

## **WESTOVER CREEK SUBWATERSHED**

### **STEWARDSHIP ACTION PLAN 2011**



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# WESTOVER CREEK SUBWATERSHED CHARACTERIZATION

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## GEOGRAPHIC LOCATION

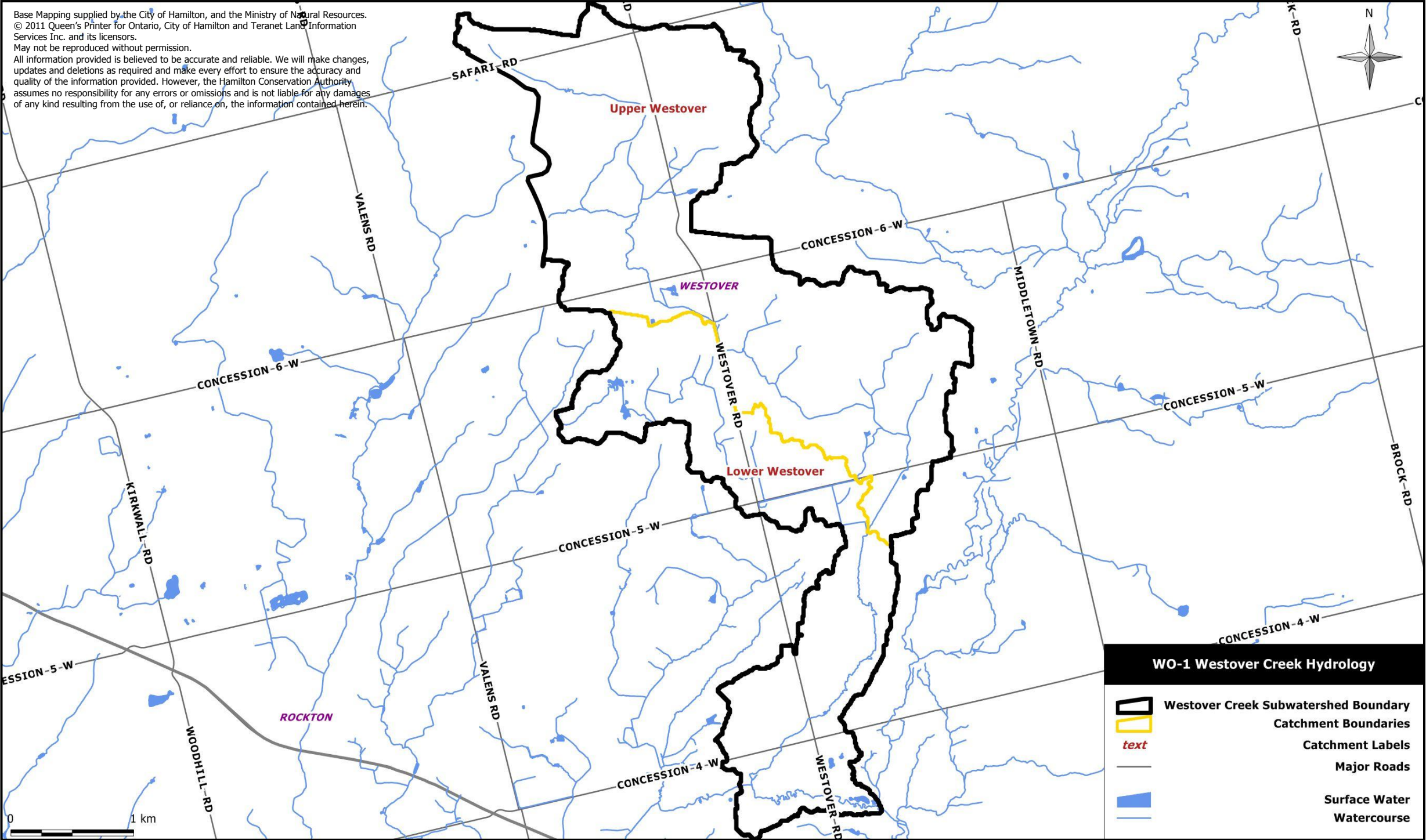
Westover Creek subwatershed is 10.65 km<sup>2</sup> in area and is comprised of two catchment basins. In descending order from the headwaters to the outlet these are: Upper Westover and Lower Westover (**Map WO-1**). These catchments are 6.75km<sup>2</sup> and 3.9km<sup>2</sup> in size, respectively. This subwatershed falls within the former municipal boundary of the Town of Flamborough and is also entirely within the City of Hamilton Ward 14.

The boundaries of the Westover Creek subwatershed and its associated catchments have recently been updated through the Source Protection Planning process, however, only slight changes to the subwatershed boundaries have occurred as a result of more accurate mapping. The naming convention from the 1997 Spencer Creek Management Plan has been retained so that reference between previous reports is possible.

The northernmost point of the Westover Creek subwatershed originates immediately north of Safari Road, halfway between Valens and Westover Roads. The western subwatershed boundary follows this boundary southward but tapers eastward as it flows south however, then as it continues to flow south the boundary then moves westward again to the southernmost point of the subwatershed, just south of Concession 4 West and Westover Road. The eastern subwatershed boundary moves from the northernmost point of the subwatershed, eastward toward Middletown Road where it then tapers southwestward to the southernmost point of the subwatershed. Westover Creek joins Middle Spencer Creek at the southeast corner of Westover Road and Concession 4 West.

The historic settlement area of Westover falls within the middle of this subwatershed. No highways or major transportation routes pass through this subwatershed, however frequently traveled roads include Westover Road and Concessions 4, 5 and 6 West.







## HYDROLOGY

### Surface Water

Westover Creek is one of 15 subwatersheds of Spencer Creek that drain a 278 km<sup>2</sup> area into Cootes Paradise Marsh and ultimately Hamilton Harbour. Westover Creek subwatershed has a drainage area of 10.65 km<sup>2</sup>. The length of Westover Creek is approximately 11km from the headwaters to the confluence with Middle Spencer Creek; however, the combined length of the creek and all of its tributaries is 25.01 km.

Westover Creek drains the Westover Lowland Forest, Westover Southwest Complex, and Hayesland Swamp Environmentally Significant Areas. Portions of the Sheffield-Rockton and Hayesland-Christie Provincially Significant Wetland Complexes are also within the Westover Creek subwatershed. The wetlands in this area serve an important hydrological function by retaining runoff, contributing to stream baseflow, and maintaining surface water quality in the headwaters of these watersheds (Dwyer, *et al.*, 2003).

The midportion of the watercourse is permanently flowing warmwater fish habitat, while the lower portion is coolwater. This suggests that groundwater discharge may be having an influence in the lower portion of the subwatershed. In the headwater tributaries of the West Spencer Creek and Westover Creek subwatersheds, groundwater upwelling has been noted in the upper reaches of these watercourses, but land use practices in these areas, including the construction of online ponds, have altered their thermal regimes (Griffiths; 2001, 2002).

For a more detailed description refer to the Halton Hamilton Source Protection Region Preliminary Draft Watershed Characterization Report for the Hamilton Conservation Authority Watershed, 2008 and any subsequent updates thereof.

The 2010 Halton-Hamilton Source Water Protection (HHSWP) Draft Proposed Assessment Report identified Westover Creek as having a good surface water quality score. The Assessment Report also identified the Westover Creek subwatershed as having a low surface water stress threat based on monthly demand on the water supply. At the time of this report, the Draft Proposed Assessment Report is currently being reviewed.

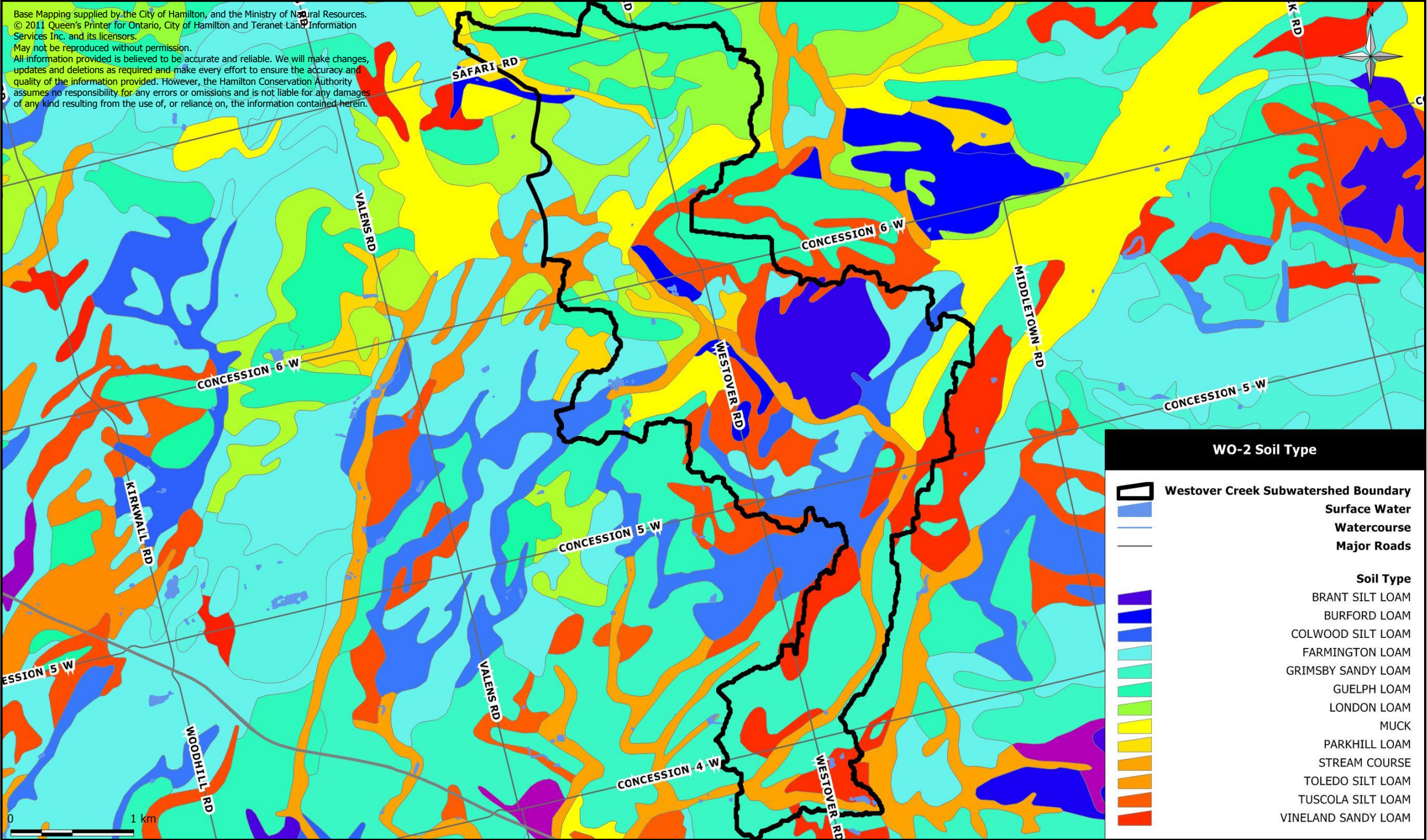
There are no flow and precipitation monitoring stations for the HCA hydrometeorological network in the Westover Creek subwatershed. There are also no surface water quality sampling stations within this subwatershed. However, there are two flow and water quality monitoring stations for the Halton Hamilton Source Protection Region in this subwatershed.

### Groundwater

The HHSWP 2010 Draft Proposed Assessment Report identified the entire Westover Creek subwatershed to be a significant ground water recharge area. The majority of the subwatershed, excluding the northeast most portion has also been identified as a highly vulnerable aquifer. These conditions can be attributed to the geologic and soils characteristics in this subwatershed.

The 2010 Draft Proposed Assessment 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 Westover Creek subwatershed. Therefore no Tier 2 report is recommended for this subwatershed.

There are two Provincial Groundwater Monitoring Network wells within the Westover Creek subwatershed. Data collected through this network is included in Appendices D & E of this document.





**SOILS AND PHYSIOGRAPHY**

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

There are a number of major physiographic regions which characterize the topography and influence the drainage and land use patterns of the Hamilton Watershed. These features include the Niagara Escarpment/Dundas Valley, Glacial Moraine Complexes, Flamborough Plain, Haldimand Clay Plain, Norfolk Sand Plain, and the Iroquois Plain/Lake Ontario Shoreline (Chapman and Putnam, 1984). As discussed previously, these landforms are the result of glacial activity during the Wisconsin period, on a bedrock surface that had already undergone significant erosion, resulting in the formation of the Niagara Escarpment. Much of the physiographic information discussed below is derived from Chapman and Putnam (1984) and SNC Lavalin, *et al.* (2006).

The majority the subwatershed falls within the Flamborough Plain. It is an area of shallow glacial drift and exposed bedrock (Chapman and Putnam, 1984). There are a number of northeast-southwest oriented drumlins found scattered across the plain and wetland areas are common. The Flamborough Plain is drained primarily by the Beverly Swamp/Spencer Creek complex. The wetlands and gravels of this upland plain provide baseflow to these streams (HRCA, 1983). The plain slopes to the south from about 365 to 275 masl (meters above sea level). The limited overburden, apart from the drumlins, consists of either bouldery glacial till or sand and gravel.

The soil characteristics of the Westover Creek subwatershed are shown on **Map WO-2**. Thirteen soils complexes have been identified within the Westover Creek subwatershed, as summarized in **Table WO-1**.

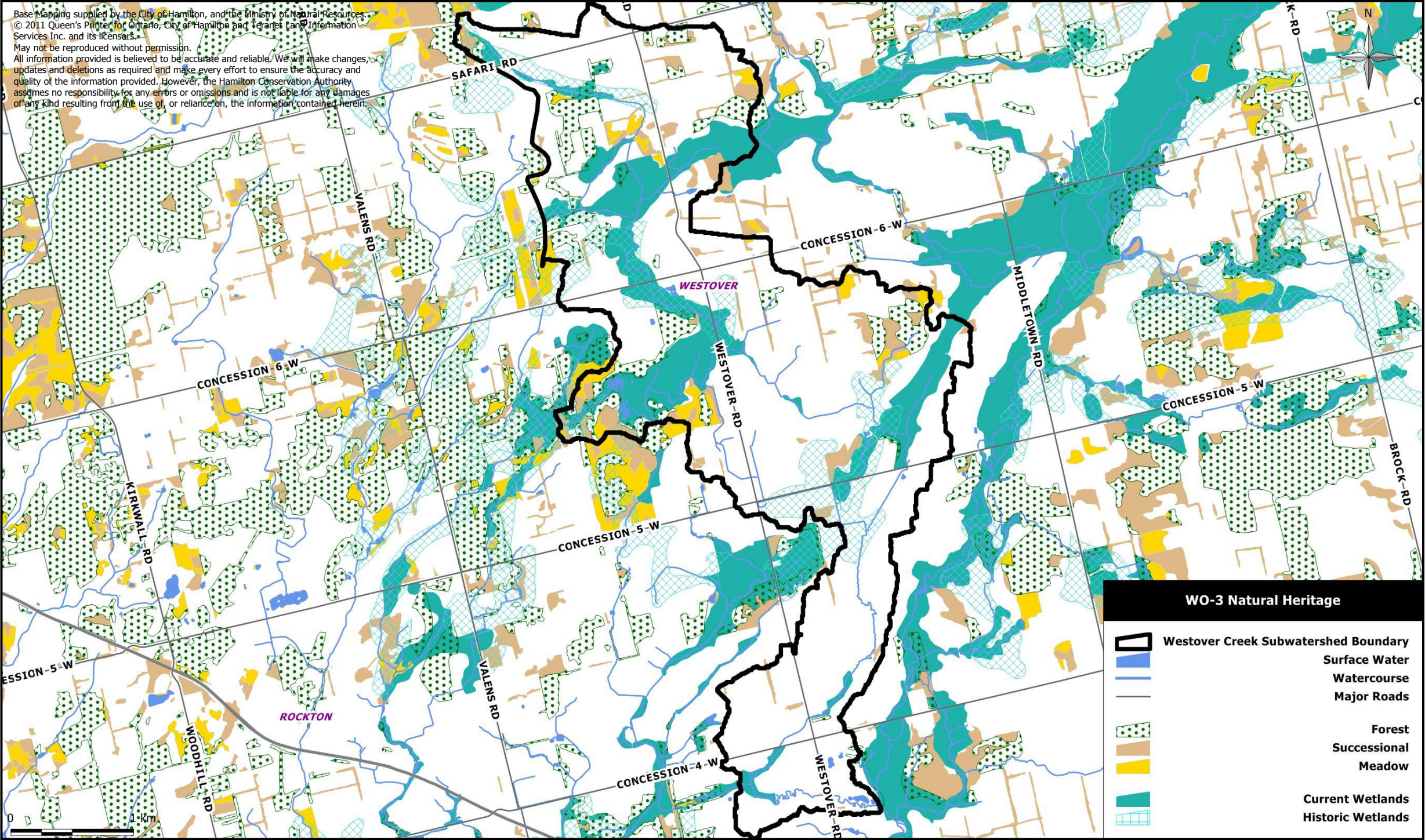
Soil characteristics vary throughout the subwatershed; the erosion potential range from very low to high. In the middle and lower areas of these subwatersheds, soils are loamy and organic. In the Donald Farm Complex area outside of the stream channel a variety of shallow soils, which are not deep, exist. The well-drained Farmington loam, well-drained Grimsby sandy loam, poorly-drained Colwood silt loam, and imperfectly-drained Tuscola silt loam are the shallow soils in the Complex area. Along Spencer Creek, the soils include poorly-drained Flamborough sandy loam and recent alluvium (Hamilton Naturalists’ Club, 2003).

**Table WO-1:** Soil and Erosion Potential in the Westover Creek Subwatershed

Soil Type	Natural Drainage	Erosion Factor*	Topography (slope)***	Erosion Potential
Br – Brant Silt Loam – Shallow Phase	Well drained	2	3.5	Moderate
Bu – Burford Loam	Well drained	4	3.5	Very Low
Co – Colwood Silt Loam	Poorly drained	2	0.4	Very Low
Cp – Colwood Silt Loam – Shallow Phase	Poorly drained	3	1.2	Very Low
Fl – Farmington Loam	Well drained	1	3.8	Moderate
Gi – Grimsby Sandy Loam	Well drained	4	4.5	Very Low
Gl – Guelph Loam	Well drained	n/a	12.6	n/a
Gp – Grimsby Sandy Loam – Shallow Phase	Well drained	n/a	4.8	n/a
Gs – Guelph Loam – Shallow Phase	Well drained	1	3.5	Moderate
LI – London Loam	Imperfectly drained	2	3.5	Moderate
Ls – London Loam – Shallow Phase	Imperfectly drained	2	2.6	Moderate
M – Muck	n/a	n/a	n/a	n/a
Pl – Parkhill Loam	Poorly drained	2	1.2	Very Low
Ps – Parkhill Loam – Shallow Phase	Poorly drained	3	1.2	Very Low
Ts – Toledo Silt Loam – Shallow Phase	Poorly drained	2	1.2	Very Low
Tu – Tuscola Silt Loam – Shallow Phase	Imperfectly drained	2	3.0	Moderate
Vi – Vineland Sandy Loam	Imperfectly drained	4	1.5	Very Low

\* Based on the Region of Hamilton-Wentworth Soil Summary Sheet  
\*\* Based on the Ontario Environmental Farm Plan Workbook, Ontario Farm Environmental Coalition  
\*\*\*Percentage based on the average slope throughout the subwatershed







**NATURAL HISTORY & SIGNIFICANT SPECIES**

This subwatershed reaches into the Westover Lowland Forest and Drumlin Field, Westover Drumlin Field, Westover Southwest Complex, Hayesland Swamp Environmentally Significant Areas (ESA’s) The subwatershed also contains small portions of the Donald Farm Complex and Beverly Swamp ESA’s. The Westover Drumlin Field is also designated as an Earth Sciences Area of Natural or Scientific Interest (ANSI) by the Ministry of Natural Resources (MNR). The Beverly Swamp is designated as a Life Sciences ANSI by the MNR. These natural areas are critical habitat and migratory corridors for terrestrial and aquatic species. Biophysical attributes of these areas were assessed in the Hamilton Natural Areas Inventory Nature Counts Project, Dwyer et al., 2003).

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

Forest Cover (km <sup>2</sup> )	Wetland Cover (km <sup>2</sup> )	Meadow Cover (km <sup>2</sup> )	Stream Length (km)
	1.65	0.23	25.01

Natural vegetation covers 2.56 km<sup>2</sup> or 24% of Westover Creek subwatershed. A breakdown of the current natural land cover statistics for the area are noted within **Table WO-2**. Based on the digital data provided for this analysis, forest cover accounts for 6.4% of this subwatershed, while meadow cover is 2.2% of the land base. Stream length of Westover Creek and all its tributaries is 25.01 km. Map **WO-3** illustrates that natural heritage of the Westover Creek subwatershed.

15.5% of the landscape is wetland. Historical wetlands mapping shows that 1.4 km<sup>2</sup> of wetlands in this subwatershed were lost before 1967 or between 1967 and 1982. 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).



## NATURAL HISTORY & SIGNIFICANT SPECIES

Numerous fisheries and benthic macroinvertebrates monitoring stations have been sampled in Westover 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 one ecological monitoring station in the Westover Creek subwatershed will be monitored in Year 1 of a three year cycle. The monitoring station is in the catchment. The most recent year of fisheries data from the three year cycle are listed in the Lower Westover catchment datasheet in the remainder of this document. The first two years 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 Westover 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.

In the headwater tributaries of Spencer Creek (Fletcher, Upper Spencer, Flamborough, Upper West Spencer), daily maximum temperatures during the summer months typically range from 10°C to 21°C, occasionally exceeding this range up to 25°C. Overall, coldwater conditions are maintained throughout these upper reaches due to groundwater discharge which occurs in these with coolwater habitats in bogs, creeks and lakes throughout Ontario (Scott and Crossman, 1973).

The fishery in these subwatersheds is quite diverse, including a variety of cold, cool, and warmwater fishes inhabiting an assortment of habitat niches available throughout its reaches. Several temperature sensitive species have been observed including mottled sculpin, rainbow darter (*Etheostoma caeruleum*), fantail darter (*E. flabellare*), finescale dace, pearl dace, northern redbelly dace, and brassy minnow (*Hybognathus hankinsoni*) (ESP, 1997; HCA 1993, 1995, 1998, 2000). Rainbow and fantail darters are inhabitants of cool, clean gravelly streams in

Ontario, and are of great value as sensitive indicators of chemical pollution and siltation (Scott and Crossman, 1973). Brassy minnow prefer cool streams, creeks, and dark bog ponds, and are often found in association with pearl, finescale, and northern redbelly dace (Scott and Crossman, 1973).

Redside dace (*Clinostomus elongatus*) was historically documented in these subwatersheds as recently as 1998, but has not been observed since that time (Holm *et al.*, 1998). Redside dace prefer clear, cool, flowing water with gravel or stoney substrates - conditions which occur in all three subwatersheds (see section 4.2.3. – Species at Risk).

The redside dace is a colourful minnow species that prefers clear, cool, flowing water with gravel or stoney substrates, with an acute sensitivity to turbidity (Scott and Crossman, 1973). This species has a limited distribution in North America, and is found only in clear streams flowing into western Lake Ontario within Canada. Within the Hamilton Watershed, redside dace were historically documented in the Fletcher Creek, Flamborough Creek, Upper Spencer Creek, and Westover Creek Subwatersheds, but recent studies have indicated that their distribution in this region has been substantially reduced, with one individual most recently observed in Upper Spencer Creek in 1998 (HCA, 2005b). The redside dace is considered to be a species of "Special Concern" by COSEWIC, "Threatened" by COSSARO, and is currently on Schedule 3 of SARA (Environment Canada, 2005). The main factors which have adversely affected redside dace populations are destruction and degradation of habitat through siltation, removal of bank cover, and water quality deterioration.



# WESTOVER CREEK SUBWATERSHED CHARACTERIZATION

## NATURAL HISTORY & SIGNIFICANT SPECIES

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

Certain species have been classified by COSEWIC, the Committee on the Status of Endangered Wildlife in Canada and COSSARO the Committee on the Status of Species at Risk in Ontario as being at risk. Each species on the list is given a status depending on the degree of risk: Extinct, Extirpated, Endangered, Threatened and Special Concern. The species listed below have been designated by COSEWIC under the Species at Risk Act and COSSARO under the Ontario Endangered Species Act and can be found within the Westover 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
- 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
- Snapping Turtle
- Golden-winged Warbler
- Woodland Vole
- Yellow-breasted Chat

### Threatened

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

### Endangered

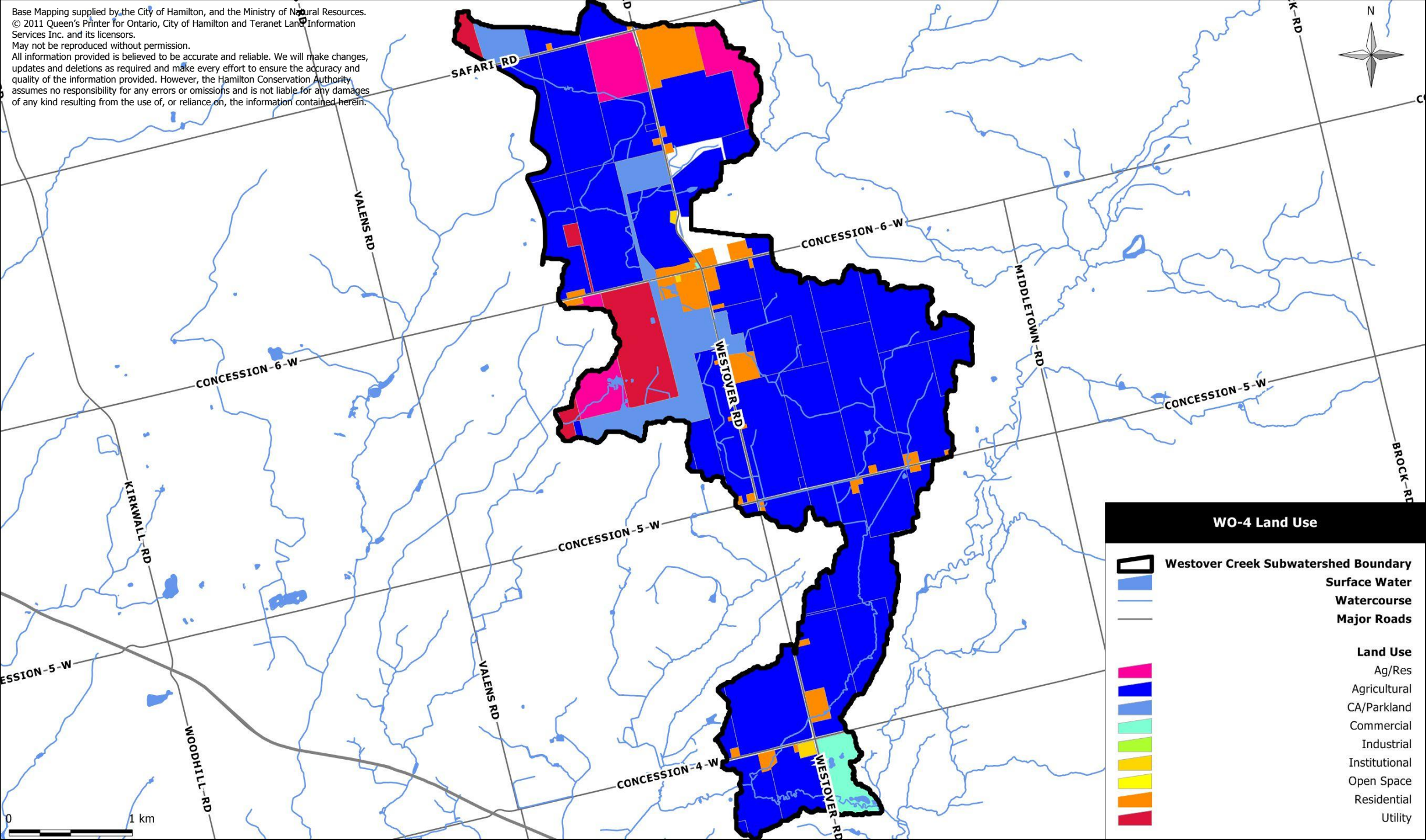
- American Chestnut
- Butternut
- Ginseng
- Acadian Flycatcher
- Flowering Dogwood

### Species with Recovery Strategies

Species	Recovery Strategy Status
American Chestnut	Completed and available
American Ginseng	Drafted not available
Butternut	Completed and available
Eastern Flowering Dogwood	Not available
Acadian Flycatcher	Completed and available
Hooded Warbler	Complete and available



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WESTOVER CREEK SUBWATERSHED CHARACTERIZATION

CULTURAL HISTORY

The first recorded visit to the area by Europeans was on September 24, 1669, when the French explorers La Salle and Joliet met near Tinawatawa, now Westover. (Wikipedia, 2011)

Historically, few actual settlers came into Beverly Township before 1810 and those who came thereafter were mostly immigrants from the British Isles. Wentworth arose in its present form in 1855. Surveying of the townships of Ancaster, Beverly and Flamborough started in 1793 and the two Flamboroughs were created 5 years later. Although Beverly Township, with its nearly 70,000 acres, is more than double the size of any other township in the watershed, settlement was slower than in the other parts. Due to its lack of early roads and its remoteness from any water highway, its land was not as accessible as in the other townships. Furthermore, much of its lands as undesirable because it was swampy or it had rock lying close to the surface. (Spencer Creek Conservation Authority, 1965). This is still somewhat true today.

It is believed that the town of Westover was started as a resting place for those travelling between Kitchener - then called Berlin - and Hamilton; it was the half way point. (Architecture Ontario, 2011)

Currently, the approximate population of the Westover Creek subwatershed is approximately 369 persons with a population density of approximately 35 persons per square kilometer, less than that of the more urbanized subwatersheds within Spencer Creek.

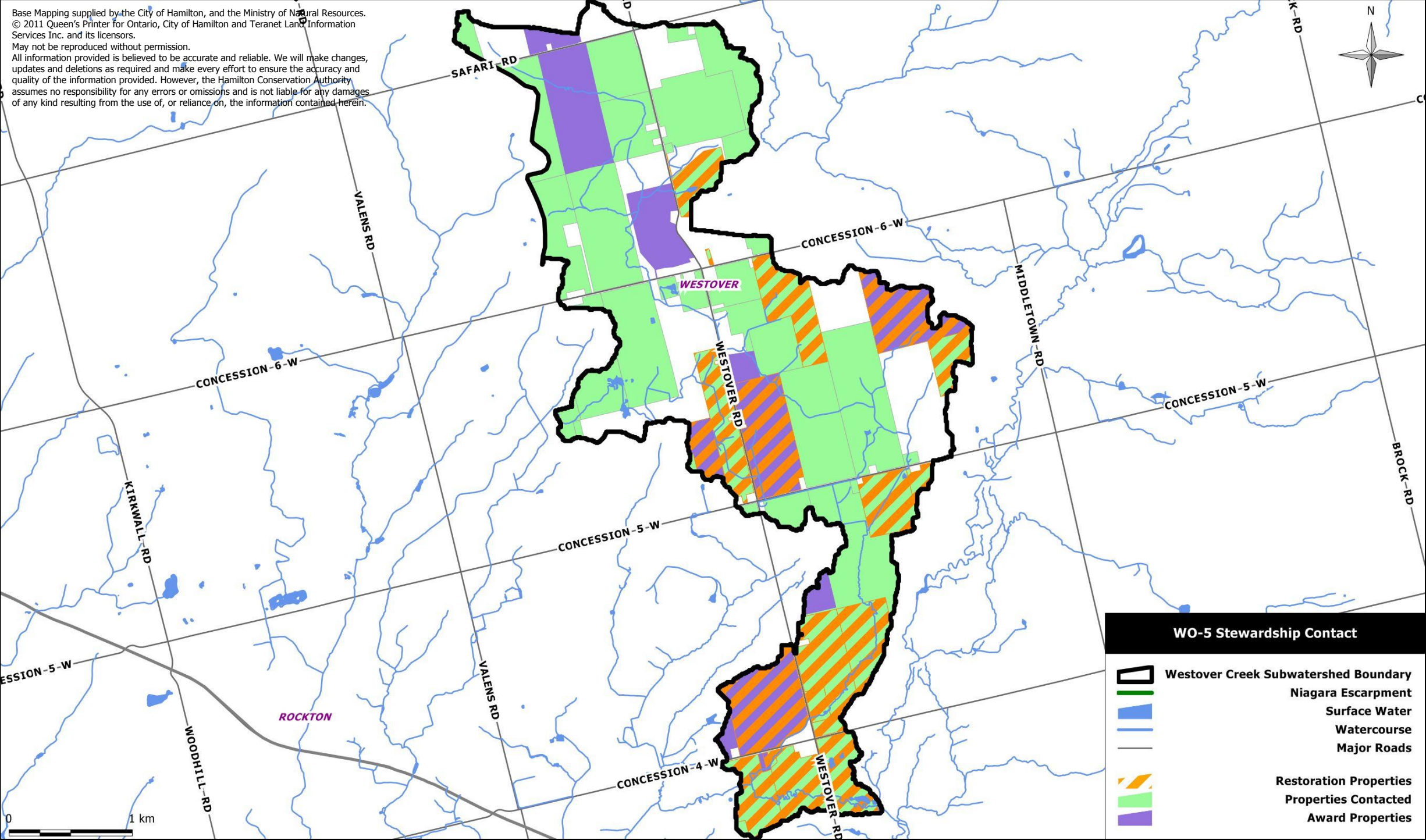
Current land use within the Westover Creek subwatershed is predominantly agricultural with open space and residential being the secondary land uses (**Table WO-3**). Residential land use is largely concentrated at intersections of major transportation routes and in the hamlet of Westover. There is a small amount of institutional and commercial lands distributed throughout the subwatershed to support local residents and the agriculture industry. (**Map WO-4**).

Table WO-3: Land Use Statistics

Area (km <sup>2</sup> )	Agricultural (km <sup>2</sup> )	Commercial (km <sup>2</sup> )	Industrial (km <sup>2</sup> )	Institutional (km <sup>2</sup> )	Open Space (km <sup>2</sup> )	Residential (km <sup>2</sup> )	Utility (km <sup>2</sup> )	Impervious Surfacing (%) 1997 Study Data	Impervious Surfacing (%) 1997 Study Predicted Increase
10.65	8.22	0.2	n/a	0.02	0.75	0.57	0.5	2	0



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WESTOVER CREEK SUBWATERSHED CHARACTERIZATION

STEWARDSHIP HISTORY

Although there are many properties that do not incorporate a portion of a natural feature, almost half of the properties within the subwatershed do contain forest, wetland, meadow or riparian / aquatic habitat (**Table WO-4**). Of these landowners, 52 (or 73%) have been contacted by the Hamilton-Halton Watershed Stewardship Program (HHWSP), and 10 (or 19%) of those have become Watershed Stewards (**Table WO-4**). Therefore, there is still potential to reach the remaining 19 or 27% of landowners with natural features to create awareness regarding Beneficial Management Practices (BMP's) for natural areas. Through this contact there is also great potential to engage more landowners in the Watershed Steward Program. Watershed Stewards are landowners who have agreed to protect and maintain the natural features that fall within their property. In addition to landowners who have natural features on their properties, landowners who do not have natural features on their properties can also act as Watershed Stewards as they can be advocates of stewardship messaging in other capacities.

Currently, the majority of the landowners that have worked with the Watershed Stewardship Program are in the Lower Westover catchment and lower half of the Upper Westover catchment. Therefore, landowner contact would be best focused in the northern reaches of the Upper Westover catchment.

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

This subwatershed exceeds the habitat guidelines for wetland cover. Efforts should be made to work with landowners and public agencies to protect these wetlands, both provincially and locally significant, to maintain this status.

This subwatershed does not meet Environment Canada's How Much Habitat is Enough Guidelines for forest cover. Forest cover would need to be increased by 2.5km<sup>2</sup> to meet this guideline, with an emphasis being placed on forest patch shape and size. These efforts will work toward meeting targets related to percentages of core forest cover to support interior forest breeding birds and other wildlife populations.

This subwatershed also does not meet the How Much Habitat is Enough guidelines for percentage of stream naturally vegetated. An additional 7.7 kilometers of stream would have to be buffered with 30m wide buffers, on either side, in order to meet this target. Efforts should be made to establish riparian buffers along the watercourses to meet this habitat guideline and prevent sedimentation and runoff contamination within the system.

Table WO-4: Stewardship Statistics

Approximate Population	Population Density (persons / km <sup>2</sup> )	Total # of Properties with Forest, Wetland, Meadow or Watercourse	# of Landowners with Forest, Wetland, Meadow or Watercourse & Contacted by HCA Stewardship	# of HCA Stewardship Watershed Stewards with Forest, Wetland, Meadow or Watercourse	Total # of Landowners in Subwatershed Contacted by HCA Stewardship	Total # HCA Stewardship Watershed Stewards in Subwatershed
369	35	71	52	10	180	16

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

PARAMETER	% Wetlands	% Stream Naturally Vegetated	Total Suspended Sediments	% Impervious Surfacing	Fish communities	% Forest Cover	Size of largest Forest patch	% 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	15.49	50.82	??	2	Coolwater	6.38	0.1	100m – 0 % 200m – 0%

# STRESSES & STEWARDSHIP ACTIONS

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There are thirty eight types of *stresses* identified as negatively impacting the Spencer Creek Watershed. Many of the stresses currently affect the Westover Creek subwatershed. Those stresses that are not applicable to Westover Creek have also been included in this Action Plan to illustrate the cumulative stresses on the Spencer Creek Watershed.

An inventory count of the number of each type of stress observed in each catchment basin of the subwatershed is listed in **Table WO- 7**. The most prevalent stresses identified in the Westover Creek Subwatershed are insufficient riparian buffers, on-line ponds, utility pipelines, land maintenance practices and water takings. **Table WO-8** outlines *Stewardship Actions* that have been developed to mitigate the impacts of these and the remaining stresses listed in **Table WO- 7**.

Specific locations where these stresses are occurring are mapped and inventoried in the subsequent catchment datasheets. Within the Westover Creek subwatershed, 116 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.

It should be noted that the high number of insufficient riparian buffer stresses identified in these subwatersheds, compared with previous Stewardship Action Plans developed for other subwatersheds within Spencer Creek, can be attributed to improved riparian buffer mapping which now allows for all segments of creek where insufficient riparian buffers exist to be identified.

Although, buffers categorized as ranging from no buffer to 29.99 meter widths do not meet the How Much Habitat is Enough guidelines as outlined by Environment Canada, they were not included as insufficient in this report as the standard for minimum buffer width (3 meters) as defined by the Environmental Farm Plan was used as the criterion for the GIS analysis.

In summary, the establishment of riparian buffers throughout this subwatershed is of primary concern. The absence or insufficient width of riparian buffers directly relate to the health of the local aquatic ecosystem as it increases the potential for runoff contamination and bank erosion in the creek system. The Hamilton-Halton Watershed Stewardship Program, Ontario Soil and Crop Improvement Association and Hamilton-Wentworth Stewardship Council deliver technical and financial assistance programs for the establishment of riparian buffers along watercourses.

There are numerous on-line ponds 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. Stewardship actions related to these stresses should be implemented to mitigate the thermographic effects of on-line ponds and to eliminate barriers to fish passage. Removal or retrofit of pond retention structures or the installation of by-pass channels and fish ladders are recommended mitigation concepts.

The implementation of stewardship actions associated with utility pipelines identified within this subwatershed should also be a priority. The utility pipelines are categorized as anticipated stresses for the purpose of this report as no evidence of a current adverse impacts on the environment were reported. The implementation team should work to develop relationships with the utility companies to share monitoring data and maintenance schedules to prevent adverse impacts from occurring.

Land maintenance practices were identified as a stress in this subwatershed. These stresses are generally associated with mown grass, especially along hydro corridors. Efforts should be made to implement the Stewardship Actions related to working with landowners to create grassland and meadow habitat in these areas.

There are four active permits to take water on Westover Creek. Efforts to coordinate and reduce these water takings, especially surface water takings, should be taken during low water conditions. The Conservation Authority staff should continue to review permit applications, both new and renewal, focusing on assessing the cumulative impacts of multiple takings on one system. Conservation Authority staff should also recommend to the Ministry of the Environment (MOE) that ecological impacts of water takings should also be considered by the MOE when reviewing permit to take water applications.

STRESSES & STEWARDSHIP ACTIONS

This section of the plan identifies the occurrences of stresses within each catchment of Westover 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, 118 stresses were identified for the Westover Creek Subwatershed and inventory counts are presented in **Table WO-7**.

TABLE WO-7: Stresses Inventory by Catchment

STRESS	MAP CODE	NO. IN SUBWATERSHED	NO. IN EACH CATCHMENT	
			Lower Westover	Upper Westover
Abandoned Groundwater Wells	GW	2	2	
Buried Stream	BS			
Channelization	CH			
Combined Sewer Overflow	CSO			
Dam	DM			
Debris Jam	DJ			
Detachment from Nature	DT			
Development	DV	2		2
Encroachment	EN			
Erosion	ER			
Faulty Septic System	SS			
Fluctuating Water Level	WL			
Habitat Fragmentation	HF	1	1	
Illegal Fill Placement	FP			
Inadequate Stormwater Management	SW			
Increased Impervious Surface	IS			
Insufficient Riparian Buffer	RB	83	34	49
Invasive/Introduced Species	IV			
Landfill Leachate	LL			
Land Maintenance Practices	LM	5	2	3
Litter	LI			
Migration Barrier	MB			
Nutrient Loading	NL			
Online Pond	OP	12	5	7
Outdoor Recreation Related Impacts	OR			
Perched Culvert	CP	2	2	
Pesticide Use	PS			
Plowed Watercourse	PW			
Runoff Contamination via Transportation Corridors	TC			
Sediment Loading	SL			
Site Clearing Prior to Development	SC			
Stormsewer Outfall	SO			
Transportation Corridor Expansion	TE			
Utility Pipeline	UP	7	4	3
Watercourse Enclosure	WE			
Water Taking	WT	4	1	3
Wildlife Collision	WC			
Wildlife Overpopulation	WO			

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

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Abandoned Groundwater Wells</b> <b>Map Code: GW</b>  <b>Definition: Groundwater wells that are no longer in use, often are in a state of disrepair and can be direct conduits for contaminants into groundwater aquifers.</b>	Conduct a direct mailing to all property owners identified in the HCA OGS Groundwater Study database as having abandoned groundwater wells on-site promoting legislation related to decommissioning and/or upgrading groundwater wells and the City of Hamilton Well Decommissioning Program.			Agriculture and Agri-Food Canada - Water Wells, Best Management Practices Pg 52  Ontario Water Resources Act Regulation 903: Water Wells  OMAFRA Best Management Practices Series – Water Wells	HHWSP	CITY / HCA / GV
	Conduct a direct mailing to all property owners identified in the HCA OGS Groundwater Study database as having abandoned groundwater wells on-site, that are also within Source Water Protection Areas, to promote funding available for decommissioning and upgrading groundwater wells through the Ontario Drinking Water Stewardship Program.				HHWSP / CITY Op. & Main.	HCA / HWSC
	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.				HHWSP	CITY / HCA / GV
			Work with landowners to decommission abandoned groundwater wells.		HHWSP	CITY / HCA / GV
<b>Buried Streams</b> <b>Map Code: BS</b>  <b>Definition: The structural alteration of a stream channel, involves piping the creek system underground, eliminating aquatic habitat.</b>		Undertake a feasibility and prioritization study for “daylighting” buried streams in the study area.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107  HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55  Fisheries Act, Section 37  City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158	CITY Cap. Plan.	HCA / DFO / MNR / HHWSP / RAP
	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.				HHWSP / HWSC	HCA / RAP / WPN / DFO
			Work with landowners to undertake daylighting projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.		HHWSP	HCA / DFO / CITY / HWSC



TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
				Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines		
<b>Channelization</b> <b>Map Code: CH</b>  <b>Definition: The structural alteration of a stream channel, usually involves straightening of meanders and increasing gradient which increases velocity and erosion potential.</b>		Undertake a feasibility and prioritization study for restoring channelized creeks to those with a natural design.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107	CITY Cap. Plan.	HCA / DFO / MNR / HHWSP / RAP
	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.			HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55  Fisheries Act, Section 37	HHWSP / HWSC	HCA / RAP / WPN / CITY / RBG / FSRT
			Work with landowners downstream of channelized sites to rehabilitate the riparian zone to reduce flow velocities, erosion and sedimentation.	City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158	HHWSP	CITY / DFO / HCA / RBG / HWSC /
			Work with landowners to undertake natural channel design projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.		HHWSP	HCA / DFO / CITY / HWSC
<b>Dams</b> <b>Map Code: DM</b>  <b>Definition: a barrier to obstruct the flow of water, usually one of earth or masonry, built across a stream or river.</b> <b>(*Also includes weirs formerly map code WR)</b>	Conduct a direct mailing to property owners with dams identified in the MNR Dam Inventory Project to offer financial and technical assistance for the retrofitting or removal of dams.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107	HHWSP	HCA / HWSC / DFO / MNR
		Undertake a feasibility and prioritization study for the removal of dams inventoried.		HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55  Fisheries Act, Section 37	HCA Eng./ MNR	HWSC / HHWSP
	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 Conservation Authority Dam Inventory Project  In-stream Barrier Assessment	HHWSP / HWSC	HCA / MNR / DFO

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
			Work with landowners to remove/retrofit dams as prioritized in the Barrier Mitigation Plan associated with the Hamilton Harbour Fisheries Management Plan.	for the Hamilton Harbour AOC.  Hamilton Harbour Fisheries Management Plan	HHWSP	HCA / HWSC / MNR / DFO / CITY
<b>Debris Jams</b> <b>Map Code: DJ</b>  <b>Definition: The accumulation of debris within a watercourse that prevents the flow of water.</b>		Complete an assessment of creek/in-stream flow barriers that are prone to debris/ice jams and cause barriers to fish migration, including the prioritization of barriers to be removed.		In-stream Barrier Assessment for the Hamilton Harbour AOC.  Hamilton Harbour Fisheries Management Plan	HCA Eng.	MNR / HHWSP
	Incorporate debris jam removal into the City of Hamilton Extreme Park Makeover Program.				CITY Op. & Main.	HHWSP /HCA/ HWSC / MNR / DFO / BARC
	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.				HHWSP / HWSC	HCA / MNR
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the importance of debris jam management in flood prevention.				HCA Eng.	MNR / CITY
			Work with landowners to remove debris jams using proper sediment and erosion control practices.		HHWSP	CITY / DFO / HCA / HWSC
<b>Detachment from Nature</b> <b>Map Code: DT</b>  <b>Definition: The condition of people disassociating their existence from nature.</b>		Assess barriers to participation in environmental programs to improve program design.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations PAA-2, PAA-3, EPI -1, EPI-2, EPI-5 Pages 129-138  Royal Botanical Gardens Back to Nature: Towards a Ontario Strategy for Bringing Children and Nature Together - Event	HHWSP	HWSC /CITY / GV
		Assess landowner willingness to participate in and/or support water quality improvement and habitat restoration projects.			HHWSP	CITY / HCA / HWSC
	Continue to implement the Watershed Steward Award Program.				HHWSP	BARC / HCA

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
		Encourage municipalities and trail managers to coordinate trail plans that improve access between urban centres and provide links to parks and rural areas		and Workshop Report  Evergreen Schoolground Greening Resources: Getting Started	HCA Lands / CITY Cap. Plan. / RBG	HHWSP / HWSC
	Engage citizen groups to conduct local subwatershed monitoring & reporting projects, including: water quality, base flow, litter hot spots, Ecological Monitoring Assessment Network, Frog Watch, Ice Watch, etc.				HHWSP / HCA Ecol. / CITY Nat. Her. / BARC	GV / HWSC / RBG
	Engage high school students in volunteer opportunities related to environmental programming in order to meet community volunteer hours required for secondary school completion.				HCA / HWSC / BARC / RBG / GV	CITY
	Erect creek crossing & ecological corridor signage along roadways.				CITY Nat. Her.	BARC / GV / HCA / HWSC / WPN
	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, HNC Junior Naturalists, HCA Junior Conservationists, etc.				BARC / GV / HCA Lands / CITY Nat. Her. / RBG	
	Support the formation and activities of "Friends of" groups aimed at protecting and rehabilitating natural features.				HHWSP / HWSC / HCA Lands / CITY Nat. Her.	BARC / DFO / BTC
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote watersheds, watershed characteristics and the ecological significance of natural features.				HHWSP / HWSC	BARC / CITY / GV / HCA / WPN / DU
			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 Ecol. / CITY Op. & Main. / BARC	HWSC / RBG / BTC
			Work with schools and School Boards to implement the School Grounds Naturally Program; undertaking school yard naturalization projects.		HHWSP	HCA / CITY / HWSC

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Development</b> <b>Map Code: DV</b>  <b>Definition: The process of developing populated settlements: including housing and supporting infrastructure.</b>		Continue to incorporate downstream assessments of creek conditions, with recommendations for improvement, as part of the overall subwatershed studies conducted as part of new Greenfield development planning.		Credit Valley Conservation and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Manual	CITY Cap. Plan.	HCA
	Host annual training sessions for City staff & developers to create awareness regarding the incorporation of development related BMPs into planning applications (i.e. pervious pavement, low maintenance lawns, green rooftops, storm water management, road-salt alternatives, snow-piling, erosion & sediment control measures, compliance & enforcement, etc.).				HCA Plan.	BARC / CITY / DFO / GV / MTO
		Implement the fish habitat buffer requirements for warm and coldwater streams as outlined in the HCA Planning and Regulations Policy and Guidelines document (30m setback for coldwater systems and 15m setback for warmwater systems).			HCA Ecol.	CITY
		implement stewardship and management recommendations resulting from the HCA development permit application review process.			HCA Plan.	CITY / HHWSP / HWSC
		Lobby the provincial government to amend the building code to include and favour Low Impact Development technologies; e.g. green roofs, multilevel parking, interlocking pavement, etc.			CITY Op. & Main. / HCA Eng.	HHHBA / GV
		Lobby the provincial government to support property tax-based loans for local development charges to assist in funding development and retrofits using low impact development technologies.			CITY Cap. Plan.	HHHBA / HCA Plan.

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
		Revise conflicting municipal by-laws regarding development practices and guidelines to facilitate increased use of Low Impact Development technologies.			CITY Cap. Plan. / HCA Plan.	GV / HHHBA / DFO
		Work with developers to initiate a Water Management Task Force to assist in implementing stewardship actions and recommendations from the Stormwater Master Plan.			HCA Eng.	CITY / RAP / HHHBA
<b>Encroachment</b> <b>Map Code: EN</b>  <b>Definition: The act of undertaking practices on another person's property, i.e. erecting structures, planting gardens, disposal of waste.</b>	Conduct a direct mailing of an encroachment education brochure to landowners adjacent to Conservation Authority, RBG and City natural areas.			HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55, 60	HCA Lands / RBG / HHWSP / CITY Op. & Main.	HWSC
	Engage citizen groups to monitor & report areas affected by encroachment that are in need of restoration.			City of Hamilton Draft Private Tree and Woodland Conservation By-law	HCA Plan. / CITY Op. & Main. / RBG	HHWSP / BARC / GV / HWSC / BTC
	Install property demarcation posts (with agency logos) at regular intervals along property boundaries to prevent encroachment into natural areas.			City of Hamilton By-law No. 03-117 Illegal Dumping	HCA Lands / RBG / CITY Op. & Main.	HHWSP
	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.				CITY Op. & Main. / HCA Lands / HHWSP / RBG	BARC / GV / HWSC / BTC
			Work with citizen groups to remove encroaching material on public and private lands, including "Friends of" work days, Adopt a Creek, Fishing Clubs, Stewardship Rangers, etc.		CITY Op. & Main. / HHWSP / RBG / HCA Lands	HHWSP / HCA / CITY / HWSC / BARC / GV / RBG / HNC
	Work with local nurseries & landscaping co.'s to educate / encourage landowners to use native plants.				HHWSP	CITY / HCA / HWSC / RBG / GV
<b>Erosion</b> <b>Map Code: ER</b>		Complete field study of stream morphology, determining erosion hotspots & associated causes		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations	HCA Eng.	CITY Cap. Plan.



TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Definition: The process of soil being scoured or washed away by flowing water.</b>	Conduct a direct mailing to landowners where erosion has been identified through the City of Hamilton GRIDS Plan.			ULM-2, ULM-3, FW-4 Pages 69, 70, 107	HHWSP	HCA / CITY / OSCIA / HWSC
	Create demonstration sites on public lands that highlight streambank stabilization and natural channel design projects.			HCA Planning and Regulation Policies and Guidelines Pages 68-69	HHWSP	CITY / HCA / DFO / HWSC / RBG / OSCIA
		Expand the City of Hamilton Erosion Hot Spots identification project into rural areas		Fisheries Act, Section 35	CITY Cap. Plan.	HCA
	Host training sessions for City staff and developers to create awareness regarding BMPs & importance of properly maintained erosion / sediment control measures & enforcement.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142, 159-160	HCA Eng.	CITY / DFO / HWSC
		Select erosion sites as identified in the City of Hamilton GRIDS Plan for the upcoming HCA Erosion and Sediment Control Pilot Project.		Erosion and Sediment Control Guidelines for Urban Construction	HCA Plan.	HHWSP / HWSC / CITY / DFO
	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	HCA Plan.	DFO / MNR / CITY
	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.				HHWSP / HWSC	CITY / DFO / HCA / HHHBA / OSCIA
			Work with City staff to install permeable conveyance systems (infiltration trenches) along roadsides as an alternative to the conventional ditch system.		CITY Op. & Main.	HCA / MTO / DFO
			Work with landowners to undertake bank stabilization and erosion rehabilitation projects using bioengineering design principles.		HHWSP	HWSC / HCA / BARC / DFO / OSCIA / FSRT

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
			Work with landowners to undertake erosion rehabilitation projects as identified in the City of Hamilton GRIDS Plan.		CITY Cap. Plan.	HHWSP / HWSC / HCA / DFO
<b>Faulty Septic Systems</b> <b>Map Code: SS</b>  <b>Definition: Malfunctioning septic systems; including plugged distribution tiles, infrequent tank pumping, etc. lead to untreated sewage contaminating our ground and surface water.</b>		Analyze existing water quality data for high levels of bacteria, chlorides, phosphorous, nitrates and TKN and cross reference the results against land use data to prioritize areas for education outreach and restoration.		Ontario New Home Warranty Program – A New Homeowner’s Guide to Septic Systems  City of Hamilton’s Greensville Community Subwatershed Study	CITY Bldg. Serv. / HCA Eng.	RAP
		Conduct an inventory to determine how many households in the Spencer Creek watershed are serviced by on-site treatment systems.			CITY Bldg. Serv.	RAP
	Create demonstration sites on public lands that highlight properly functioning septic systems.				CITY Bldg. Serv. / HCA Lands / CITY Op. & Main.	HHWSP / HWSC
		Develop a tax reduction incentive or grant program for upgrading faulty septic systems			City Cap. Plan.	MOE / HHWSP
		Undertake a risk analysis of the potential for old and/or degraded sewer lines to contaminate groundwater.			CITY Bldg. Serv.	MOE / RAP
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the proper maintenance of existing septic systems.				HHWSP / HWSC	HCA / BARC / CITY
			Work with landowners to properly maintain their septic systems or upgrade or decommission faulty or unused septic systems.		HHWSP	CITY / HCA / HWSC / GV
<b>Fluctuating Water Levels</b> <b>Map Code: WL</b>  <b>Definition: Irregular occurrences of high and low water levels in the creek</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to explain the purpose and operation of Christie and Valens dams.				HCA Eng.	HHWSP / CITY / MNR

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
system.		Work to determine the cause of water level fluctuations and develop recommendations for altering practices to reduce or eliminate fluctuations.			HCA Eng.	HHWSP / CITY / MNR / DFO
			Work to implement alternative practices as per recommendations resulting from the inquiry into the cause of water level fluctuations in the system.		HCA Eng.	HHWSP / CITY / MNR / DFO
<b>Habitat Fragmentation</b> <b>Map Code: HF</b>  <b>Definition: Disruption of large continuous tracts of habitat.</b>		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 Remedial Action Plan Stage 2 Update: Recommendation FW-12 Page 123 HCA Planning and Regulation Policies and Guidelines Pages 53-59	CITY Nat. Her. / HCA Ecol.	MNR / HHWSP / HWSC / RAP / RBG
	Create demonstration sites on public lands that highlight various types of terrestrial and aquatic habitat restoration projects.				HHWSP	HCA / CITY / HWSC / RBG / DU / HNC / DFO
		Develop How Much Habitat is Enough targets for each subwatershed.		City of Hamilton Draft Private Tree and Woodland Conservation By-law	HCA Ecol.	CITY/ HHWSP / DU / CCC / HWSC / RBG / MNR / DFO
	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.			Cootes to Escarpment Park System – A Conservation and Land Management Strategy	HHWSP	HHWSP / HCA / HWSC / CITY / HNC
	Encourage urban reforestation practices in private properties and reduction of lawn areas.			Nature Counts – City of Hamilton Natural Areas inventory	CITY	HHWSP / HCA / HWSC / HNC
		Establish a Woodlot Owners Association for this area as recommended by Re-Leaf Hamilton		City of Hamilton Natural Heritage Strategy	HWSC	HHWSP / HCA / HWSC / RBG / HNC / MNR
		Protect and enhance natural corridors through parks and public lands by ensuring that naturalization and habitat creation are incorporated into master planning.		Dundas Valley 50 Year Vision  Hamilton Harbour Fisheries Management Plan	HCA Lands / CITY Op. & Main. / RBG	HHWSP / HWSC / MNR / HNC

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy ecosystems and the importance of habitat connectivity.			OMAFRA Best Management Practices Series – Farm Forestry and Habitat Management	HHWSP / HWSC	HCA / RBG / CITY / DU / MNR / HNC / CC
		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	CITY Nat. Her.	HCA / RBG / HHWSP / HNC / HWSC
			Work with landowners to undertake habitat creation and enhancement projects which enhance core habitat by infilling areas within or linking existing forested areas	Aggregate Resources Act	HHWSP	OSCIA / DU / HWSC / HCA / DFO
			Work with utility companies to implement integrated vegetation management practices along utility corridors.		HCA Plan. / CITY Nat. Her.	MNR / HHWSP / HWSC / RBG / HNC
			Work with the aggregate industry to restore decommissioned pits and quarries into natural habitat through the Management of Abandoned Aggregate Properties Program.		HCA Ecol.	HCA / CITY / MNR
		Work with the aggregate industry when planning new/expanded pit and quarry operations to minimize impacts on the adjacent natural features.			HCA Ecol.	HCA / CITY / MNR
<b>Illegal Fill Placement</b> <b>Map Code: FP</b>  <b>Definition: The act of dumping fill material into or adjacent to natural areas.</b>	Host a training session for HCA and City staff on how to identify illegal fill and how to report incidences.			HCA Planning and Regulation Policies and Guidelines Pages 61-62	HCA Plan.	CITY / DFO
	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.			City of Hamilton By-law No. 03-117 Illegal Dumping	HCA Plan.	HHWSP / HWSC / CITY
			Work with landowners to rehabilitate fill sites where identified		HHWSP / HCA Plan.	CITY / DFO
<b>Inadequate Stormwater Management</b>		Implement recommendations from the City of Hamilton Stormwater Master Plan.		Hamilton Harbour Remedial Action Plan Stage 2 Update:	CITY Cap. Plan.	HCA / RAP / BARC / GV

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Map Code: SWM</b>  <b>Definition: Inadequately managing stormwater to control water quality and flooding; often associated with the drainage of developed lands.</b>		Offer financial incentives to replace driveways and decks with permeable pavement, interlocking brick, etc.		Recommendations ULM -6, ULM-9, ULM-11 Pages, 72, 75, 77	CITY Cap. Plan.	
	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 Rain barrel Pilot Project, High Household Water Consumption Program, and EnerGuide for Low Income Households Program.			HCA Planning and Regulation Policies and Guidelines Pages 74-77  Fisheries Act, Section 34  City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162	CITY Cap. Plan. / GV	HHWSP / HCA / DFO / BARC / RAP / HHHBA
	Promote the use of constructed wetland technology and Low Impact Development in the design of stormwater management facilities.				CITY / HCA Eng.	
			Retrofit existing dry stormwater management ponds to wet ponds where beneficial to water quality, aquatic habitat and erosion control.		CITY Cap. Plan.	RAP / HCA
			Retrofit outlet structures to decrease the velocity of stormwater as it flows into the creek system.		CITY Op. & Main.	HCA / RAP / HHWSP / HWSC
		Undertake a study to determine the percentage of landowners with connected downspouts.			CITY Cap. Plan.	GV / RAP / BARC
	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.				CITY Cap. Plan. / GV	HHWSP / HCA / DFO / BARC / RAP / HHHBA



TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
		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.			HCA Plan.	HHWSP / DFO / BARC / RAP / HHHBA
			Work with landowners to disconnect downspouts and install rain barrels.		CITY Cap. Plan.	HHWSP / BARC / GV
<b>Increased Impervious Surfacing</b> <b>Map Code: IS</b>  <b>Definition: The decreased potential for rainwater infiltration into the soil as a result of increased paved/impermeable surfacing.</b>	Create demonstration sites that highlight development related BMP's and Low Impact Development technologies; e.g. permeable pavement, green roofs, on-site wastewater treatment, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -5b, ULM-6 Page 71, 72	HCA Plan.	CITY / HHHBA / GV / HHWSP / HWSC
			Enhance groundwater recharge by ensuring that enough land, post construction remains pervious, so as to maintain water balance, as a condition for development application approval.	HCA Planning and Regulation Policies and Guidelines Pages 74-77  Fisheries Act, Section 34	HCA Eng.	CITY / GV / HHHBA
	Host training sessions for HCA and City staff, developers and consultants to promote the incorporation of development related BMP's into planning applications; e.g. permeable pavement, green roofs, on-site wastewater treatment, etc.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162	HCA Plan. / CITY Op. & Main.	HHHBA
		Incorporate a proportionally-based impervious surfacing fee for large commercial/industrial lands to offset the cost of stormwater infrastructure and compensate rehabilitation efforts associated with stormwater infrastructure.			CITY Cap. Plan.	HCA / RAP
		Measure impervious surfacing of commercial and industrial lands.			CITY Cap. Plan.	HCA / RAP

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the implementation of development related BMP's and Low Impact Development technologies when undertaking home renovations.				GV	HCA / CITY / HHHBA / HHWSP
<b>Insufficient Riparian Buffer</b> <b>Map Code: RB</b>  <b>Definition: Disruption of large continuous tracts of habitat along watercourses.</b>	Conduct a direct mailing to property owners identified as having insufficient riparian buffers, promoting funding and technical assistance available for establishing riparian buffers			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-2 Page 69	HHWSP / HWSC	HCA / CITY / OSCIA
	Create demonstration sites in high traffic locations that highlight riparian buffers. i.e. golf courses, municipal parks, etc.			HCA Planning and Regulation Policies and Guidelines Pages 40, 55, 60	HHWSP	HCA / HWSC / CITY
	Host workshops promoting the environmental and economic benefits of riparian buffers. i.e., preventing soil loss, preventing drifting snow, habitat creation, etc.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 145-150,162-163	HHWSP	HCA / HWSC / CITY / OSCIA
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			City of Hamilton Natural Heritage Strategy	HHWSP	HCA / HWSC / CITY / OSCIA
	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.			Dundas Valley 50 Year Vision	HHWSP	HCA / HWSC / CITY / OSCIA
			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.	Cootes to Escarpment Park System – A Conservation and Land Management Strategy	HHWSP	HCA / HWSC / CITY / OSCIA
<b>Invasive/Introduced Species</b> <b>Map Code: IV</b>  <b>Definition: The</b>		Develop an Invasive Species Management Program which includes monitoring sites and management for specific species.		HCA Planning and Regulation Policies and Guidelines Pages 53-56, 70-71	HCA Ecol.	HHWSP / MNR / HWSC / CITY / HNC / RBG / CCC

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>establishment/proliferation of exotic species that have no natural control measures which compete with native species for resources and degrade the ecosystem.</b>	Host training sessions for City staff, landscapers, consultants and nurseries to create awareness regarding the detrimental effects of invasive species and to encourage the use of native species.			Action Plan for Addressing Terrestrial Invasive Species within the Great Lakes Basin	HCA Ecol.	HHWSP / HWSC / CITY / HNC
		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.		Invasive Alien Plant Species Found in the Carolinian Zone – Inventory and Management Options for rare Charitable Research Reserve	HCA Ecol.	HHWSP / HWSC / CITY / RBG / BARC
	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.			Mistaken Identity – Invasive Plants and their native look-alikes.  City of Hamilton Natural Heritage Strategy  Dundas Valley 50 Year Vision	HHWSP	HCA / HWSC / CITY
			Work with landowners to control invasive species and to plant native species.	Cootes to Escarpment Park System – A Conservation and Land Management Strategy	HHWSP	HCA / HWSC / CITY / GV
	Work with nurseries to develop a promotional program highlighting native species alternatives for commonly used non-native ornamental species.				HHWSP	CITY / HWSC / RBG / HCA / GV
<b>Land Maintenance Practices</b> <b>Map Code: LM</b>  <b>Definition: Errant or excessive land maintenance practice which unnecessarily degrade wildlife habitat.</b>		Incorporate the installation of alternative roadside vegetation, such as MTO roadside prairie and wildlife shrub corridors, into existing maintenance plans.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-2, FW-4 and Pages 106-107	City Op. & Main.	HCA / CITY
			Work to naturalize infrequently used areas of municipal parks and Conservation Areas.		CITY Op. & Main. / HCA Lands	HHWSP / HWSC / HNC
		Work with the City to develop guidelines for using native plant species for revegetation projects along roadsides			City Op. & Main.	HCA Ecol.
			Work with the City to ensure roadside maintenance is not done in excess of access standards.		CITY Op. & Main.	HCA / HHWSP / HWSC / GV / HNC

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
		Work with utility companies to develop protocols for recommended low impact land maintenance practices to be implemented throughout utility corridors.			HCA Plan.	CITY / HHWSP / HWSC / RBG
<b>Landfill Leachate</b> <b>Map Code: LL</b>  <b>Definition: rainwater filtering down through the landfill materials with the potential to contaminate groundwater aquifers.</b>		Monitor existing groundwater sampling programs to ensure that groundwater contamination is not 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	HCA Eng.	CITY / RAP / MOE
<b>Litter</b> <b>Map Code: LI</b>  <b>Definition: The act of illegally disposing of waste into public/natural areas.</b>	Implement the 'Pack it in – Pack it out" waste disposal policy at strategic city parks, Conservation Areas and RBG lands.			City of Hamilton By-law No. 03-118 Litter, Yard Waste and Property Maintenance	CITY Op. & Main. / RBG / HCA Lands	HHWSP
	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.				CITY Op. & Main.	HCA / RBG / GV / HWSC / HHWSP / BARC
		Undertake an inventory of illegal dumping sites throughout the subwatershed. Prioritize sites for the installation of deterrent mechanisms and the implementation of the Keep Hamilton Clean and Green Strategy Components.			HCA Lands / CITY Op. & Main.	RBG
	Utilize literature, websites, public service announcements, & direct landowner contact to create awareness regarding the prevention and clean-up of litter.				CITY Op. & Main. / HCA Lands / RBG	HHWSP / HWSC / GV / BARC
	Work to develop an Adopt a Park / Friends of Program for Conservation Authority lands.				HCA Lands	CITY / HHWSP / HWSC
	Work to replace all current recycle bins in public areas with ones that have lids.				CITY Op. & Main. / RBG / HCA Lands	GV



TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
			Work with local residents to host litter clean up events on public lands; including City parks, Conservation Areas and RBG lands.		CITY Op. & Main. / RBG / HCA Lands	HHWSP / HWSC / BARC / GV
<b>Migration Barrier</b> <b>Map Code: MB</b>  <b>Definition: Any infrastructure that precludes the passage of wildlife into upstream habitat or the upper reaches of natural corridors.</b>	Erect wildlife crossing signage where known migration corridors cross roadways and trails.			In-stream Barrier Assessment for the Hamilton Harbour AOC.	HCA Ecol. / CITY Nat. Her. / RBG	HHWSP / HNC / BARC / HWSC / WPN / RAP
			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	HCA Ecol. / CITY Nat. Her. / RBG	HHWSP / HNC / BARC / HWSC / WPN / RAP
<b>Nutrient Loading</b> <b>Map Code: NL</b>  <b>Definition: Excessive nutrients being inputted into a watercourse; often resulting from the application of manure/fertilizer. (* Also includes Phosphorous Loading formerly map code PL)</b>	Create demonstration sites on public lands that highlight nutrient management BMP projects.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-9, RM-7. Pages 116, 158	HHWSP	HCA / HWSC / OSICA / RAP
		Develop a fertilizer use by-law under the Fertilizer Act, limiting the use of fertilizer for non essential purposes.		Nutrient Management Act 2002, O. Reg 267/03	CITY Cap. Plan.	HCA / BARC / RAP / HHWSP / RBG
		Develop a plan to reduce nutrient levels to meet Provincial Water Quality Objectives as determined by the land use dependent nutrient level monitoring program.		Fisheries Act, Section 34	HCA Eng.	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG
		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.		HCA Planning and Regulation Policies and Guidelines Page 72	HCA Eng.	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG
		Encourage the Ministry of the Environment to develop a nutrient monitoring and reduction program for non agricultural nutrient generating land uses; including nurseries, hobby farms and equine facilities.		OMAFRA Best Management Practices Series – Nutrient Management Planning  OMAFRA Best Management Practices Series – Manure Management	HCA Eng. / HCA Ecol.	OMAFRA / OSICA / MNR / RAP

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
		Encourage the Ministry of the Environment to require that biosolid users submit soil sampling results, post application, as a monitoring condition of the Certificate of Approval process.			HCA Eng. / HCA Ecol.	MOE / CITY / RAP
		Establish a nutrient level monitoring program with strategic sampling sites that are land use dependent, to identify specific sources of nutrient loading.			HCA Eng.	CITY / OSCIA / OMAFRA / BARC / RAP / HHWSP / RBG
	Host a training workshop for local golf course practitioners to discuss BMP's for golf course management, including Audubon Cooperative Sanctuary Program certification standards.				HHWSP	HCA / HWSC / RAP / RCGA
		Lobby the provincial government to develop a policy to ban the use of phosphorous in fertilizer for cosmetic use.			GV	CITY / HCA / MOE
	Promote software associated with the Nutrient Management Plan, to agricultural operators to ensure precise fertility programs.				HHWSP	OSCIA / OMAFRA / HWSC
	Promote the City of Hamilton Only Rain Down the Drain awareness campaign.				City Op. & Main.	HHWSP / GV / BARC / RAP
	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.				HHWSP / HCA Eng.	BARC / GV / RBG / OSCIA / MOE / OMAFRA / RAP
			Work with landowners to reduce nutrient loading by implementing agricultural and urban BMP's related to nutrient management.		HHWSP	OSCIA / HCA / CITY / OMAFRA / HWSC
<b>On-line Ponds</b> <b>Map Code: OP</b>  <b>Definition: An in-stream structure designed to impound stream flow; leads</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and pond retrofit options.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-1, FW-4 Page 104, 107	HHWSP / HWSC	DFO / HCA / OSCIA / OMAFRA / CITY

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
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  In-stream Barrier Assessment for the Hamilton Harbour AOC	HHWSP / HCA Plan. / HCA Eng.	DFO / HCA / OSCIA / OMAFRA / CITY / HWSC
<b>Outdoor Recreation Related Impacts</b> <b>Map Code: OR</b>  <b>Definition: Recreational activities occurring in natural areas that inadvertently degrade the natural features of the area.</b>	Add “tread lightly” messaging to partner recreation oriented websites.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-8, PAA-1, PAA-2, PAA-3 Pages 115, 126-130	HCA Lands / CITY Op. & Main. / RBG	NHC / BTC
		Consider designating days/areas for ATV and snowmobile use.			HCA Lands / RBG / CITY Op. & Main.	HHWSP / HNC
		Continue to monitor Category A and B waterfalls on public lands for signs of degradation.		The Conservation Lands of Ontario – Three Year Business Plan	HCA Lands / CITY Op. & Main.	
		Develop marketing strategies for sensitive lands that focus on sustainable use.		A Joint Outdoor Tourism Marketing Strategy	HCA Lands / RBG / CITY Op. & Main	BTC / HNC
	Erect signage explaining the environmental significance of natural areas and promoting user “etiquette” for the area.			Niagara Escarpment Access Enhancement Plan	HCA Lands / RBG / CITY Op. & Main.	HHWSP / HNC / BTC
			Host annual clean up days for natural areas identified as having excessive amounts of litter.	Dundas Valley 50 Year Vision Strategy	HCA Lands / RBG / CITY Op. & Main.	HHWSP / HWSC / HNC / BARC / BTC
	Install deterrent mechanisms along trails and in off trail areas known to be degraded by trespassing; such as no trespassing signage.			Cootes to Escarpment Conservation & Land Management Strategy	HCA Lands / RBG / CITY Op. & Main.	HNC / BTC
	Promote the City of Hamilton Adopt-a-Park and Extreme Park Makeover Programs.				CITY Op. & Main.	HCA / RBG / HHWSP / HNC / BTC
		Refer to the Niagara Escarpment Access Enhancement Plan to design infrastructure for high traffic areas to guide users along approved trails.			HCA Lands / CITY Op. & Main. / RBG	BTC
			Rotationally restrict access to degraded areas to allow for the regeneration of vegetation.		HCA Lands / RBG / CITY Op. & Main.	HNC / BTC

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
	Support the formation and activities of “Friends of” groups aimed at protecting and rehabilitating natural features.				HHWSP / CITY Op. & Main. / HCA Lands / RBG	HWSC / BARC / BTC
			When conducting maintenance of existing trails, seek guidance from the HCA Planning and Engineering Department with respect to materials and design.		HCA Lands / RBG / CITY Op. & Main.	HHWSP / HNC / BTC
		When undertaking master planning exercises, design trails to meet guidelines as set in HCA’s Planning and Regulation Policies and Guidelines.			HCA Lands / RBG / CITY Op. & Main.	
<b>Perched Culverts</b> <b>Map Code: CP</b>  <b>Definition: In-stream culverts that when improperly designed/installed, create barriers to water flow and fish migration.</b>	Host training sessions for HCA Lands and City staff to promote the proper design and installation of culverts.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-1, FW-4 Pages 104, 107  Fisheries Act, Section 37  HCA Planning and Regulation Policies and Guidelines Page 41  In-stream Barrier Assessment for the Hamilton Harbour AOC	CITY Op. & Main / HCA Eng.	DFO / HHWSP / MNR
		Undertake an inventory of perched and closed bottom culverts throughout the subwatershed. Prioritize culverts for mitigation or replacement.			CITY Op. & Main.	DFO / HCA / HHWSP / MNR
	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.				HHWSP / HWSC	DFO / HCA / CITY / MNR
			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.		HHWSP / HCA Plan. / HCA Eng.	DFO / HCA / OSCIA / OMAFRA / CITY
<b>Pesticide Use</b> <b>Map Code: PS</b>	Create demonstration sites on public lands that highlight pesticide/herbicide free lawns, gardens, natural areas, crops, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations	HHWSP	CITY / GV / HWSC / OSCIA / OMAFRA

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Definition: The application of pesticides to control perceived pests.</b>	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.			TSSR-6, EPI-4 Pages 99, 137  Fisheries Act, Section 34  City of Hamilton By -Law No. 07-282	HHWSP	CITY / HWSC / RCGA
	Promote Municipal and Provincial Pesticide By-Laws.			Pesticides Act Ontario Regulation 63/09	CITY Op. & Main. / GV	HWSC / HHWSP / OSCIA / OMAFRA
	Promote the City of Hamilton's Turf King Hamilton Program which includes Integrated Pest Management principles, Natural Tips for Healthy Lawns and Gardens and alternative turf management techniques.			OMAFRA Best Management Practices Series – integrated Pest Management  OMAFRA Best Management Practices Series – Pesticide Storage, Handling and Application	CITY Op. & Main.	GV / HWSC / HHWSP / OSCIA / OMAFRA
	Promote the Ministry of the Environment 'Add It Up Program – Going Pesticide Free' Program				GV	CITY / HHWSP / HWSC
		Undertake a study to determine the current level of pesticide/herbicide use in the subwatershed and develop targets for reduction.			CITY Op. & Main.	GV / HWSC / HHWSP / OSCIA / OMAFRA
	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.				GV	HCA / OSCIA / OMAFRA / HHWSP / CITY
			Work with landowners to implement alternatives to pesticide use.		HHWSP / GV	CITY / HWSC / OSCIA / OMAFRA
<b>Plowed Watercourse</b> <b>Map Code: PW</b>  <b>Definition: Headwater swales or small watercourses that are worked for agricultural</b>	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.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-4 Pages 70, 71  Fisheries Act, Section 37	HHWSP	DFO / HCA / OSCIA / HWSC



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STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
production.	Create and link to existing OMAFRA demonstration sites that highlight BMP's that promote good agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 44, 145-150	HHWSP	DFO / HCA / OMAFRA / OSCIA / HWSC
	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.			OMAFRA Best Management Practices Series – Soil Management	HHWSP / HWSC	DFO / HCA / OMAFRA / OSCIA
			Work with landowners to install effective agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.		HHWSP	DFO / HCA / HWSC / RBG / RAP
<b>Runoff Contamination via Transportation Corridors</b> <b>Map Code: TC</b>  <b>Definition: Contamination resulting from stormwater runoff from major arterial roadways; often associated with the application of salts for de-icing and the residual precipitate created by automobile exhaust.</b>	Host training sessions for City Staff and Contractors using the Ministry of the Environment Snow Disposal and De-icing Operations in Ontario Guidelines.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-5b Page 71	CITY Op. & Main.	MTO
			Implement improved snow removal methods as recommended by the study to determine effective methods of snow removal which also reduce contamination of watercourses.	Fisheries Act, Section 34  City of Hamilton 2003 Road Salt Management Plan  Municipalities of Wellington County – 2005 Salt Management Plan	CITY Op. & Main.	MTO
			Install vegetated filter strips and riparian buffers along medians and roadsides.		CITY Op. & Main.	MTO / HCA
	Liaise with City staff to promote road salt alternatives, alternative application methods and recommended snow removal practices. E.g. City of Guelph liquid application prior to inclement weather.				CITY Op. & Main. / HCA Eng.	DFO / MTO
		Support planning for alternative and sustainable transportation strategies including Rapid Transit.			CITY Op. & Main.	HCA / MTO / HHHBA / RAP
		Undertake a study to determine the most effective method of snow removal that will reduce contamination of watercourses.			CITY Op. & Main.	DFO / HCA / MTO

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
	Utilize literature, websites, public service announcements & direct landowner contact to promote the use of sidewalk salt alternatives.				CITY Op. & Main. / GV	DFO / HCA / MTO
		Investigate using the Region of Waterloo Smart About Salt Council as a model to develop a Smart About Salt Program in Hamilton.				
<b>Sediment Loading</b> <b>Map Code: SL</b>  <b>Definition: Organic and inorganic material that is entrained by the flow of water and is deposited in a creek system.</b>			Monitor and enforce the proper installation and maintenance of sediment and erosion control measure on construction sites.	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-5, FW9 Pages 70, 71, 116  Fisheries Act, Sections 34 and 36  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  OMAFRA Best Management Practices Series – No-Till Making it Work  Ministry of the Environment Stormwater Management Design Guidelines	HCA Plan.	DFO / HHHBA / CITY
	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.				HHWSP / HCA Eng.	DFO / HWSC / MNR / OSCIA / OMAFRA / RAP
			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)		HCA Eng.	DFO / HWSC / HHWSP / MNR / OSCIA / OMAFRA / RAP
			Work to mitigate non point sediment sources identified in the Watershed Planning Network Priority Remediation Report.		HCA Eng.	DFO / MNR / CITY / HWSP / HHWSP
			Work with contractors to ensure that site clearing prior to development is phased as the project progresses to reduce the area and length of time bare soil is exposed.		HCA Plan.	CITY / HHHBA / DFO
			Work with landowners to reduce sediment loading by implementing BMP projects; e.g. streambank stabilization, riparian buffers, natural channel design.		HHWSP	DFO / HWSC / HCA / MNR / OSCIA / OMAFRA
<b>Site Clearing Prior to Development</b> <b>Map Code: SC</b>		Develop a municipal by-law to serve as a guideline for the management of tree species.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-4	City Nat. Her.	HCA / HWSC / MNR

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Definition: The act of stripping or excavating the vegetation and topsoil from a site prior to construction works.</b>	Host training sessions for City staff, developers and consultants to promote City standards and guidelines related to site preparation prior to development.			Page 71  HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69	CITY Bldg. Serv. / HCA Plan.	DFO / HHHBA
	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			City of Hamilton Draft Private Tree and Woodland Conservation By-Law	CITY Nat. Her.	DFO / MNR / RAP / HHHBA / HWSC / HHWSP
	Work with contractors to ensure that only necessary areas of development sites are cleared prior to development to eliminate the unnecessary destruction of habitat.			City of Hamilton By -Law No. 03-126 Site Alteration By-Law  Erosion and Sediment Control Guidelines for Urban Construction  City of Hamilton By-law for Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the Removal of Topsoil	HCA Plan.	CITY / HHHBA / DFO
<b>Storm Sewer Outfalls</b> <b>Map Code: SO</b>  <b>Definition: The point where a sewer system discharges into a watercourse during a storm event.</b>	Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scouting and girl guide groups and other children's groups, to create awareness regarding the impacts of stormwater on stream systems.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -6, ULM-9, ULM-11, RM-7 Pages, 72, 75, 77, 158	BARC	HCA / RBG / GV / HWSC / HHWSP / CITY
	Promote the City of Hamilton Public Works Stormwater Pollution Solutions for Urban and Rural Residents Outreach Program			Fisheries Act, Section 34	CITY Op. & Main.	HCA / RBG / GV / HWSC / HHWSP
	Promote the Municipal Sewer-Use By-law No. 06-228.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 138, 158-159	CITY Op. & Main.	HCA / RBG / GV / HWSC / HHWSP
		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.			CITY Op. & Main. / HCA Eng.	BARC / RAP / MOE
			Work to implement the recommendations in the sewershed water quality study.		CITY Op. & Main. / HCA Eng.	RAP / BARC / HWSC / DFO / HHWSP

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STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
			Work with City Staff to retrofit outfalls to incorporate erosion control measures such as plunge pools, rip rap, tree planting etc.		CITY Op. & Main.	HCA / RAP / BARC / HWSC / DFO / HHWSP
		Work with Green Venture to develop a Stormwater Mitigation Program.			GV	HCA / RAP / BARC / CITY
			Work with landowners to disconnect downspouts and to install rain barrels.		GV / CITY Op. & Main.	HHWSP / BARC
			Work with landowners to establish riparian buffers and/or erosion protection downstream of storm sewer outfalls; e.g. river stone.		HHWSP	HCA / RAP / BARC / HWSC / DFO / CITY
		Reduce stormwater load to meet the MOE volumetric target of a 90% overflow capture rate for combined sewer systems			CITY Op. & Main.	BARC / RAP/ HCA / GV
		Work toward achieving the final net loading targets for CSO's outlined in the RAP.			CITY Op. & Main.	BARC / RAP/ HCA / GV
<b>Transportation Corridor Expansion</b> <b>Map Code: TE</b>  <b>Definition: The process by which new roads are built or existing roads are widened.</b>	Host training sessions for City staff, developers and consultants to promote BMP's and new environmental technologies relating to transportation corridors; e.g. permeable pavement, wildlife under/overpasses, vegetated filter medians and rights of way, light coloured aggregate in hot mix, etc.			HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69  Ontario Provincial Standards for Roads and Public Works	CITY Op. & Main.	HCA / MTO / HHHBA
		When planning for major road works, design transportation corridors using new technologies for environmental solutions.		Erosion and Sediment Control Guidelines for Urban Construction	CITY Op. & Main.	HCA / MTO / HHHBA
			When repairing roads, utilize new technologies for road maintenance that are proven to have environmental benefits.		CITY Op. & Main.	HCA / MTO / HHHBA
<b>Utility Pipeline</b> <b>Map Code: UP</b>  <b>Definition: Oil and gas conveyance systems.</b>		Review individual utility company emergency protocols for identification of issues, reporting protocols and emergency contacts.			HCA Eng.	CITY / MOE

TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
<b>Water Takings</b> <b>Map Code: WT</b>  <b>Definition: The process by which surface and groundwater are pumped out of the natural system; for the purposes of irrigation, aggregate extraction, etc.</b>		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.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-12 Page 77	HCA Eng.	MNR / MOE
	Encourage landowners with surface water takings to install groundwater systems.			Ontario Water Resources Act O. Reg. 387/04	HHWSP	HCA / OSCIA / MOE / HWSC / OMAFRA
	Encourage landowners with water taking needs to establish an Irrigation Advisory Committee to schedule takings alternately.			OMAFRA Best Management Practices Series – Irrigation Management	HHWSP	HCA / OSCIA / MOE / HWSC / OMAFRA
	Host open houses when experiencing Level 1 low water conditions to address landowner concerns and promote recommended reductions in rates and volumes of takings.			Information to Support a Level III Declaration and Implementation Strategy for the Hamilton Conservation Authority Watershed	HHWSP / HCA Eng.	HCA / OSCIA / MOE / HWSC / OMAFRA
		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.		HCA Protocol Memorandum Ontario Low Water Response Hamilton Conservation Authority Watershed	HCA Eng.	MOE
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote BMP's relating to water conservation technology.				HHWSP	HCA / OSCIA / MOE / HWSC / OMAFRA
			Work with landowners to implement BMP's related to water conservation.		HHWSP	HCA / OSCIA / MOE / HWSC / OMAFRA
			Work with landowners who have groundwater taking systems to decommission unused wells in accordance with the Ontario Water Resources Act.		HHWSP	HCA / OSCIA / CITY
<b>Wildlife Collisions</b> <b>Map Code: WC</b>  <b>Definition: Incidences where</b>			Conduct temporary road closures at known wildlife crossings and nesting sites during peak migration and nesting times.	British Columbia Wildlife Collision Prevention Program Report	CITY Nat. Her.	MNR / HCA / MTO / RBG

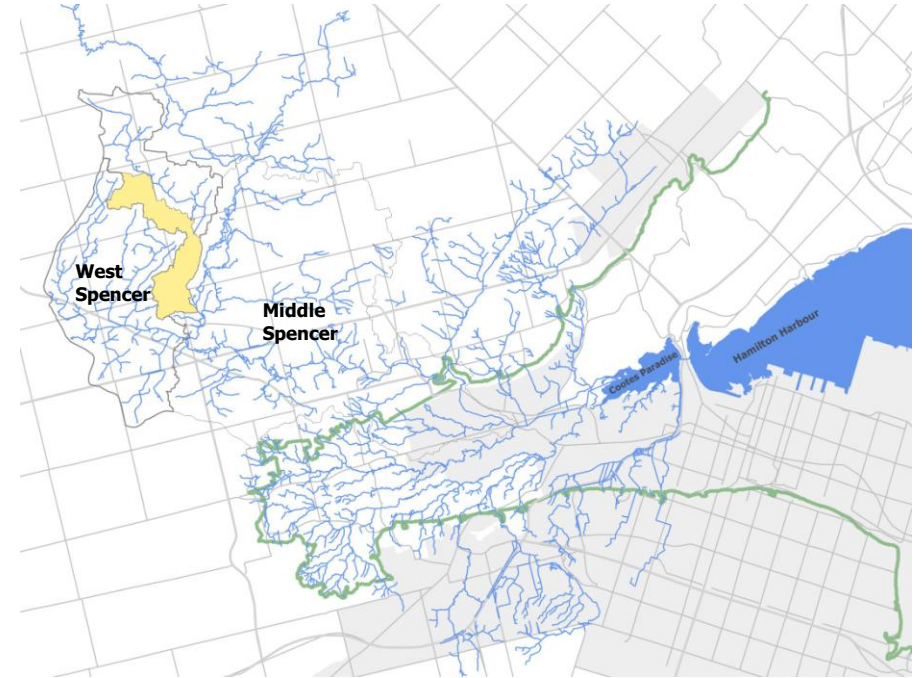


TABLE WO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Awareness Opportunities	Special Study Opportunities	Restoration Opportunities			
animals are 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	CITY Nat. Her.	MNR / HCA / MTO / RBG
			Erect fencing and alternative nesting mounds at known sites for turtle nesting.		CITY Nat. Her.	MNR / HCA / MTO / RBG
		Evaluate the effectiveness of the MTO roadside prairie and wildlife shrub corridor projects in preventing wildlife collisions.			CITY Nat. Her.	MNR / HCA / MTO
			Produce and distribute window decals for large windows of homes and high rise buildings to prevent bird collisions.		HCA Ecol. / CITY Nat. Her.	HHWSP / HWSC / RBG
			Reduce the use of road salt or consider alternatives that do not attract wildlife.		CITY Nat. Her.	MNR / HCA / MTO
	Utilize literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding managing human-wildlife conflicts.				CITY Nat. Her. / HCA Ecol.	MNR / MTO / RBG / HWSC / HHWSP
		When planning major road works, consider the incorporation of wildlife over/underpasses, avoiding known migratory corridors and other wildlife accommodations in the design.			CITY Nat. Her.	MNR / HCA / MTO / RBG
Wildlife Overpopulation Map Code: WO  Definition: When a species population exceeds the carrying capacity of its habitat.	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	HCA Ecol. / CITY Nat. Her.	HHWSP / MNR
			Work to implement the recommendations for sustainable populations in the HCA/MNR Deer Management Strategy.		HCA Ecol. / CITY Nat. Her.	HHWSP / MNR

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		

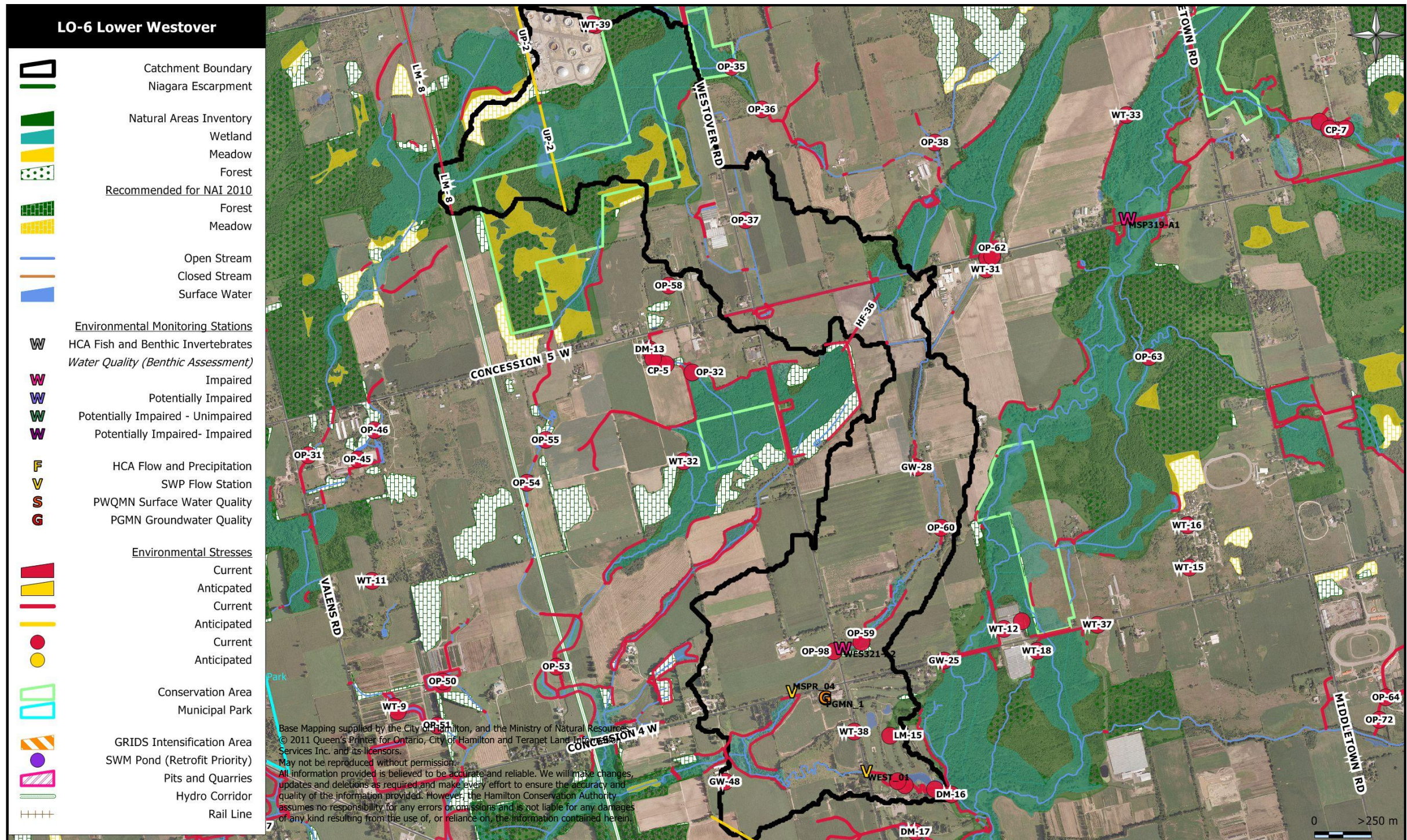


## LOWER WESTOVER CATCHMENT

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### *DATA SHEETS*







LOWER WESTOVER DATA SHEET

Table WO-9: Stresses Identified in the Lower Westover Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
CP-8	Perched Culvert	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
CP-9	Perched Culvert	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
GW-28	Abandoned Groundwater Well	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
GW-48	Abandoned Groundwater Well	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-38	Water Taking	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-37	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-59	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-60	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-97	On-line Pond	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-98	On-line Pond	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
LM-15	Land Maintenance Practices	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
LM-8	Land Maintenance Practices	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
HF-36	Habitat Fragmentation	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
UP-2	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
UP-2	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
UP-1	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
UP-1	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RB-347	Insufficient Riparian Buffer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	



LOWER WESTOVER DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
WES321_A2	19-Jul-10	Brook stickleback	5	n/a	Cool
WES321_A2	19-Jul-10	Central mudminnow	9	n/a	Cool
WES321_A2	19-Jul-10	Common shiner	1	n/a	Cool
WES321_A2	19-Jul-10	Creek chub	3	n/a	Cool
WES321_A2	19-Jul-10	White sucker	4	n/a	Cool

BENTHICS ASSESSMENT

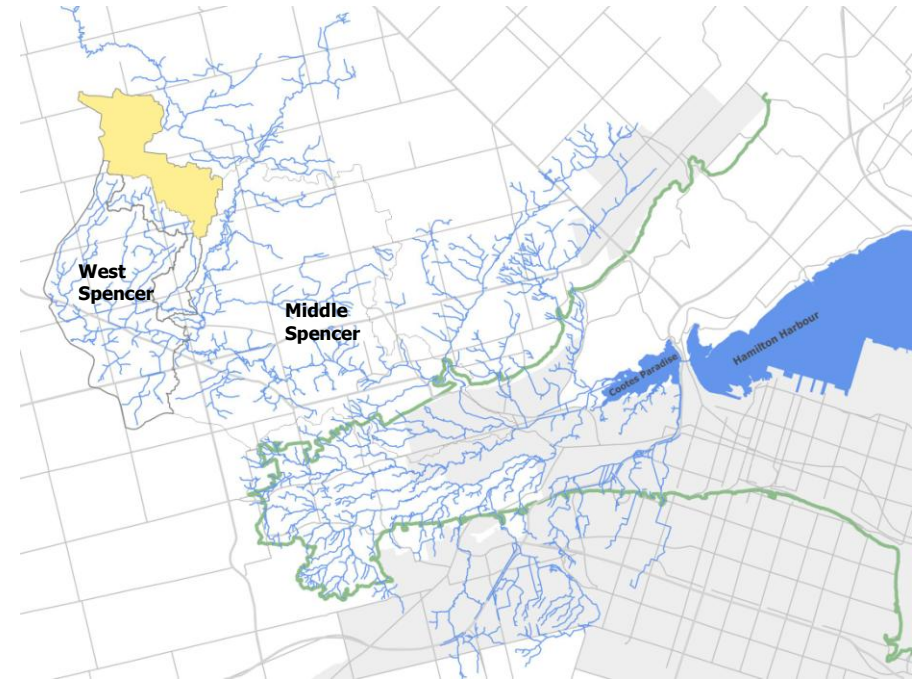
LOCATION	DATE	DESCRPTION
WES321_A2	2010	Impaired

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m³/s
MSPR_04	5/27/2008	0.44022
MSPR_04	7/2/2008	0.562
MSPR_04	8/5/2008	0.64506
MSPR_04	8/27/2008	0.63257
MSPR_04	9/23/2008	0.69281
MSPR_04	10/15/2008	0.61632
MSPR_04	10/23/2008	0.51033
WEST_01	5/27/2008	0.04653
WEST_01	7/2/2008	0.02422
WEST_01	8/5/2008	0.07733
WEST_01	8/27/2008	0.05506
WEST_01	9/23/2008	0.09959
WEST_01	10/15/2008	0.07588
WEST_01	10/23/2008	0.0813

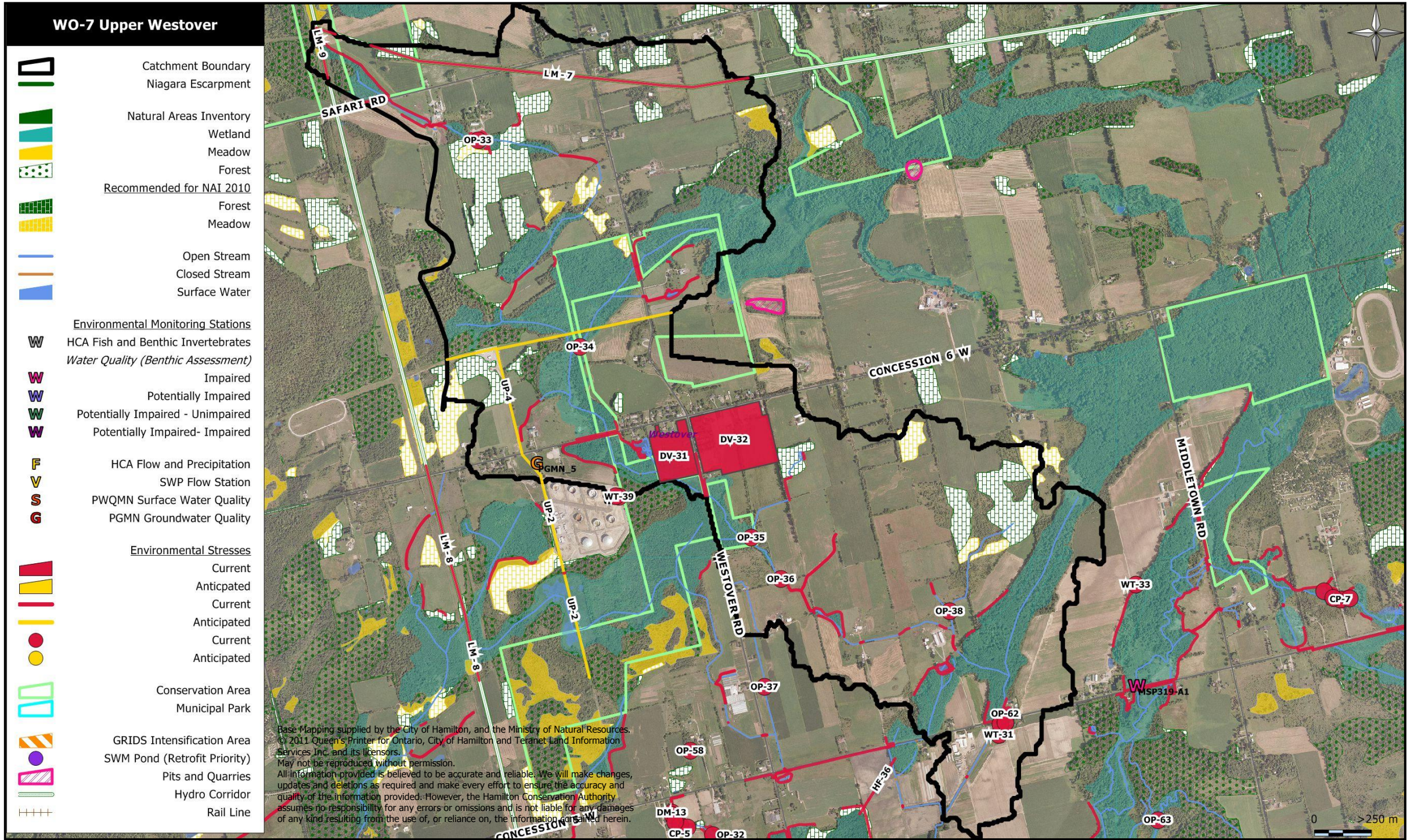


## UPPER WESTOVER CATCHMENT

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### *DATA SHEETS*







UPPER WESTOVER CREEK DATA SHEET

Table WO-10: Stresses Identified in the Upper Westover Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
DV-31	Development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
DV-32	Development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
WT-31	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
WT-39	Water Taking	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-62	Water Taking	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-33	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-34	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
OP-35	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
OP-36	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-38	On-line Pond	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-61	On-line Pond	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-62	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
LM-7	Land Maintenance Practices	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
LM-9	Land Maintenance Practices	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="checkbox"/>
LM-9	Land Maintenance Practices	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
UP-4	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
UP-3	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
UP-2	Utility Pipeline	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RB-53	Insufficient Riparian Buffer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

LOWER WESTOVER CREEK 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

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m³/s

