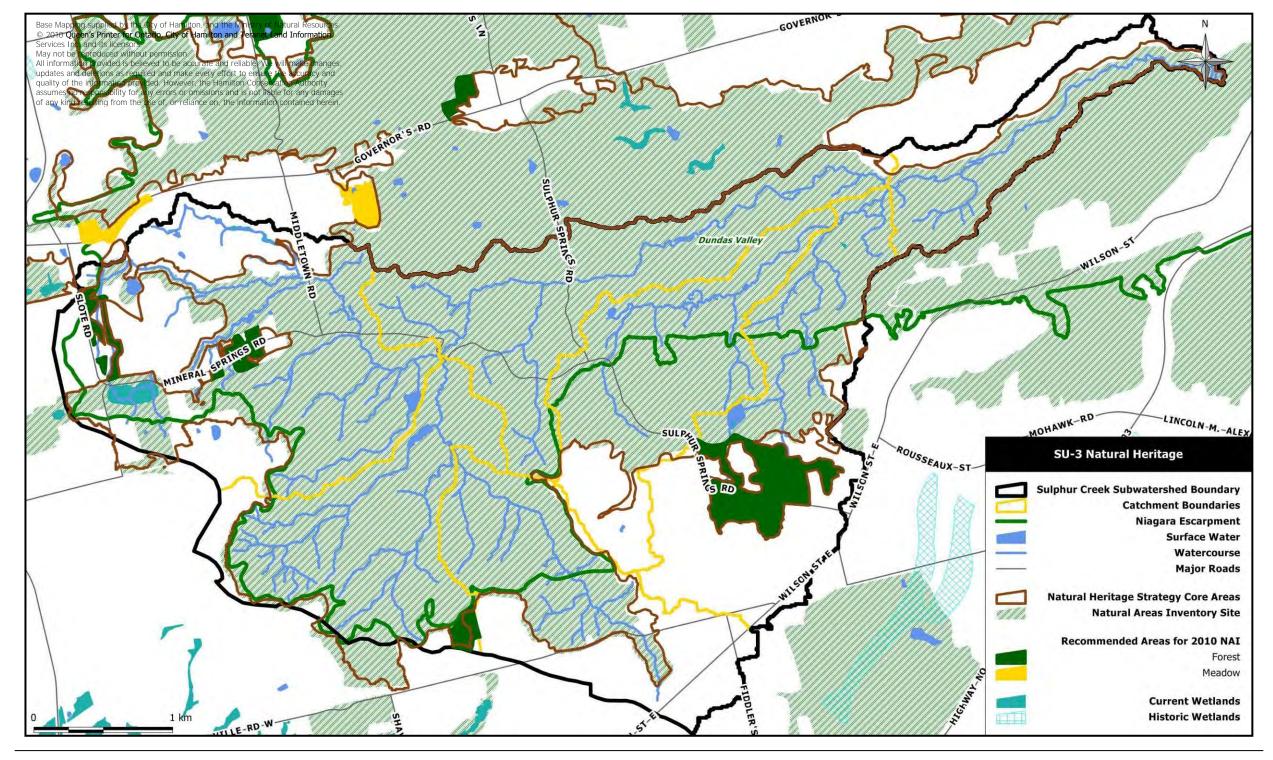
The soil characteristics of the Sulphur Creek subwatershed are shown on **Map SU-2**. Five soils complexes have been identified within the Sulphur Creek subwatershed, as summarized in **Table SU-1**. Soil characteristics vary throughout the subwatershed; however the majority of the soils are well drained. 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 low to moderate.

Table SU-1: Soil and Erosion Potential in the Sulphur Creek Subwatershed

Soil Type	Natural Drainage	Erosion Factor*	Topography (slope)	Erosion Potential
Gi – Grimsby Sandy Loam	Well drained	4	6-9%	Moderate
Sp – Springvale Sandy Loam	Well drained	4	6-9%	Moderate
Al – Alberton Silt Loam	Variable	N/A	1%	Low
An – Ancaster Silt Loam	Well drained	2	38%	Moderate
Co – Colwood Silt Loam	Poor	2	1%	Low
Tu – Tuscola Silt Loam	Imperfect	2	3-5%	Low

<sup>\*</sup> Based on the Region of Hamilton-Wentworth Soil Summary Sheet

<sup>\*\*</sup> Based on the Ontario Environmental Farm Plan Workbook. Ontario Farm Environmental Coalition



#### **NATURAL HISTORY & SIGNIFICANT SPECIES**

The Niagara Escarpment, a UNESCO World Biosphere Reserve, is a prominent feature of this subwatershed; it allows for the unique natural history of the Dundas Valley ESA. Additionally, this subwatershed reaches into the Copetown Bogs, another municipally designated environmentally significant area (ESA). 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 at., 2003).

Natural vegetation covers 10.87 km² or 64% of Sulphur Creek subwatershed. The Hamilton Conservation Authority owns many of these natural areas as they own 6.5 km² or 38% of the lands within the subwatershed. A breakdown of the current natural land cover statistics for the area are noted within **Table SU-2**. Based on the digital data provided for this analysis, forest cover accounts for 62.2% of this subwatershed, while meadow cover is 1.2% of the land base. Stream length of Sulphur Creek and all its tributaries is 62.04 km. Map**SU-3** illustrates that natural heritage of the Sulphur Creek subwatershed.

Less than 1% of the landscape is wetland. Historical wetlands mapping did not show any wetlands lost before 1967 or between 1967 and 1982 identified in this subwatershed. 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.

Table SU- 2: Natural Land Cover Statistics

Forest Cover	Cover Cover (km²)		Stream Length
(km²)	(km²)	(km²)	(km)
10.65	0.06	0.21	62.04

Sulphur 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 extending into the former Town of Ancaster and the Sulphur 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 gullying on the erosion prone slopes and by providing in-stream cover (Dwyer, 2003).



#### **NATURAL HISTORY & SIGNIFICANT SPECIES**

Numerous fisheries and benthic macroinvertbrates monitoring stations have been sampled in Sulphur 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 three ecological monitoring stations in the Sulphur Creek subwatershed will be monitored in Year 2 of a three year cycle. The monitoring stations are in the Jerseyville Road, Weir's Lane and Lower Sulphur Creek 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 Sulphur 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.

Water quality conditions within the Sulphur Creek subwatershed are generally unimpaired. Urban development in the headwaters of this watercourse has resulted in water quality impairments in its upper tributaries. Benthic collections from the headwaters of Sulphur Creek in Ancaster suggest impaired water quality, with low abundances of sensitive species and high abundances of species suggestive of accumulations of detritus and organic matter and frequent oxygen deficiencies. An abandoned online stormwater pond, as well as old stormwater infrastructure from the surrounding neighbourhoods, where roof leaders and storm drains are directly piped to the creek, is likely the main cause of these impairments (Griffiths; 2001, 2002).

Passing through the Dundas Valley, water quality conditions in Sulphur Creek substantially improve, and remain relatively unimpaired to its confluence with Ancaster Creek. The main channel of this water course was historically considered to provide coldwater habitat and able to support trout populations (Department of Commerce and Development, 1960). Brook trout were noted in this area in the mid -1980's, but none have been collected since 1990(HCA, 2003). Mayfly, caddisfly, stonefly and true fly taxa characteristic of permanent, clear coldwater conditions are commonly found in benthic collection through these reaches. High contributions of groundwater and extensive forest cover through the Dundas Valley likely accounts for the maintenance of coldwater conditions in these reaches (Griffiths: 2000, 2002, 2003).

In the vicinity of Mineral Springs, where a number of small tributaries draining the western portion of the subwatershed emerge, the benthic fauna clearly suggest that these reaches have little remaining capacity to cope with any further local stresses. A sizeable proportion of the fauna at this site is composed of pollution tolerant sludge worm taxa, suggesting that a large amount of silt and organic matter is being stored along this reach which is not consistent with the water quality conditions reflected by the remainder of the benthic fauna. Upstream pasture lands that have been tiled drained likely contribute to these impairments (Griffiths, 2002).

Cold to coolwater conditions occur in Sulphur Creek as below the escarpment, groundwater discharge from the fractured bedrock serve to moderate water temperatures. Temperature studies completed in Spring and Sulphur Creeks generally indicate that daily temperature maxima rarely exceed 20oC during the summer months, except in the reaches that have been impacted by residential development (HRCA, 1997; HCA, 2002).

Given the coldwater characteristics of portions of this subwatershed, sensitive fish species that have been documented, both recently and historically, include rainbow darter, fantail darter, brassy minnow, finescale dace, pearl dace and northern redbelly dace (C. Portt and Associates, 1002: HRCA; 1997, 2000; HCA: 2002, 2005).

Rainbow trout runs have been documented as extending as far as the escarpment in Sulphur Creek (HRCA, 2000; HCA 2002, 2005). American brook lamprey, a stream-dwelling species which prefers cold brooks and small rivers (Scott and Crossman, 1973), are found throughout the Sulphur Creek subwatershed (HCA; 2002, 2005).



#### **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 Sulphur Creek subwatershed. The COSEWIC and COSSARO statuses don't always coincide for each species, therefore some species will be on more than one list.

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

- Pickerel Frog
- Western Chorus Frog
- Sharp Shinned Hawk
- Brown Snake
- Northern Leopard Frog
- Eastern Screech-Owl
- False Mermaid
- Red-tailed Hawk
- Double-crested Cormorant Snapping Turtle
- Cooper's Hawk
- Eastern Bluebird
- Northern Harrier

# **Special Concern**

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

#### **Threatened**

- Chimney Swift
- Golden-winged Warbler
- Hooded Warbler
- Jefferson Salamander

# **Endangered**

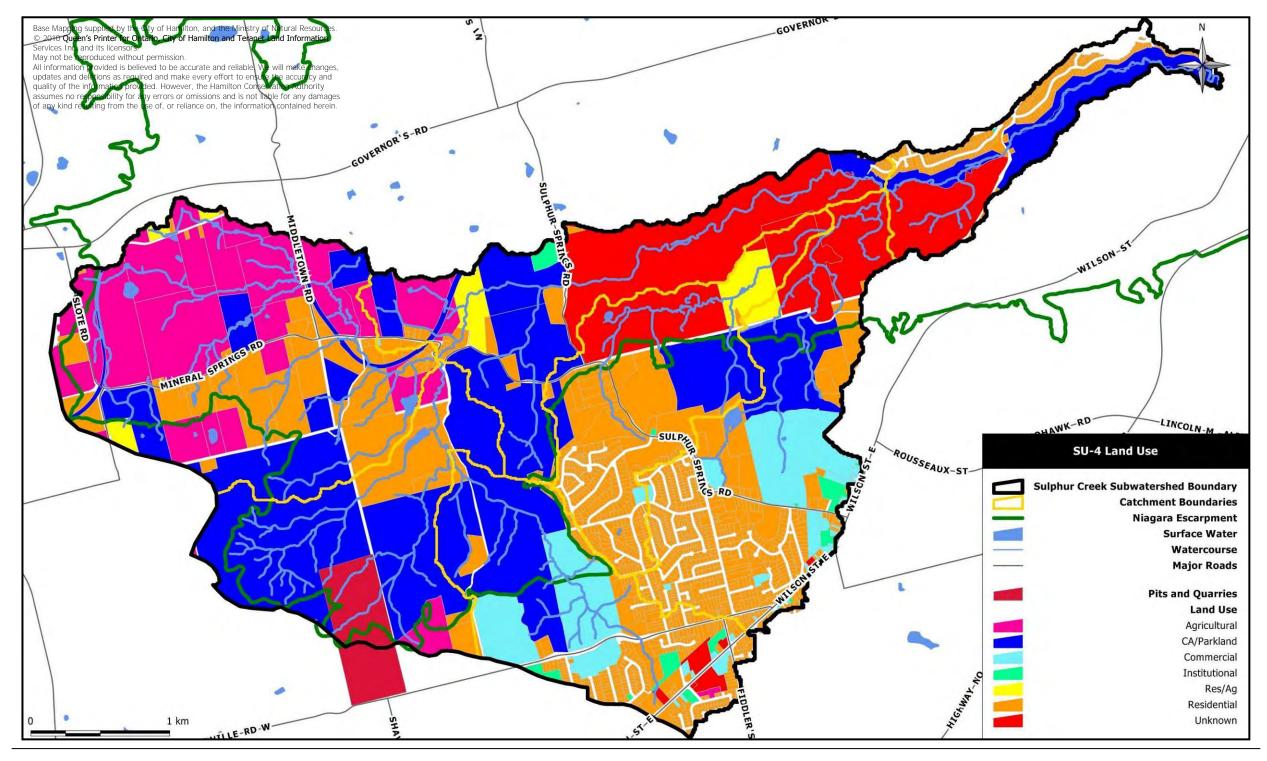
- American Chestnut
- Butternut
- Ginseng
- Acadian Flycatcher
- Flowering Dogwood

# **Species with Recovery Strategies**

**Recovery Strategy Status** Species Completed and available American Chestnut Drafted not available American Ginseng Butternut Completed and available

Not available

Eastern Flowering Dogwood Acadian Flycatcher Completed and available **Hooded Warbler** Complete and available



#### **CULTURAL HISTORY**

The permanent phase in the settlement of the Spencer Creek Watershed began following the American War of Independence. Loyalists, largely from the Hudson-Mohawk and Pennsylvania districts crossed the Niagara River, and while many of them settled close to the river, others moved up Lake Ontario to its western end. Because of the high well-drained land, and because of good spring water and streams for power, and because the site was on the early road from Niagara to the western part of the province, settlers came into the Ancaster area as early as 1790. Jean Baptiste Rousseaux from Lower Canada and James Wilson from Pennsylvania were the founders of the village (Spencer Creek Conservation Authority, 1965).

When these British Loyalists left the United States to move to Upper Canada many of them brought slaves with them. However, in 1793 a law was introduced preventing the introduction of further slavery into Upper Canada. By the 1820s, refugee slaves from the United States began following the North Star to escape slavery, and formed what was called the "Underground Railroad". As many as 40,000 slaves escaped the United States into Canada. Enerals Griffin was an African American born in Virginia, who, with his wife, Priscilla, bought what is presently known as "Griffin House" on Sulphur Springs Road and settled there in 1834. The Griffins were one of only a few Black families in the Ancaster community at that time. As time passed, the family continued to intermarry. Their identity by colour disappeared, and by the mid-20th century their Black past was unknown to many descendants. At St. Andrew's Presbyterian Church, on Sulphur Springs Road in Ancaster, two headstones mark the graves of Enerals and Priscilla Griffin.

The ruins of the Hermitage property stand as a witness to the life of George Gordon Browne Leith, the second son of a Scottish baronet who resided on Sulphur Springs Road in 1855. The ground floor of the main house had a drawing room, library, dining room and a huge entrance hall; all furnished in stately opulence with oil paintings, fine carpets and polished fixtures.

Unfortunately, the Hermitage burned almost completely in October 1934, leaving only the ruins remaining today.

The approximate population of the Sulphur Creek subwatershed is 5600 persons with a population density of approximately 332 people per square kilometer.

Current land use within the Sulphur Creek subwatershed is predominantly open space with residential being the secondary land use (**Table SU-3**). There is significant open space in this subwatershed centering around the 1500 hectare Dundas Valley



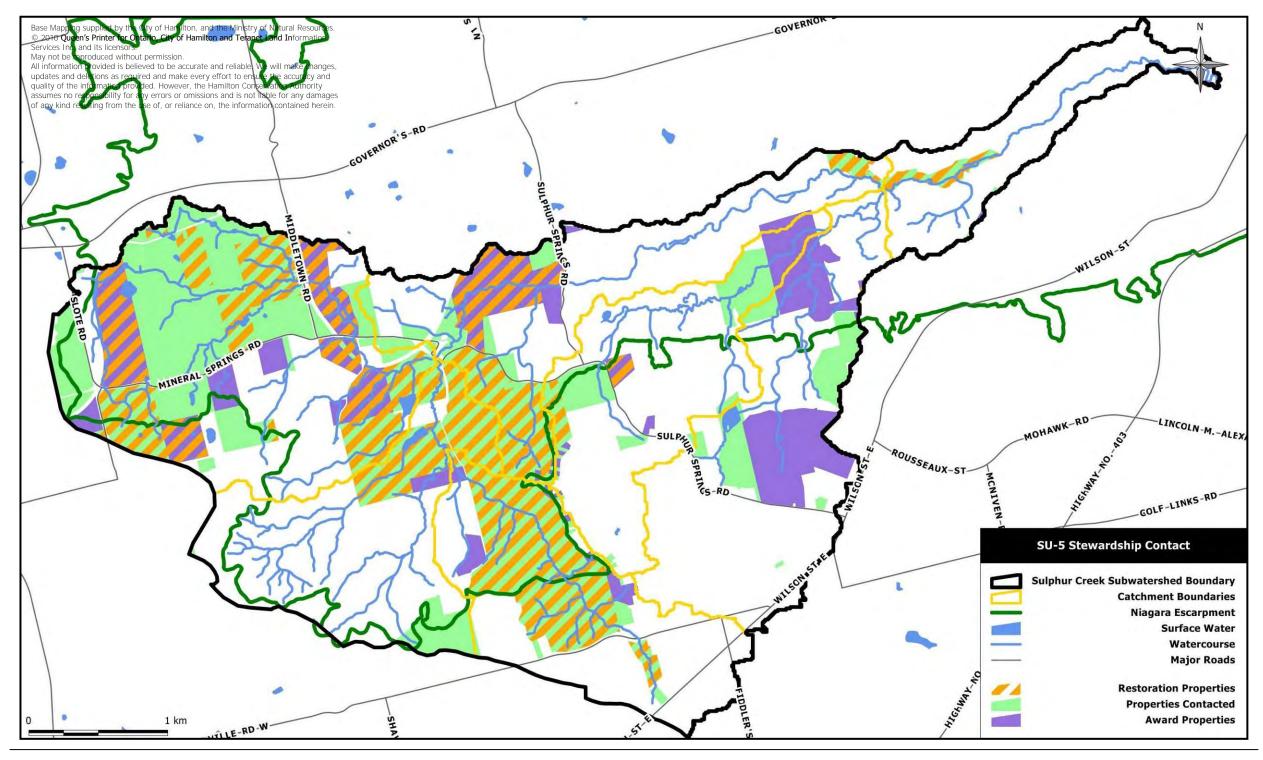
Conservation Area **(Map SU-4).** Residential land use is largely limited to the portions of the subwatershed that fall within the boundaries of the former Town of Ancaster with the exception of large rural non-farm estates scattered throughout the Dundas Valley. Agricultural land use is prominent in the rural areas of the subwatershed.

Commercial and industrial land use is concentrated within business parks along the major transportation corridors, specifically along Wilson Street. A utility corridor bisects this subwatershed crossing through five of the seven catchments. It is important to note that when last evaluated the area of impervious surfacing within this subwatershed did not exceed the Environment Canada standards recommended for healthy stream systems. However, it was predicted that the area of impervious surfacing would increase by 5.4% over a ten year period; if this prediction was correct then it should be considered that this trend could continue and that the area of impervious surfacing in this subwatershed could eventually exceed Environment Canada's standards.

Table SU-3: Land Use Statistics

Area (km²)	Agricultural (km²)	Commercial (km²)	Industrial (km²)	Institutional (km²)	Open Space (km²)	Residential (km²)	Utility (km²)	Surfacing (%) 1997 Study Data	Surfacing (%) 1997 Study Predicted Increase	Impervious Surfacing (%) Current Estimation Based on the Urban Boundary
17.13	2.58	1.05	0.24	0.14	5.33	4.66	n/a	4.7	9.3	22





#### STEWARDSHIP HISTORY

There are numerous significant properties within this subwatershed that incorporate large tracts of natural features. There are 496 properties that contain forest, wetland, meadow or riparian / aquatic habitat (**Table SU-4**). Of these landowners, 147 (or 30%) have been contacted by the Hamilton-Halton Watershed Stewardship Program (HHWSP), and 50 (or 10%) of those have become Watershed Stewards (**Table SU-4**). Therefore, there is considerable potential to reach the remaining 70% of landowners with natural features to create awareness regarding Beneficial Management Practices (BMP's) for natural areas and agricultural operations. 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, storm water management practices, etc.

Currently, Watershed Stewards are predominantly located in the Slote Road, Jerseyville Road and Mineral Springs Road catchments. The Hamilton Conservation Authority is a major land holder in the subwatershed with the exception of the headwaters areas in the Slote Road, Jerseyville Road, Sulphur Springs Road and Hermitage Ruins catchments. Therefore landowner

contact should be focused in these areas of those catchments, especially where the properties include natural features. However, given that a small number of landowners own the majority of significant properties in the remaining areas of the subwatershed, efforts to include these landowners in the Watershed Steward Program should be a priority.

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 SU-5** displays the status of the Sulphur Creek subwatershed when compared to these Federal guidelines.

Due to the residential development of this subwatershed and subsequent increase in impervious surfacing, BMP's relating to storm water management must be promoted and exemplified by partner agencies in an effort to prevent erosion, sedimentation and contamination within the system. This is especially important in the Jerseyville Road, Sulphur Springs Road and Hermitage Ruins catchments since much of the development has occurred in these areas of the subwatershed.

This subwatershed far exceeds Environment Canada's How Much Habitat is Enough Guidelines for forest cover. Efforts to retain this percentage of forest cover and to preserve biodiversity and core habitat within the area should be undertaken to support interior forest breeding birds and other wildlife populations.

Table SU-4: Stewardship Statistics

Approximate Population	Population Density (persons / km²)	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
5600	332	496	147	50	181	54

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

PARAMETER	% Wetlands	% Stream Naturally Vegetated	Total Suspended Sediments	% Impervious Surfacing	Fish communities		Forest patch	% 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	0.35	70	??	9.3	Cold to coolwater	62.2	10.38	100m – 51 % 200m – 25%

#### STRESSES & STEWARDSHIP ACTIONS

There are thirty six types of *stresses* identified as negatively impacting the Sulphur 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 SU-7**. The most prevalent stresses identified in the Sulphur Creek Subwatershed are Stormsewer Outfalls, Abandoned Groundwater Wells, Dams and On-line Ponds. **Table SU-8** outlines *Stewardship Actions* that have been developed to mitigate the impacts of these and the remaining stresses listed in **Table SU-7**.

Specific locations where these stresses are occurring are mapped and inventoried in the subsequent catchment datasheets. Within the Sulphur Creek subwatershed, 72 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.

Abandoned groundwater wells are direct conduits to groundwater aquifers and have the potential to introduce contaminates into the groundwater supply. Derelict well caps and casing are also safety hazards to people and wildlife. Efforts to promote the City of Hamilton Well Decommissioning Program should be taken.

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 two sites of active erosion; one at Martin Road downstream of the Canterbury Creek (Martin's Road) Dam and the other east of Middletown Road immediately north of Mineral Springs Road, for priority remediation. It is believed that the former is caused by intense flows of stormwater from the subdivision upstream which is retained and then released from the reservoir behind the Canterbury Creek dam. The latter is believed to be the result of sedimentation upstream. Assessments of stormwater impacts on these sites and remediation plans for these sites should be developed by the Spencer Creek Stewardship Action Plans Implementation Team.

Gully erosion has also been noted along roadsides in this subwatershed, specifically along Sulphur Springs and Mineral Springs Road where the road right of ways have been converted from the tile drain system to a trench system. The Implementation Team should make efforts to confirm the cause of the gully erosion and to investigate alternative road side drainage technologies to mitigate this erosion.

Habitat Fragmentation has been identified in four locations within this subwatershed. Strategic acquisitions and management of lands in these area can enhance core habitat and ecological function in this the Sulphur Creek system. 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. The Spencer Creek Stewardship Action Plans Implementation Team should support and assist with the implementation of recommendations in these documents. There are numerous on-line ponds and dams in this subwatershed which fragment aquatic habitat by creating physical and thermal barriers to migration. Aquatic wildlife are unable to negotiate these barriers and therefore restoration is necessary to open up additional habitat upstream. Removal or retrofit of pond retention structures or the installation of by-pass channels and fish ladders are recommended mitigation concepts.

According to the City of Hamilton Draft Stages of Development Plan for 2010-2012, Ancaster, there are two significant pending development applications in this subwatershed; they include the third phase of the Deerview Crossing development and the Woodland Manor development, both on Sulphur Springs Road.

This subwatershed is experiencing an ecosystem imbalance. A survey conducted by the Hamilton Conservation Authority and the Ministry of Natural Resources in 2007 has identified an overpopulation of white-tailed deer in this area. Evidence of excessive browsing inhibiting regeneration of woodland flora triggered the conservation authority to undertake a deer exclosure pilot project in 2008; the results of the exclosure experiment further supports the survey findings by demonstrating that the area is beyond its carrying capacity for this species. The Hamilton Conservation Authority is currently working with the Ministry of Natural Resources to develop regionally specific management strategies for this situation, guided by the MNR Strategy for Preventing and Managing Human-Deer Conflicts in Southern Ontario document which was developed through a multi stakeholder facilitated process to ensure that all sector groups interests were considered.

# **CATCHMENT SUMMARIES**

This section of the plan identifies the occurrences of stresses within each catchment of Sulphur 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. Ecological monitoring data for each catchment is also outlined following each catchment map. In total, 72 stresses were identified for the Sulphur Creek Subwatershed and inventory counts are presented in **Table SU-7**.

**TABLE SU-7:** Stresses Inventory by Catchment

TABLE 66-7: Officeses inventory by Cate					NO	D. IN EACH CATCHME	NT				
STRESS	MAP CODE	NO. IN SUBWATERSHED	Hermitage Ruins	Jerseyville Road	Lower Sulphur Creek	Mineral Springs	Rifle Range	Slote Road	Sulphur Springs Road		
Abandoned Groundwater Wells	GW	13	1	2		4	1	3	2		
Buried Stream	BS										
Channelization	CH										
Combined Sewer Overflow	CSO										
Dam	DM	8	1	1			1	3	2		
Debris Jam	DJ										
Detachment from Nature	DT										
Development	DV	2							2		
Encroachment	EN	3	1			1			1		
Erosion	ER										
Faulty Septic System	SS										
Fluctuating Water Level	WL										
Habitat Fragmentation	HF	4	1			2	1				
Illegal Fill Placement	FP	1						1			
Inadequate Stormwater Management	SW	2		2							
Increased Impervious Surface	IS										
Insufficient Riparian Buffer	RB	4						4			
Invasive/Introduced Species	IV	1				1					
Landfill Leachate	LL										
Land Maintenance Practices	LM	1						1			
Litter	LI	1		1							
Migration Barrier	MB										
Nutrient Loading	NL										
Online Pond	OP	7	1				1	4	1		
Outdoor Recreation Related Impacts	OR	1					1				
Perched Culvert	CP	2						2			
Pesticide Use	PS										
Plowed Watercourse	PW	1						1			
Runoff Contamination via Transportation Corridors	TC	1			1						
Sediment Loading	SL	1						1			
Site Clearing Prior to Development	SC										
Stormsewer Outfall	SO	16	2	4	6				4		
Transportation Corridor Expansion	TE										
Water Taking	WT										
Wildlife Collision	WC	1	1								
Wildlife Overpopulation	WO	2					1	1			

<sup>\*</sup> 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 SU-8: STRESSES AND STEWARDSHIP ACTIONS** 

STRESSES	STEWARDSHIP ACTIONS			DELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
Abandoned Groundwater Wells Map Code: GW  Definition: Groundwater wells that are no longer in use, often are in a state of	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
disrepair and can be direct conduits for contaminates into groundwater aquifers.	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
Buried Streams Map Code: BS  Definition: The structural alteration of a stream channel, involves piping the creek system underground, eliminating aquatic	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	HCA / HWSC / HHWSP / RAP / WPN / DFO	HHWSP / HWSC	2011-2015
habitat.		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		Regulation Policies and Guidelines Pages 36-41, 55 Fisheries Act, Section 37 City of Hamilton Stormwater	HCA / HHHBA / DFO	HCA (Ecology)	2011-2012
		Undertake a feasibility and prioritization study for "daylighting" buried streams in the study area.		Master Plan Class Environmental Assessment Report	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.	Pages 142-158  Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines	HHWSP / HCA / DFO / CITY / HWSC	HHWSP	2013-2015
Channelization Map Code: CH  Definition: The structural alteration of a stream channel, usually involves straightening of meanders and increasing	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	HCA / HWSC / HHWSP / RAP / WPN / CITY / RBG /	HHWSP / HWSC	2011-2015
gradient which increases velocity and erosion potential.		Undertake a feasibility and prioritization study for restoring channelized creeks to those with a natural design.		Regulation Policies and Guidelines Pages 36-41, 55	HCA / CITY / DFO / MNR / HHWSP / RAP	CITY	2011-2012

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	NEEWIED DOCUMENTS	AGENCIES	AGENCY	
			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	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.	Assessment Report Pages 142-158	CITY / DFO / HHWSP / HCA / RBG / HWSC /	HHWSP	2011-2015
Combined Sewer Overflows Map Code: CSO			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	CITY / BARC / RAP/ HCA	CITY	2011-2015
Definition: a sewer system that collects sanitary sewage and stormwater runoff in a single pipe system.			Work toward achieving the final net loading targets for CSO's outlined in the RAP.	Page 39	CITY / BARC / RAP/ HCA	CITY	2011-2015
Dams Map Code: DM  Definition: a barrier to obstruct the flow of water, usually one of earth or masonry, built across a stream or river.	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 Planning and	HCA / HWSC / HHWSP / MNR / DFO	HHWSP / HWSC	2011-2015
(*Also includes weirs formerly map code WR)	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.			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	HCA / HWSC / HHWSP / MNR / DFO / CITY	HCA (Ecology) / DFO	2011-2015
			Work to remove or retrofit water control structures on public lands.	Harbour AOC.  Hamilton Harbour Fisheries	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 Instream Barrier Assessment for the Hamilton Harbour AOC.	Management Plan	HCA / HWSC / HHWSP / MNR / DFO / CITY	HHWSP	2011-2015

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

	STEWARDSHIP ACTIONS						
STRESSES				RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities		AGENCIES	AGENCI	
Debris Jams Map Code: DJ	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.  Hamilton Harbour Fisheries	HHWSP /HCA/ HWSC / CITY / MNR / DFO / BARC	HHWSP / HWSC	2011-2015
	debris jams using proper sediment and erosion control practices.  Incorporate debris jam removal into the City of Hamilton Extreme Park Makeover Program.  Int from Nature  Utilize workshops, information sessions, literature,  Hamilton Harbour Remedial	Management Plan	HHWSP /HCA/ HWSC / CITY / MNR / DFO / BARC	HHWSP / HWSC	2011-2015		
		HHWSP /HCA/ HWSC / CITY / MNR / DFO / BARC	CITY	2011-2015			
Detachment from Nature Map Code: DT  Definition: The condition of people disassociating their existence from	websites, public service announcements, interpretive signage & direct landowner contact to promote BMP"s and the ecological significance of natural features.  Action Plan Stage 2 Update: Recommendations PAA-2, PAA-3, EPI -1, EPI-2, EPI-5	BARC / CITY / GV / HCA / HHWSP / HWSC / WPN / DU	HHWSP / HWSC / BARC	2011-2015			
nature.	Erect creek crossing & ecological corridor signage along roadways.			Pages 129-138  Royal Botanical Gardens Back to Nature: Towards a Ontario Strategy for Bringing Children and Nature Together - Event and	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.				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.			Workshop Report  Evergreen Schoolground	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			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
			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

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
5.11.2023	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities		AGENCIES	AGENCY	
			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
Map Code: DV  Definition: The process of developing populated settlements: including housing and supporting infrastructure.	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
Encroachment Map Code: EN  Definition: The act of undertaking practices on another person's property,	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
i.e. erecting structures, planting gardens, disposal of waste.	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 / HHWSP / HCA / BARC / RBG / GV / HWSC / BTC	HCA / CITY / RBG	2011-2015
	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

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
	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
Erosion Map Code: ER  Definition: The process of soil being scoured or washed away by flowing	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
water.	Create demonstration sites on public lands that highlight streambank stabilization and natural channel design projects.			HCA Planning and Regulation Policies	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.			and Guidelines Pages 68-69	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.		Fisheries Act, Section 35  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
			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

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
SIKESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
			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
Faulty Septic Systems Map Code: SS  Definition: Malfunctioning septic systems; including plugged distribution	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
tiles, infrequent tank pumping, etc. lead to untreated sewage contaminating our	Create demonstration sites on public lands that highlight properly functioning septic systems.				HHWSP / GV / HHHBA	CITY / HCA	2011-2012
ground and surface water.		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
		V	Work with landowners to properly maintain their septic systems or upgrade faulty septic systems.	_	CITY / HCA / HWSC / GV	HHWSP	2011-2015
Fluctuating Water Levels Map Code: WL  Definition: Irregular occurrences of high and low water levels in the creek system.	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
Habitat Fragmentation Map Code: HF  Definition: Disruption of large continuous tracts of habitat.	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

**TABLE SU-8**: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS	STEWARDSHIP ACTIONS			PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	THELINE
	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	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.			Conservation By-law  Cootes to Escarpment Park System – A Conservation	HCA / RBG / HNC / HWSC / CITY	HHWSP	2011-2012
	Work to establish a Woodlot Owners Association for this area.			and Land Management Strategy	HCA / RBG / HNC / HWSC / CITY / MNR /	HWSC	2011-2012
		Protect and enhance natural corridors through parks and public lands master planning		Nature Counts – City of Hamilton Natural Areas inventory	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 Heritage Strategy City of Hamilton Natural	HHWSP / HWSC / HCA / CITY / MNR	HCA	2011-2012
		Develop How Much Habitat is Enough targets for each subwatershed.		Areas Acquisition Fund Strategy Dundas Valley 50 Year	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
			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

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
TRESCES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOGGIMENTO	AGENCIES	AGENCY	TIMEEINE
			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
Illegal Fill Placement Map Code: FP  Definition: The act of dumping fill material into or adjacent to natural areas.	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	CITY / HHWSP / DFO	HCA	2011-2015
			Work with landowners to rehabilitate fill sites as recommended by the HCA Inventory.	Illegal Dumping	HCA / CITY / DFO / MNR	HHWSP	2011-2015
Inadequate Stormwater Management Map Code: SWM  Definition: Inadequately managing stormwater to control water quality and flooding; often associated with the drainage of developed lands.	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
	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	HHWSP / HCA / DFO / BARC / RAP / HHHBA	CITY / GV	2011-2015

**TABLE SU-8**: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
TRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOGGMENTO	AGENCIES	AGENCY	TIMELINE
		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.		Assessment Report Pages 38-44, 93-97, 122-125, 158-162	HHWSP / HCA / DFO / BARC / RAP / HHHBA	НСА	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
Increased Impervious Surfacing Map Code: IS  Definition: The decreased potential for rainwater infiltration into the soil as a	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	CITY / GV / HHWSP / HWSC / HHHBA	HCA	2011-2015
result of increased paved/impermeable surfacing.	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.			HCA Planning and Regulation Policies and Guidelines Pages 74-77 Fisheries Act, Section 34	CITY / HCA / HHWSP / HWSC / HHHBA	GV	2011-2015
	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	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.			Pages 38-44, 93-97, 122-125, 158-162	HHWSP / RAP / BARC / GV	CITY / HCA	2011-2015

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
		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
Invasive/Introduced Species Map Code: IV  Definition: The establishment/proliferation of exotic species that have no natural control	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 Action Plan for Addressing	HHWSP / HCA / HWSC / CITY	HHWSP	2011-2015
measures which compete with native species for resources and degrade the ecosystem.	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.			Terrestrial Invasive Species within the Great Lakes Basin Invasive Alien Plant Species Found in the Carolinian Zone	HHWSP / HCA / HWSC / CITY / HNC / LO	HCA	2011-2015
		Develop an Invasive Species Management Program which includes monitoring sites and management for specific species.		Inventory and Management Options for rare Charitable Research Reserve	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 lookalikes.  City of Hamilton Natural Heritage Strategy	HCA / HWSC / RBG / HHWSP / GV / LO	CITY	2011-2012
		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

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	TS PARTNER	LEAD	TIMELINE
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOGGMENTS	AGENCIES	AGENCY	
			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
nsufficient Riparian Buffer Map Code: RB	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
Definition: Disruption of large continuous tracts of habitat along watercourses.	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.			and Guidelines Pages 40, 55, 60  City of Hamilton Stormwater	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.			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
	implementation of Bivil projects.	Work with City of Hamilton staff to amend the by-law requiring urban landowners to maintain low vegetation growth.		Dundas Valley 50 Year Vision Cootes to Escarpment Park	HCA / HWSC / HHWSP	CITY	2011-2015
		Update the riparian buffer mapping for Spencer Creek to assist with prioritization for direct mailings.		System – A Conservation and Land Management Strategy	CITY / HWSC / HHWSP	HCA	2011-2012
			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

**TABLE SU-8**: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
SIRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
Landfill Leachate Map Code: LL  Definition: rainwater filtering down through the landfill materials with the potential to contaminate groundwater aquifers.		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
Land Maintenance Practices Map Code: LM  Definition: Errant or excessive land maintenance practice which		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
unnecessarily degrade wildlife habitat.			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
Litter Map Code: LI  Definition: The act of illegally disposing	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
of waste into public/natural areas.	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
			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

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			DELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
SIRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
			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
Migration Barrier Map Code: MB	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	
			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
Nutrient Loading Map Code: NL	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-	DFO / HCA / OMAFRA / OSCIA / HWSC	HHWSP	2011-2015
Definition: Excessive nutrients being inputted into a watercourse; often resulting from the application of manure/fertilizer.  (* Also includes Phosphorous Loading	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.			7. Pages 116, 158  Nutrient Management Act 2002, O. Reg 267/03	HCA / BARC / GV / RBG / OSCIA / MOE / OMAFRA / RAP	HHSWP	2011-2015
formerly map code PL)	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
	eunictuary i rogium commounter eunicuard.	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	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.		Appendix A  OMAFRA Best Management Practices Series – Nutrient Management Planning	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG	HCA	2011-2013
		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	НСА	2011-2012

**TABLE SU-8**: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			DELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	- RELATED DOCUMENTS	AGENCIES	AGENCY	IIWELINE
		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
On-line Ponds Map Code: OP  Definition: An in-stream structure designed to impound stream flow; leads	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
to increased in-stream temperatures downstream and is often a barrier to fish migration.			Work with landowners to restore or retrofit on-line ponds.	Fisheries Act, Section 37  HCA Planning and Regulation Policies and Guidelines Page 63	DFO / HCA / OSCIA / OMAFRA / CITY / HWSC	HHWSP	2011-2015
				In-stream Barrier Assessment for the Hamilton Harbour AOC			
Outdoor Recreation Related Impacts Map Code: OR	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	HWSC / BARC / BTC	HHWSP / CITY / HCA / RBG	2011-2015
Definition: Recreational activities occurring in natural areas that inadvertently degrade the natural features	Add "tread lightly" messaging to partner recreation oriented websites.			FW-8, PAA-1, PAA-2, PAA-3 Pages 115, 126-130	NHC	HCA / CITY / RBG / HNC / BTC	2011-2013
of the area.	Promote the City of Hamilton Adopt-a-Park and Extreme Park Makeover Programs.			The Conservation Lands of Ontario – Three Year	HCA / RBG / HHWSP / HNC / BTC	CITY	2011-2015
	Install no trespassing signage on off trail areas.			Business Plan	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
		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	HCA / CITY / RBG	HCA / CITY / RBG	
		Develop marketing strategies for sensitive lands that focus on sustainable use.		Cootes to Escarpment Conservation & Land	BTC / HNC	HCA / CITY / RBG	2011-2013

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOGGMENTS	AGENCIES	AGENCY	
		Continue to monitor Category A and B waterfalls on public lands for signs of degradation.		Management Strategy	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	
			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
Perched Culverts Map Code: CP  Definition: In-stream culverts that when improperly designed/installed, create barriers to water flow and fish migration.	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	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.			Fisheries Act, Section 37  HCA Planning and	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.		Regulation Policies and Guidelines Page 41	DFO / HCA / HHWSP / MNR	CITY	2010-2014
			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

**TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS** 

STRESSES	STEWARDSHIP ACTIONS	DELATED DOCUMENTS	PARTNER	LEAD	TIMELINE		
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
Pesticide Use Map Code: PS  Definition: The application of pesticides to control perceived pests.	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  Fisheries Act, Section 34  City of Hamilton By -Law No. 07-282  Pesticides Act Ontario Regulation 63/09  OMAFRA Best Management Practices Series – integrated Pest Management  OMAFRA Best Management Practices Series – Pesticide Storage, Handling and Application	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.				LO / CITY / HWSC / HCPI / RCGA	HHWSP	2011-2012
	Promote the Municipal Pesticide Use By-law and Provincial Pesticide Ban.				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.				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.				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
Plowed Watercourses Map Code: PW  Definition: Headwater swales or small watercourses that are worked for	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
agricultural production.	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			Fisheries Act, Section 37  City of Hamilton Stormwater	DFO / HCA / OMAFRA / OSCIA / HWSC	HHWSP	2011-2015

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

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	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
	Create demonstrations sites that highlight BMP's that promote good agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.			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
Runoff Contamination via Transportation Corridors Map Code: TC	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	CITY / DFO / HCA / MTO / GV	CITY	2011-2015
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.	Host training sessions for City Staff and Contractors using the Ministry of the Environment Snow Disposal and De-icing Operations in Ontario Guidelines.			ULM-5b Page 71 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.		МТО	CITY	2012-2015
			Install vegetated filter strips and riparian buffers along medians and roadsides.		MTO / HCA	CITY	2011-2015
Sediment Loading Map Code: SL  Definition: Organic and inorganic material that is entrained by the flow of water and	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
is deposited in a creek system.		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

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SIRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	INVELINE
			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  City of Hamilton By-law for Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the	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.		the Alteration of Property Grades, the Placing or	DFO / HWSC / HHWSP / MNR / OSCIA / OMAFRA / RAP	HCA
			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.	Making it Work  Ministry of the Environment Stormwater Management	DFO / HWSC / MNR / OSCIA / OMAFRA / RAP / HHHBA	HCA	2011-2015
Site Clearing Prior to Development Map Code: SC  Definition: The act of stripping or	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
excavating the vegetation and topsoil from a site prior to construction works.	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	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.	Pages 50-62, 68-69  City of Hamilton Draft Private Tree and Woodland Conservation By-Law	DFO / MNR / HHHBA / CITY	HCA	2011-2015
			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	DFO / MNR / CITY / HWSP / HHWSP	HCA	2011-2015
				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			

**TABLE SU-8**: STRESSES AND STEWARDSHIP ACTIONS

07050050	STEWARDSHIP ACTIONS	DELATED DOCUMENTO	PARTNER	LEAD	TIME! INC			
STRESSES	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE	
Stormsewer Outfalls Map Code: SO  Definition: The point where a sewer system discharges into a watercourse	Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scouting and girl guide groups and other children sgroups, 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	Action Plan Stage 2 Update: Recommendations ULM -6, ULM-9, ULM-11, RM-7	HCA / RBG / GV / HWSC / HHWSP / CITY	BARC	2011-2015
during a storm event.	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			City of Hamilton Stormwater Master Plan Class	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.  Environmental Assessment Report Pages 43, 138, 158-159	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	
		3 3	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	
			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	
Transportation Corridor Expansion Map Code: TE  Definition: The process by which new roads are built or existing roads are widened.	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	HCA / MTO / HHHBA	CITY	2011-2015	

TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS

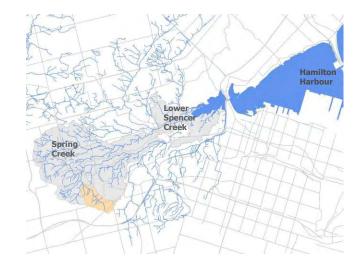
STRESSES	STEWARDSHIP ACTIONS	RELATED DOCUMENTS	PARTNER LEAD		TIMELINE		
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOGGINENTO	AGENCIES	AGENCY	TIME EINE
		When planning for major road works, design transportation corridors using new technologies for environmental solutions.		Public Works  Erosion and Sediment Control Guidelines for	HCA / MTO / HHHBA	CITY	2011-2015
	technologies for road maintenance that are proven to have environmental benefits.	Urban Construction	HCA / MTO / HHHBA	CITY	2011-2015		
Water Takings Map Code: WT  Definition: The process by which surface	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	HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
and groundwater are pumped out of the natural system; for the purposes of irrigation, aggregate extraction, etc.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote BMP"s relating to water conservation technology.			Ontario Water Resources Act O. Reg. 387/04 OMAFRA Best Managemen	HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015
	Encourage landowners with surface water takings to install groundwater systems.  Practices Series – Irriga Management	Practices Series – Irrigation Management	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
	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.  Work with landowners to implement BMP"s related to water conservation.	MOE	HCA	2011-2015			
				HCA / OSCIA / MOE / HWSC / OMAFRA	HHWSP	2011-2015	
Wildlife Collisions Map Code: WC  Definition: Incidences where animals are	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
struck by vehicles or where animals collide with buildings, often occurring with buildings with large windows.	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

**TABLE SU-8: STRESSES AND STEWARDSHIP ACTIONS** 

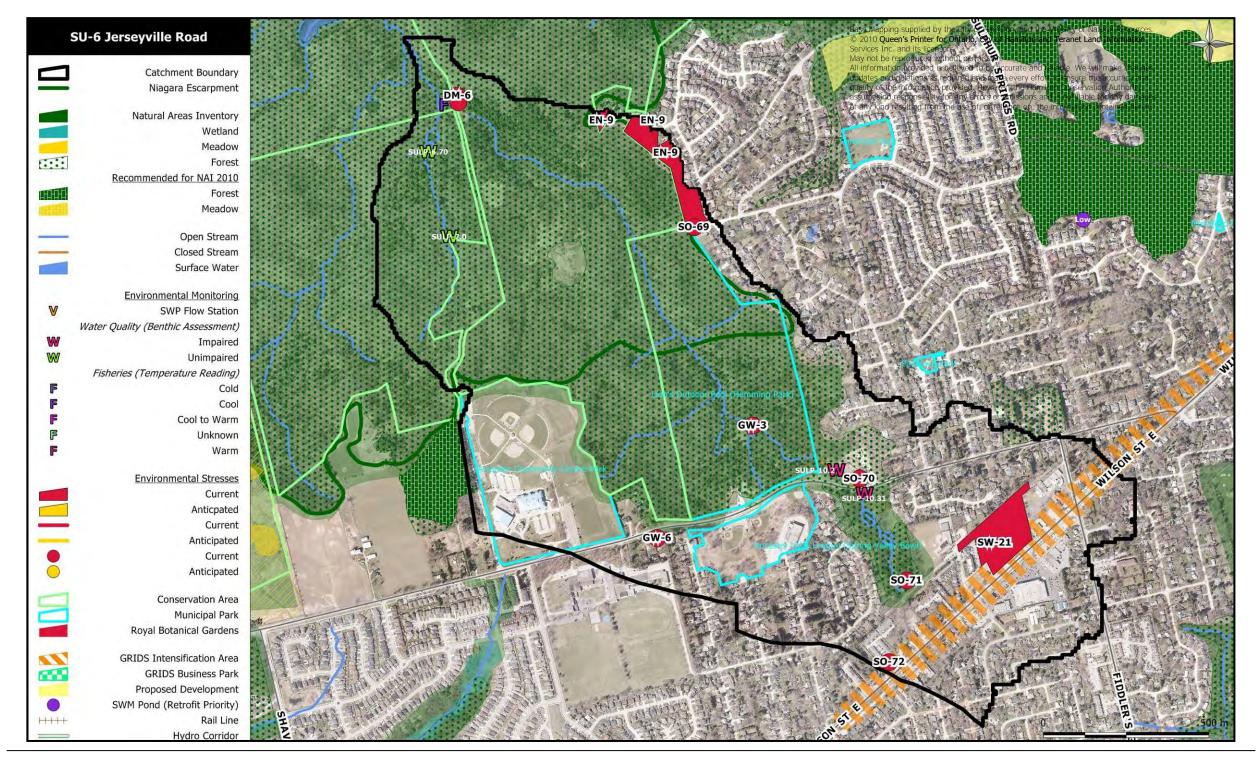
STRESSES	STEWARDSHIP ACTIONS	- RELATED DOCUMENTS	PARTNER	LEAD	TIMELINE		
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities	RELATED DOCUMENTS	AGENCIES	AGENCY	TIMELINE
		When planning major road works, consider the incorporation of wildlife over/underpasses, avoiding known 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
Wildlife Overpopulation Map Code: WO  Definition: When a species population	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			
exceeds the carrying capacity of its habitat.	·		Work to implement the recommendations for sustainable populations in the HCA/MNR Deer Management Strategy.				

I	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		·



## JERSEYVILLE ROAD CATCHMENT



#### JERSEYVILLE ROAD DATA SHEET

 Table SU-9: Stresses Identified in the Jerseyville Road Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACT	STEWARDSHIP ACTIONS			PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY	LAND	LAND	PROJECT POTENTIAL
DM-6	Dam	$\square$		$\checkmark$	$\checkmark$		
EN-9	Encroachment			<b>I</b>	$\checkmark$	$\square$	
GW-3	Abandoned Well	$\square$		$\checkmark$	$\checkmark$		
GW-6	Abandoned Well	$\square$		$\checkmark$		$\checkmark$	
LI-8	Litter	$\square$	$\square$	$\checkmark$			
SO-69	Stormsewer Outfall	$\square$	$\square$	$\checkmark$		$\square$	
SO-70	Stormsewer Outfall	$\square$	$\square$	$\square$		$\square$	
SO-71	Stormsewer Outfall	$\square$	$\square$	$\checkmark$		$\square$	
SO-72	Stormsewer Outfall	$\square$	$\square$	$\square$		$\square$	
SW-21	Inadequate Stormwater Management	$\square$	$\square$	$\square$		$\square$	
SW-22	Inadequate Stormwater Management	$\square$	$\square$	$\square$	$\square$		

## JERSEYVILLE ROAD DATA SHEET

#### FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
SUL356-K1	20-Aug-08	Blacknose dace	6	8/20/2008 16.2	

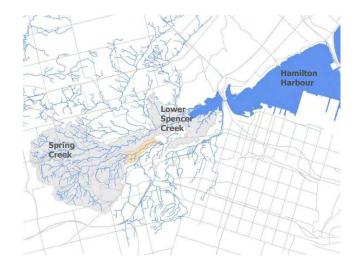
#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRPTION
SUL356-K1	2008	Potentially Impaired

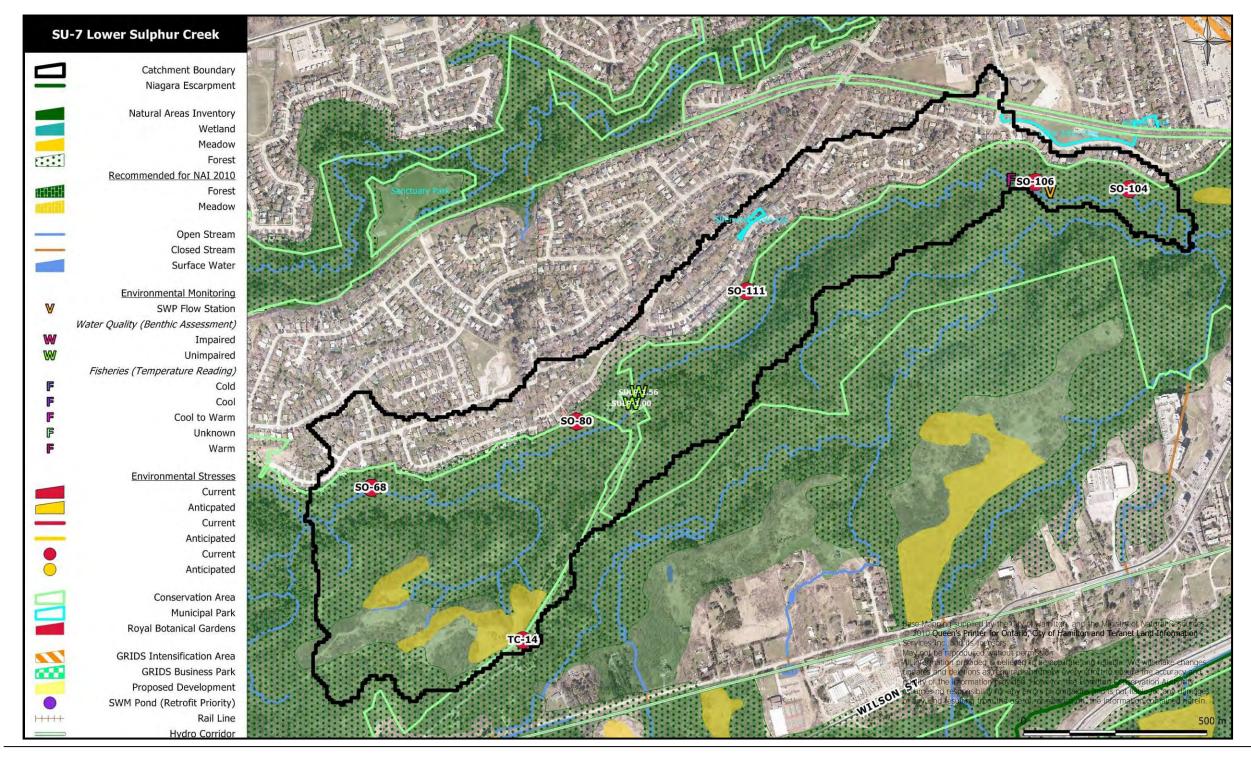
#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

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



## LOWER SULPHUR CREEK CATCHMENT



## LOWER SULPHUR CREEK DATA SHEET

Table SU-10: Stresses Identified in the Lower Sulphur Creek Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACT	STEWARDSHIP ACTIONS			PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY	LAND	LAND	PROJECT POTENTIAL
SO-104	Stormsewer Outfall	$\checkmark$	$\square$	Ø		$\overline{\mathbf{V}}$	
SO-106	Stormsewer Outfall	$\square$	$\square$	$\checkmark$		$\overline{\mathbf{V}}$	
SO-111	Stormsewer Outfall	$\checkmark$	$\square$	$\square$		$\overline{\mathbf{V}}$	
SO-68	Stormsewer Outfall	$\square$	$\square$	$\checkmark$	$\checkmark$		
SO-80	Stormsewer Outfall	$\square$	$\square$	$\checkmark$	$\checkmark$		
SO-94	Stormsewer Outfall	$\checkmark$	$\square$	<u> </u>	$\overline{\mathbf{V}}$		
TC-14	Runoff Contamination via Transportation Corrido	r 🗹	$\square$			$\overline{\mathbf{V}}$	

#### LOWER SULPHUR CREEK DATA SHEET

#### FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
SUL361-A1	11-Sep-08	Blacknose dace	10	9/11/2008 13.6	cold
SUL361-A1	11-Sep-08	Creek chub	10		
SUL361-A1	11-Sep-08	Fantail darter	1		
SUL361-A1	11-Sep-08	Fathead minnow	4		
SUL361-A1	11-Sep-08	Johnny darter	4		
SUL361-A1	11-Sep-08	White sucker	7		

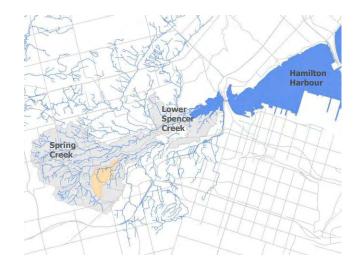
#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRPTION
SUL361-A1	2008	Potentially Impaired

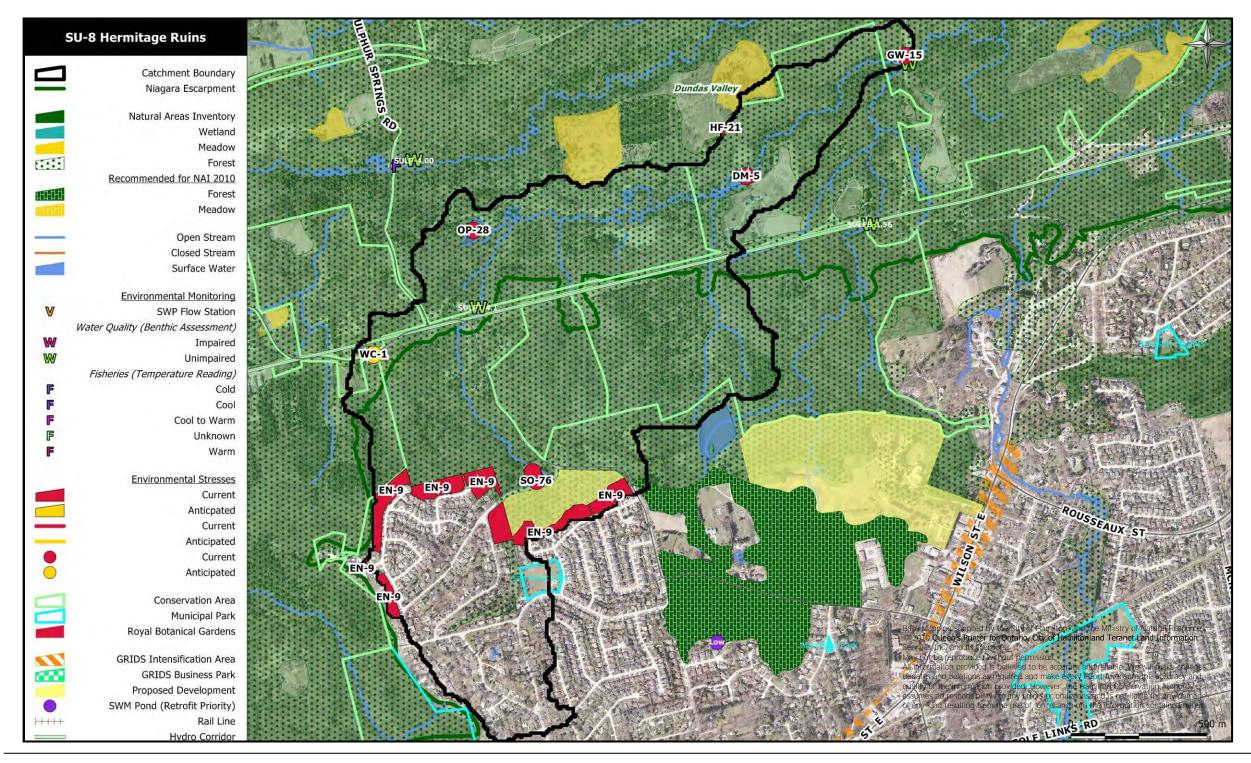
#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS
SULP_01	10/23/2008	Escherichia coli in Water	41	CFU/100mL
SULP_01	10/12/2006	Total Phosphorous	0.05	mg/L
SULP_01	10/23/2008	Total Suspended Solids	10	mg/L
SULP_01	10/23/2008	Dissolved Phosphorous	0.01	mg/L
SULP_01	10/23/2008	Dissolved Oxygen mg/L	15.98	mg/L
SULP_01	10/23/2008	Dissolved Oxygen %	132.5	%
SULP_01	10/23/2008	Conductivity	748	μs/cm
SULP_01	10/23/2008	Temperature	7.17	°C
SULP_01	10/23/2008	pH	8.29	no units
SULP_01	8/29/2006	TDS	0.0003	mg/L
SULP_01	10/12/2006	Total Coliforms (MF)	13300	CFU/100ml
SULP_01	10/23/2008	Total Kjeldahl Nitrogen	0.3	mg/L

LOCATION	DATE	FLOW m <sup>3</sup> /s
SULP_01	10/23/2008	0.09161



## HERMITAGE RUINS CATCHMENT



## **HERMITAGE RUINS DATA SHEET**

 Table SU-11: Stresses Identified in the Hermitage Ruins Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACT	STEWARDSHIP ACTIONS			PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY		LAND	PROJECT POTENTIAL
DM-5	Dam			$\checkmark$		$\checkmark$	
EN-9	Encroachment	$\checkmark$	$\square$	$\checkmark$	$\checkmark$	$\checkmark$	
GW-15	Abandoned Well	<b>V</b>		$\checkmark$	$\checkmark$		
HF-21	Habitat Fragmentation	$\checkmark$	$\square$	$\checkmark$	$\checkmark$	$\checkmark$	
OP-28	On-line Pond	$\checkmark$		$\checkmark$	$\checkmark$		
SO-76	Stormsewer Outfall	<b>V</b>		$\checkmark$		$\checkmark$	
SO-77	Stormsewer Outfall	$\checkmark$	$\square$	<b></b>		$\checkmark$	
WC-1	Wildlife Collision	✓	$\square$			$\square$	

#### **HERMITAGE RUINS DATA SHEET**

## FISHERIES ASSESSMENT

LOCATION	DATE	DESCRPTION

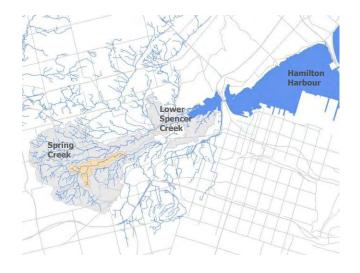
#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
SUL 359-A2	2009	Potentially Impaired - Unimpaired

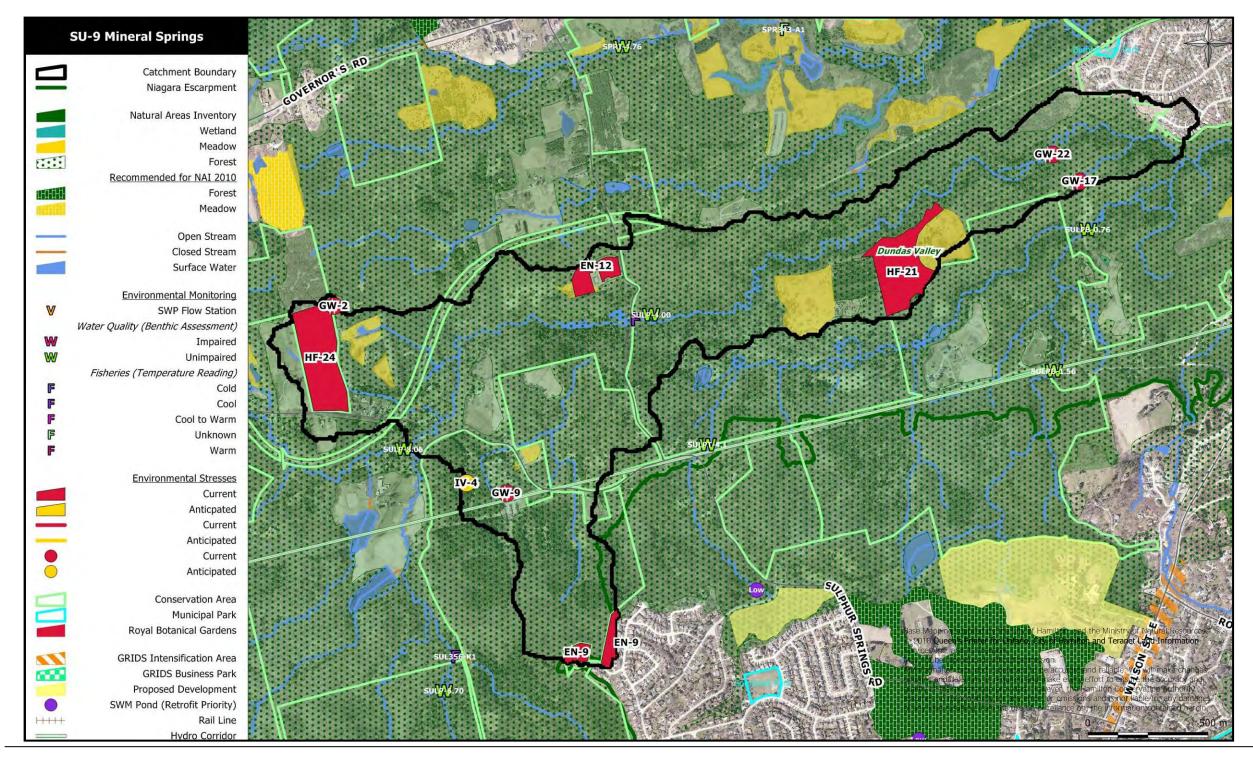
#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

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



# MINERAL SPRINGS CATCHMENT



## **MINERAL SPRINGS DATA SHEET**

 Table SU-12: Stresses Identified in the Mineral Springs Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC	PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY	LAND	LAND	PROJECT POTENTIAL
EN-12	Encroachment	$\square$	$\square$		$\checkmark$	V	
EN-9	Encroachment	$\square$			$\checkmark$	$\checkmark$	
GW-17	Abandoned Well	$\square$			$\checkmark$		
GW-2	Abandoned Well	$\square$		$\square$			
GW-22	Abandoned Well	$\square$			$\checkmark$		
GW-9	Abandoned Well	$\square$			$\checkmark$		
HF-21	Habitat Fragmentation	$\square$	$\square$	$\square$	$\checkmark$		
HF-24	Habitat Fragmentation	$\square$	$\square$		$\overline{\mathbf{V}}$	$\checkmark$	
IV-4	Invasive Species	☑	$\square$	✓	$\checkmark$		

#### **MINERAL SPRINGS DATA SHEET**

#### FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE   TEMPERATURE CLASSIFICATION
SUL350-A1	18-Aug-08	Blacknose dace	17	8/19/2008 19.1
SUL350-A1	18-Aug-08	Creek chub	7	
SUL350-A1	18-Aug-08	Fantail darter	7	
SUL350-A1	18-Aug-08	Rainbow trout	8	
SUL350-A1	18-Aug-08	White sucker	1	

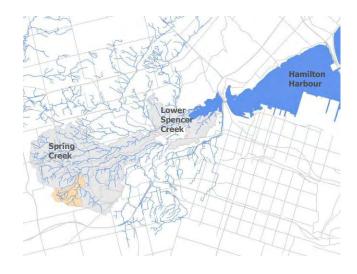
#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
SUL350-A1	2008	Unimpaired

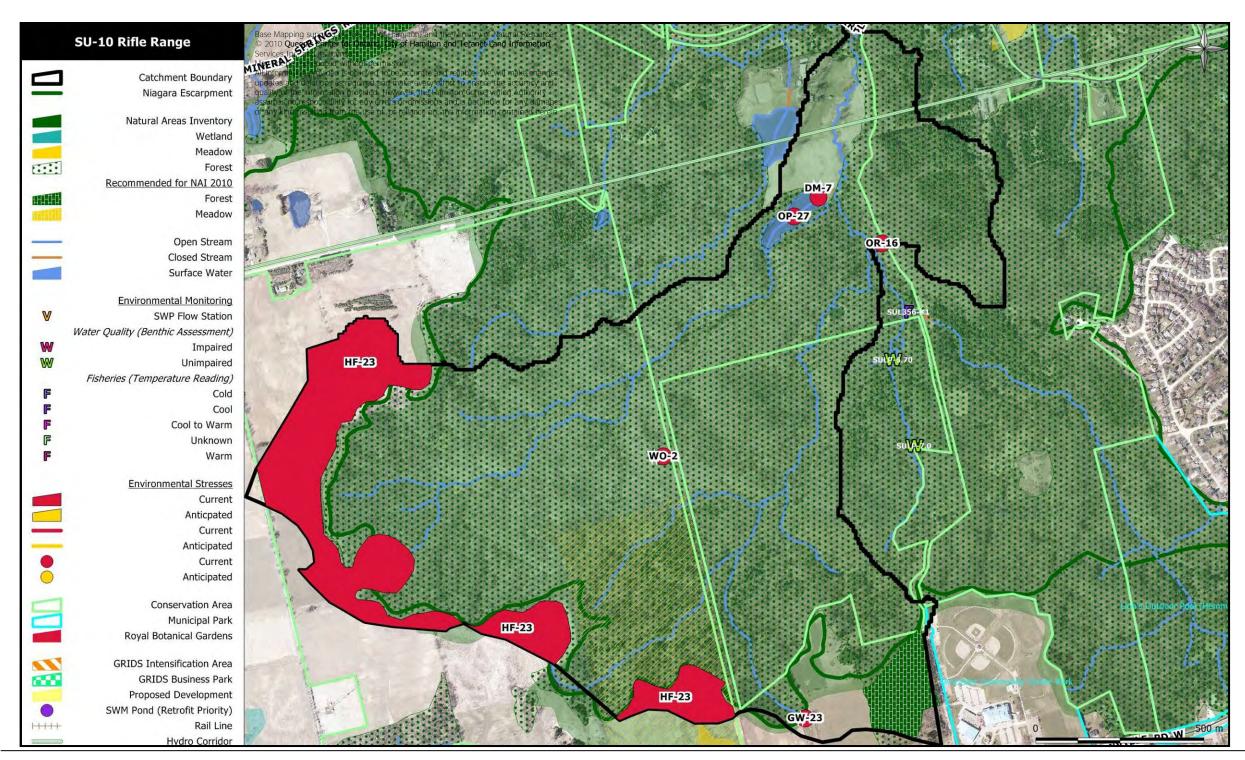
#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS UNITS

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



## RIFLE RANGE CATCHMENT



## RIFLE RANGE DATA SHEET

 Table SU-13:
 Stresses Identified in Rifle Range Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACTION	STEWARDSHIP ACTIONS		PUBLIC	PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY	LAND	LAND	PROJECT POTENTIAL
DM-7	Dam			$\square$		$\checkmark$	
GW-23	Abandoned Well	$\square$		$\square$		$\checkmark$	
HF-23	Habitat Fragmentation		$\square$	$\square$	$\checkmark$	$\checkmark$	
OP-27	On-line Pond	$\square$		$\square$		$\checkmark$	
OR-16	Outdoor Recreation Related Impacts	$\square$		$\square$		<u> </u>	
WO-2	Wildlife Overpopulation	✓		$\checkmark$	$\checkmark$		

#### **RIFLE RANGE DATA SHEET**

#### FISHERIES ASSESSMENT

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

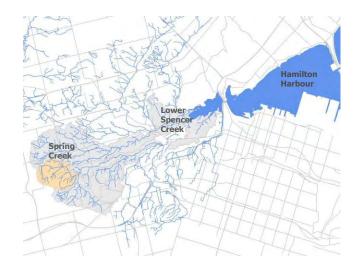
#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRPTION	

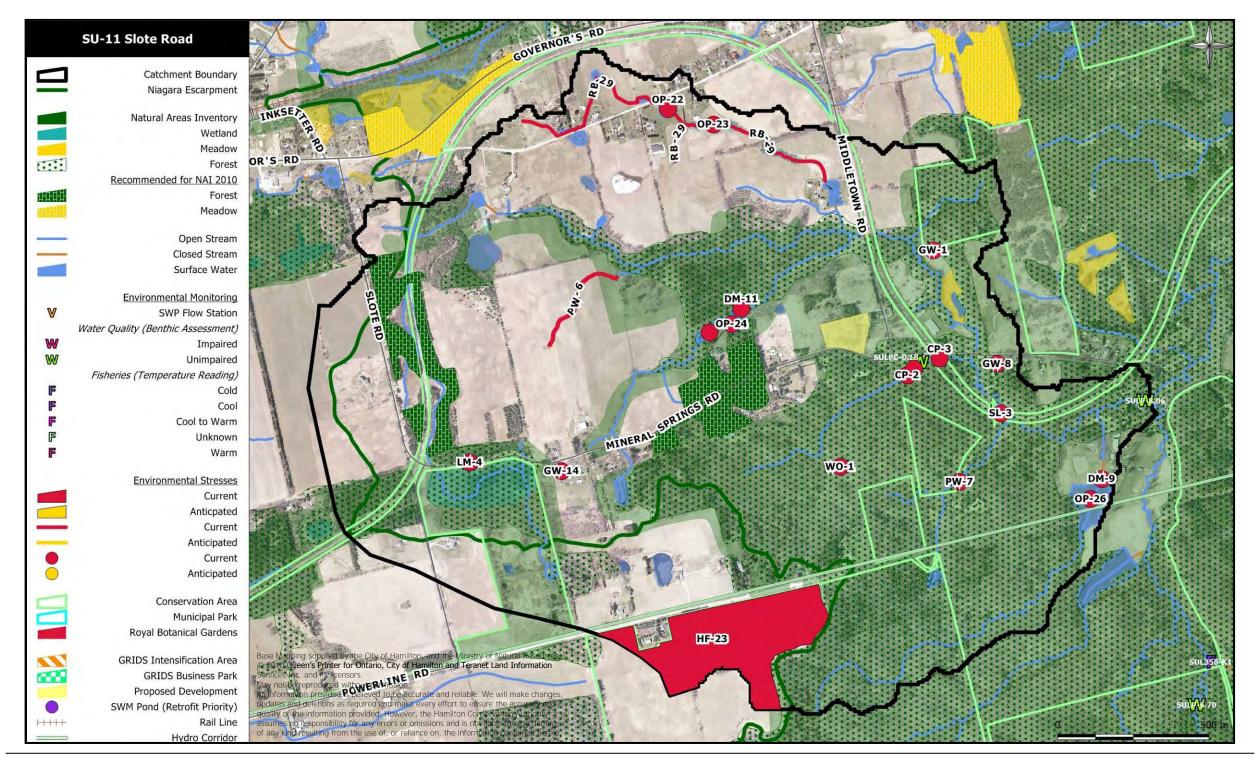
#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

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



## SLOTE ROAD CATCHMENT



## **SLOTE ROAD DATA SHEET**

Table SU-14: Stresses Identified in the Slote Road Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC	PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY	LAND	LAND	PROJECT POTENTIAL
CP-2	Perched Culvert	$\square$	<b>I</b>	$\square$		$\checkmark$	
CP-3	Perched Culvert		$\square$	$\checkmark$			
DM-10	Dam			<b>I</b>		$\checkmark$	
DM-11	Dam			$\checkmark$		$\checkmark$	
DM-9	Dam			$\checkmark$		$\checkmark$	
FP-1	Illegal Fill Placement			<b>I</b>		$\checkmark$	
GW-1	Abandoned Well			$\checkmark$		$\checkmark$	
GW-14	Abandoned Well			<b>I</b>		$\checkmark$	
GW-8	Abandoned Well	$\square$		$\square$		$\checkmark$	
HF-23	Habitat Fragmentation		$\square$	$\checkmark$		$\checkmark$	
LM-4	Land Maintenance Practices		$\square$			V	
OP-22	On-line Pond			$\checkmark$		$\checkmark$	
OP-23	On-line Pond			$\checkmark$		$\checkmark$	
OP-24	On-line Pond	$\square$				$\checkmark$	
OP-26	On-line Pond	$\square$				$\checkmark$	
PW-6	Plowed Watercourse	$\square$		$\square$			
PW-7	Plowed Watercourse			$\checkmark$		$\checkmark$	
RB-29	Insufficient Riparian Buffer	$\square$	$\square$				
RB-30	Insufficient Riparian Buffer		$\square$	$\checkmark$			
RB-37	Insufficient Riparian Buffer	$\square$	$\square$	<b>V</b>			
RB-38	Insufficient Riparian Buffer	$\square$	<b>4</b>	<b>I</b>			
SL-3	Sediment Loading			$\checkmark$	$\checkmark$		
WO-1	Wildlife Overpopulation	$\square$		$\square$		$\overline{\mathbf{V}}$	

#### **SLOTE ROAD DATA SHEET**

#### FISHERIES ASSESSMENT

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

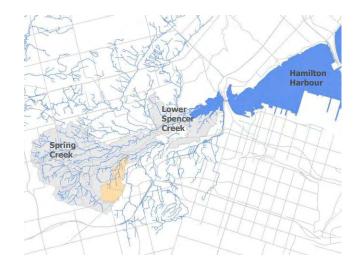
#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION

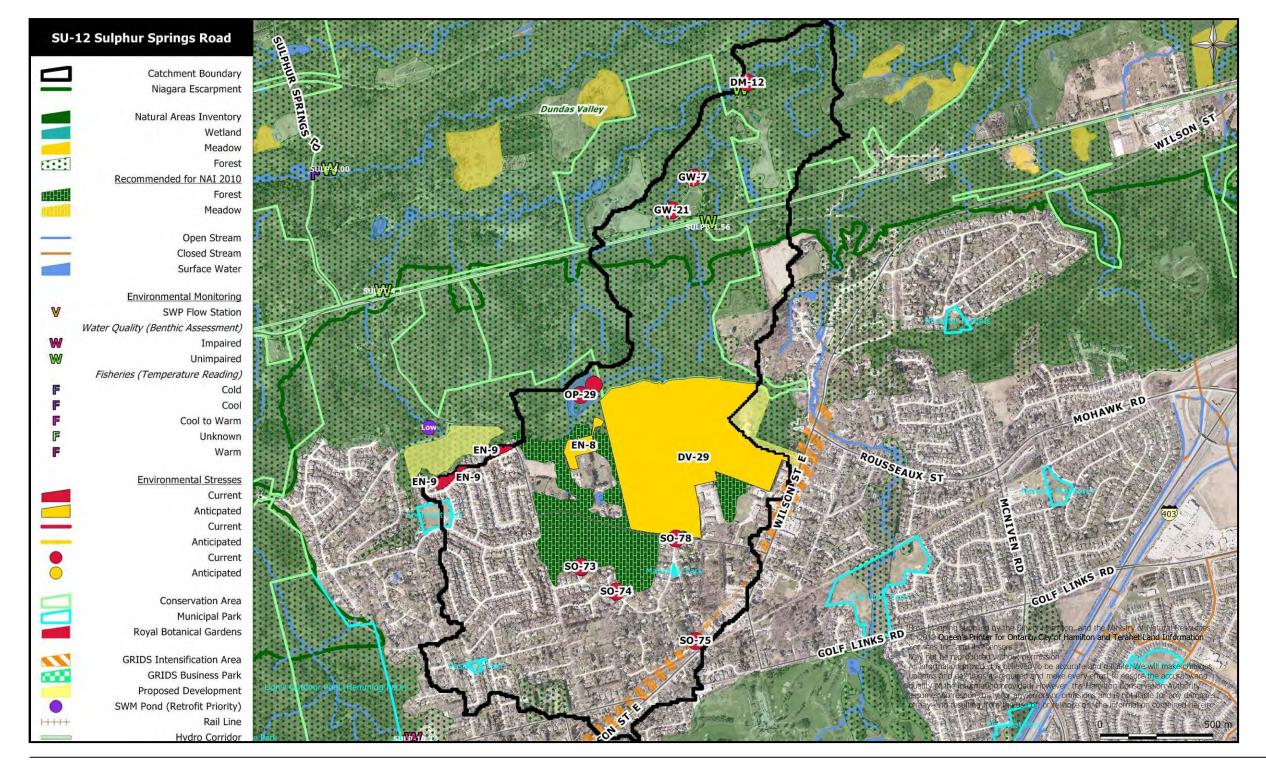
#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS UNITS

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



## SULPHUR SPRINGS ROAD CATCHMENT



## **SULPHUR SPRINGS ROAD DATA SHEET**

 Table SU-15:
 Stresses Identified in the Sulphur Springs Road Catchment

CURRENT	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC	PRIVATE	DFO COMP
STRESSES		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY	LAND	LAND	PROJECT POTENTIAL
DM-12	Dam	$\checkmark$			$\checkmark$		
DM-8	Dam	$\checkmark$				$\checkmark$	
DV-29	Development	lacksquare		$\square$	$\checkmark$	$\checkmark$	
EN-8	Encroachment	$\checkmark$		$\square$	$\checkmark$	$\checkmark$	
EN-9	Encroachment	$\checkmark$	$\square$	$\square$	$\checkmark$	$\checkmark$	
GW-21	Abandoned Well	$\checkmark$		$\square$		$\checkmark$	
GW-7	Abandoned Well	$\checkmark$		$\square$		$\checkmark$	
OP-29	On-line Pond	$\checkmark$		$\square$		$\checkmark$	
SO-73	Stormsewer Outfall	$\checkmark$	$\square$	$\square$			
SO-74	Stormsewer Outfall	$\checkmark$	$\square$	$\square$		$\checkmark$	
SO-75	Stormsewer Outfall	$\checkmark$			$\checkmark$		
SO-78	Stormsewer Outfall	$\checkmark$				$\checkmark$	

#### **SULPHUR SPRINGS ROAD DATA SHEET**

#### FISHERIES ASSESSMENT

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

#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
SUL 360-A1	2009	Impaired – Potentially Impaired

#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

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