

FLAMBOROUGH CREEK SUBWATERSHED

STEWARDSHIP ACTION PLAN 2012

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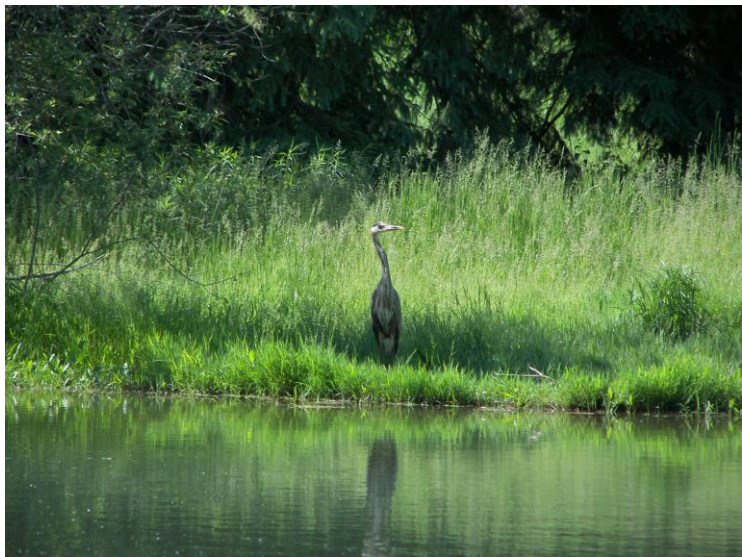
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FLAMBOROUGH CREEK SUBWATERSHED CHARACTERIZATION

GEOGRAPHIC LOCATION

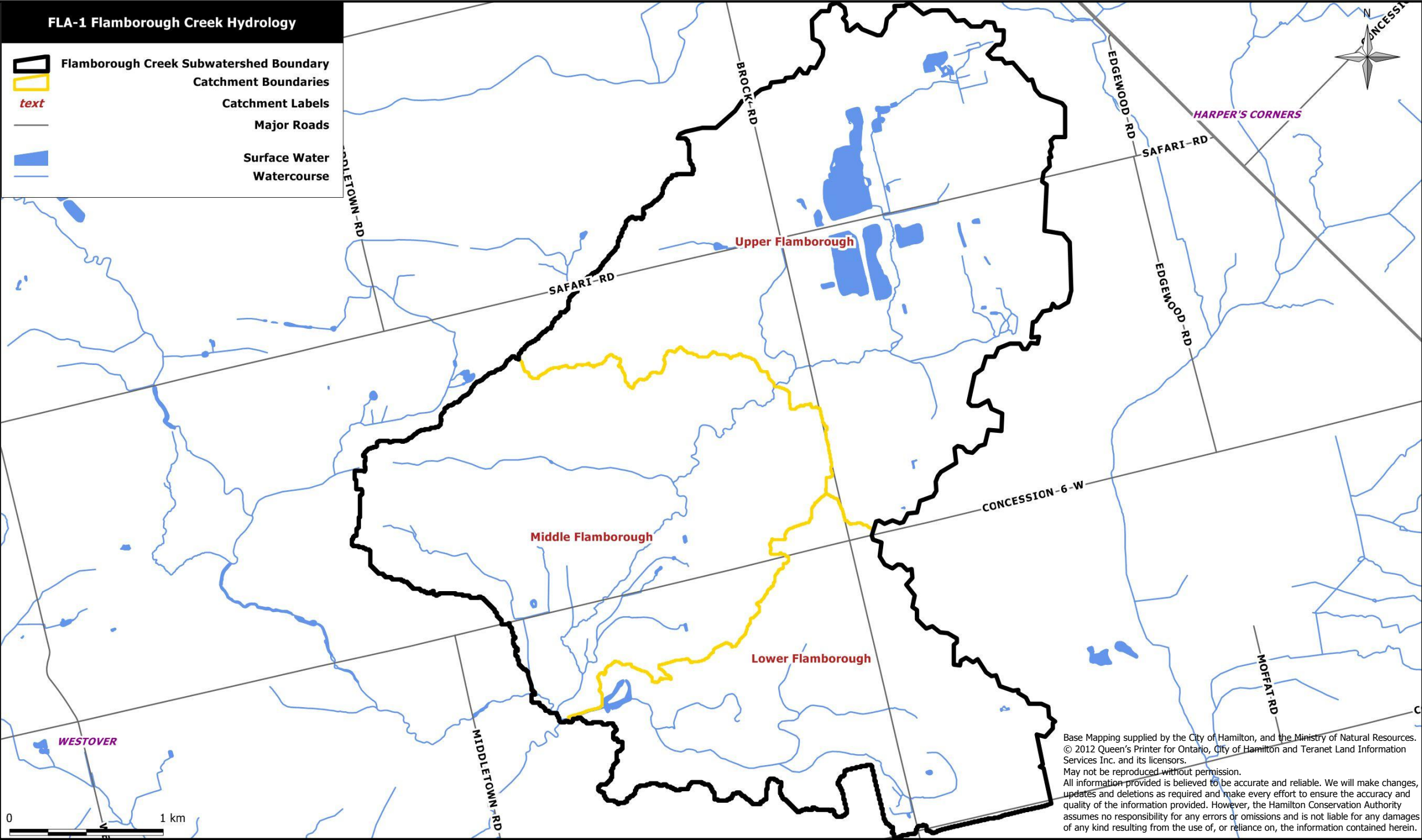
Flamborough Creek subwatershed is 13.29km² in area. It is comprised of three catchment basins. In descending order from the headwaters to the outlet these are: Upper Flamborough, Middle Flamborough and Lower Flamborough (**Map FLA-1**). They are 6.5km², 4.8km² and 3.5km² in size, respectively. This subwatershed lies within the former municipal boundary of Flamborough, and within City of Hamilton Ward 14. The majority of the subwatershed is within West Flamborough Township.

The boundaries of the Flamborough Creek subwatershed and its associated catchments have recently been updated, 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. Specifically, the former catchments of Upper Reach and Lower Reach have both been altered to allow a middle catchment. The remaining portion of Upper Reach catchment is now Upper Flamborough catchment and the remaining portion of Lower Reach catchment is now Lower Flamborough catchment.



Flamborough Creek originates south of Concession 8 West, between Brock and Edgewood Roads. The subwatershed boundary follows a southwestern direction to its westernmost point, immediately west of the area where Middletown Road is bisected by the Westover Drumlin Field. The boundary then follows a southeast direction to its southernmost point at the intersection of Brock Road and Concession 5 West. The boundary then generally follows a northern direction back to where it originates. Flamborough Creek joins Upper Spencer Creek at the southeast corner of Concession 6 West and Middletown Road.

The rural settlement areas of Harper’s Corners and Strabane are near to, but outside of the subwatershed boundaries. Frequently traveled roads within this subwatershed include Safari Road, Brock Road and Concession 6 West.



FLAMBOROUGH CREEK SUBWATERSHED CHARACTERIZATION

HYDROLOGY

Surface Water

Flamborough Creek subwatershed has a drainage area of 13.29km². The length of Flamborough Creek is approximately 6.7 km from the headwaters to the confluence with Middle Spencer Creek, with the combined length of Flamborough Creek and all of its tributaries being 27.4 km.

The Flamborough Creek system is located in West Flamborough. The headwaters of this system occur to the west of Highway 6 near Carlisle. In the upstream part of this system, the creek has three branches and an intermittent stream which collectively become Flamborough Creek. This creek joins Upper Spencer Creek near Middletown Road and Concession 6 West (HHSWP, 2008).

Flamborough Creek tributaries drain drumlins and a two kilometer long esker that lie at the perimeter of the limestone and sand plains of the subwatershed. The tributaries also drain the Hayesland Alvar and Hayesland Swamp ESA's (HHSWP, 2010).

For a more detailed description of the hydrology of Flamborough Creek 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 Flamborough Creek as having a good surface water quality score at two monitoring stations. The Assessment Report did identify the Flamborough Creek subwatershed as having a significant monthly surface water threat based on monthly demand on the water supply. However, since there are no surface drinking water intakes in this subwatershed no Tier 2 report is recommended for this subwatershed. 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 Flamborough Creek subwatershed. There are also no surface water quality sampling stations within this subwatershed.

Groundwater

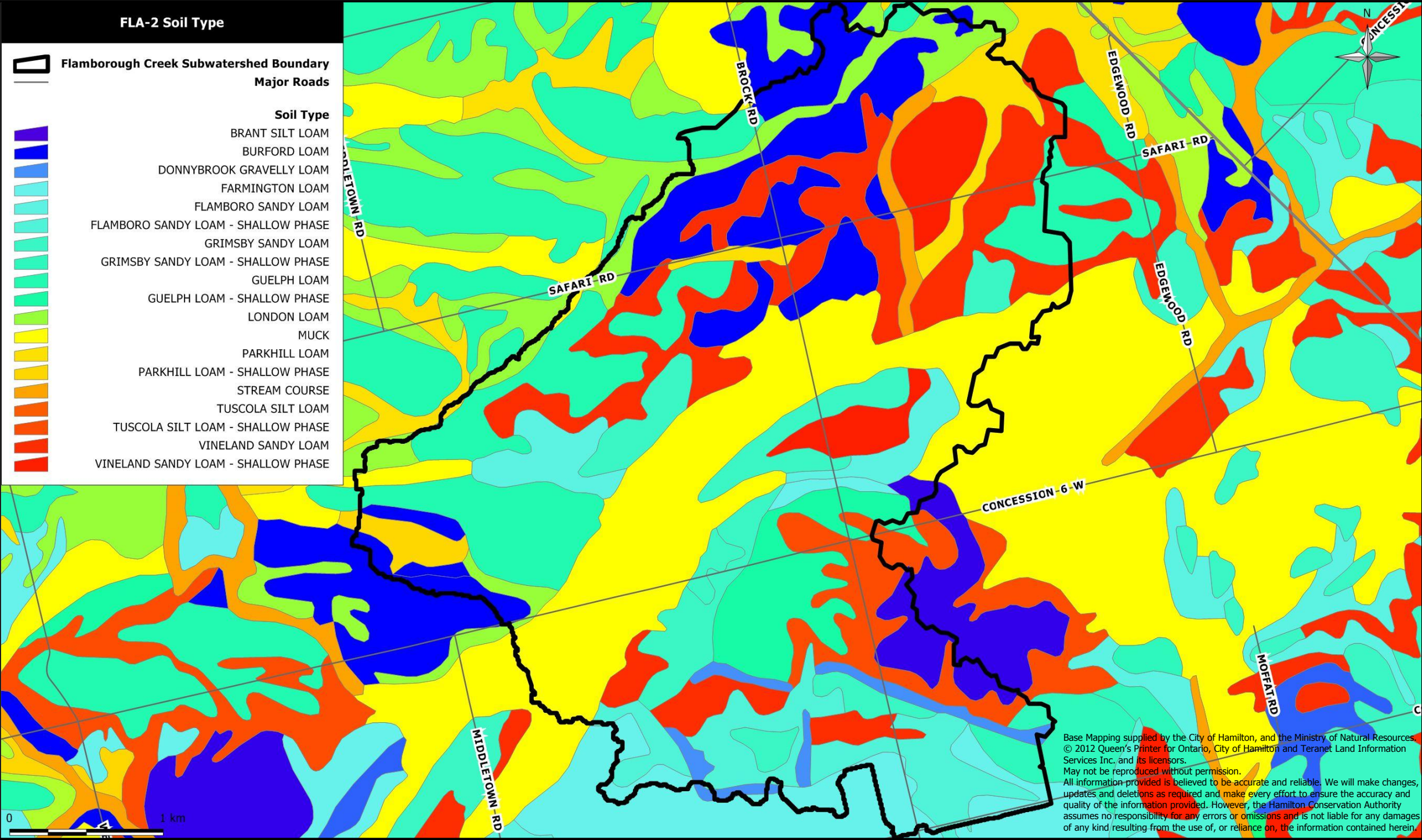
Flamborough Creek originates above the Escarpment and receives groundwater discharge from the Hayesland Swamp. This is an extensive swamp that extends eastward into Conservation Halton's jurisdiction, and also westward into other subwatersheds in the Spencer Creek watershed (HHSWP, 2008)

The HHSWP 2010 Draft Proposed Assessment Report identified the areas of the Flamborough Creek subwatershed to be a significant ground water recharge area. The majority of those areas have also been identified as highly vulnerable aquifers.

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 Flamborough Creek subwatershed. Therefore no Tier 2 report is recommended for this subwatershed.

There are no Provincial Groundwater Monitoring Network wells within the Flamborough Creek subwatershed.





FLAMBOROUGH CREEK SUBWATERSHED CHARACTERIZATION

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, 2008). 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 Wisconsinan 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 Hamilton Watershed is situated adjacent to the Horseshoe Moraines physiographic region as defined by Chapman and Putnam (1984). Within the study area, the eastern limb of the Horseshoe Moraines physiographic region is characterized by northeast-southwest trending bands of hummocky terrain contacting three distinct end Moraines, from northwest to southeast: the Paris, Galt and Moffat Moraines, as defined by Karrow (1987). The position of each of these moraines represents a pause in the recession of the Ontario glacial lobe. The moraines are comprised of relatively thick accumulations of sandy till with a high boulder and pebble content, consisting of Paleozoic clasts and Precambrian glacial erractics, overlying dolostone bedrock. The topographically elevated lands of the Galt Moraine form the major surface drainage divide along the northwest boundary of the Watershed.

In some areas the moraines are hummocky with local relief of 30m or more, steep irregular slopes and basins of closed drainage, as characterized by frequent small ponds and marshy areas. The moraines are associated with broad and extensive terraced deposits of glacial outwash and kame sand and gravel deposits. Extensive wetland areas are generally found associated with the glacial outwash deposits within these lower lying areas. Series of northwest-southeast trending drumlins are situated to the north and south of the moraines (Karrow, 1987).

The thickness of the overburden over bedrock ranges up to 30 to 35m or more along the crests of the Paris and Galt Moraines. The areas of thickets accumulation generally correspond with the surface water drainage divides.

The orientation of the Paris, Galt and Moffat end moraines, drumlins, and glacial striae in the area suggest a northwestward movement of ice from the Lake Ontario basin (Karrow, 1987). The moraines likely represent a series of recessional end moraines with Paris Moraine being formed first followed by the Galt and Moffat Moraines, respectively. The outwash plain situated between the Paris and Galt Moraines was likely formed primarily by glacial meltwater associated with the formation of the Galt Moraine during a temporary halt in the ice retreat.

In the northern portion of the Spencer Creek watershed, the Guelph drumlins rest on dolostones of the Amabel and Guelph Formations. The till in these drumlins is loamy and calcareous, and was derived mostly from dolostone of the Amabel Formation, exposed along the Niagara Escarpment (Chapman and Putnam, 1984). The till throughout is stony with large surface boulders being more numerous in some localities than others. The drumlins create local relief in an otherwise relatively flat landscape and influence surface water drainage patterns.

Westover, an Earth Science Area of Natural and Scientific Interest, is located within the Flamborough Creek subwatershed. This area is designated because it includes features of the glacial lakes, Whittlesey and Warren, which formerly occupied the Lake Erie basin (HHSWP, 2010).

There is an esker in Flamborough Creek Subwatershed. An esker is a long, winding, narrow ridge of sorted sands and gravels. These formed when sediments were deposited in a stream flowing within or beneath glacial ice. The esker in Flamborough Creek has a “Y” shape with two branches and stretches two kilometers in length (HHSWP, 2010).

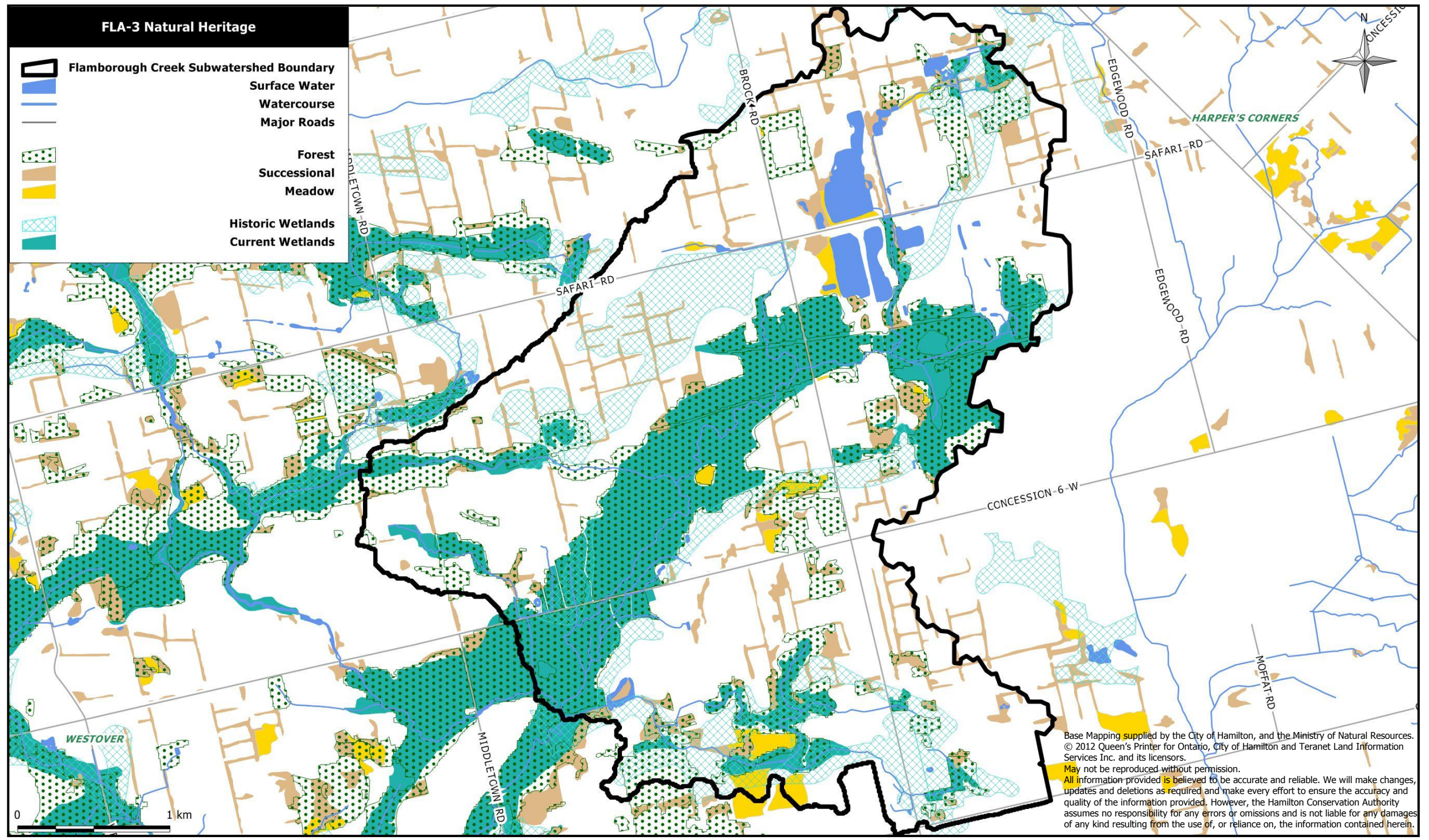
There are several types of soils within the Spencer Creek Watershed. In the Fletcher Creek, Upper Spencer Creek and Flamborough Creek tributary systems of the Spencer Creek Watershed, soil classes are dominated by sandy loam, loam and organic soils. Soils are sandy loams in the northern areas of the Fletcher Creek and Upper Spencer Creek subwatersheds. In the middle and lower area of these subwatersheds, soils are loamy and organic. Throughout the extensive Beverly Swamp area in the watershed, organic deposits have accumulated. On the periphery of the continuous wetland in the swamp area, small patches of other soils are locally present. These soils are well-drained Farmington loam on bedrock ridges and imperfectly to poorly drained loams of the London, Killean, Parkhill and Lily series. (Hamilton Naturalists’ Club, 2003)

Within the Flamborough Creek subwatershed, there are thirteen soil types/complexes (HRCA, 2000a) **Table FLA-1**. A variation of soil characteristics is observed throughout the subwatershed. Due to the variation of soil characteristics, the natural drainage of the soil ranges from poorly drained to well drained and the erosion potential ranges from very low to high. However, for lands adjacent to the creek in this subwatershed, overall most of the soil types have very low soil erosion potential (Canadian Department of Agriculture, *et al*, 1965). The soil characteristics of the Flamborough Creek subwatershed are shown on **Map FLA-2**.

Table FLA-1: Soil and Erosion Potential in the Flamborough Creek Subwatershed

Soil Type	Natural Drainage	Erosion Factor	Topography (slope)	Erosion Potential
Bu – Burford loam	Well	4	6-9	Moderate
Fl – Farmington loam	Well	1	6-9	High
Fo – Flamborough sandy loam	Poor	4	0.5-2	Very Low
Gi – Grimsby sandy loam	Well	4	2-5	Very Low
Gi – Grimsby sandy loam	Well	4	6-9	Moderate
Gl – Guelph loam	Well	1	2-5	Moderate
Gl – Guelph loam	Well	1	6-9	High
Gs – Guelph loam – shallow ph.	Well	1	6-9	High
LI – London loam	Imperfectly drained	2	0.5-2	Very Low
LI – London loam	Imperfectly drained	2	2-5	Moderate
PI – Parkhill loam	Poorly drained	2	0.5-2	Very Low
Ps – Parkhill loam – shallow phase	Poorly drained	2	0.5-2	Very Low
Tp – Tuscola silt loam – shallow ph.	Imperfectly drained	2	0.5-2	Very Low
Vi – Vineland sandy loam	Imperfectly drained	4	2-5	Very Low
Vs – Vineland sandy loam – shallow ph.	Imperfectly drained	3	0.5-2	Very Low
M – Muck	N/A	N/A	N/A	N/A

* Based on the Region of Hamilton-Wentworth Soil Summary Sheet
** Based on the Ontario Environmental Farm Plan Workbook, Ontario Farm Environmental Coalition
***Based on average topography in the subwatershed



FLAMBOROUGH CREEK SUBWATERSHED CHARACTERIZATION

NATURAL HISTORY & SIGNIFICANT SPECIES

This subwatershed reaches into two municipally designated environmentally significant areas (ESA's): Hayesland Swamp and Strabane Southwest Drumlins. These natural areas are critical habitat and migratory corridors for terrestrial and aquatic species. Biophysical attributes of these areas were assessed in the Hamilton Natural Areas Inventory Nature Counts Project (Dwyer *et al.*, 2003).

Natural vegetation covers 4.8km² or 36% of Flamborough Creek subwatershed. The Hamilton Conservation Authority owns a small portion of this natural area as they own 0.3km² or 2% of the lands within the subwatershed. The current natural land cover statistics for the area are noted within Table FLA-2. Based on the digital data provided for this analysis, forest cover accounts for 29% of this subwatershed, while meadow cover is 1.7% of the land base. Stream length of Flamborough Creek and all its tributaries is 27.4km.

Map FLA-3 illustrates that current wetlands cover 2.9 km² or 22.0% of the Flamborough Creek subwatershed. All of these wetlands are designated as Provincially Significant by the OMNR. Ontario's wetlands are evaluated through the OMNR Wetland Evaluation System (1993) for their biological, social, and hydrological components and special features. A wetland that is scored high in all four categories will receive a higher class ranking, with Class 1 being the highest.

Historical wetlands mapping showed 2.8km² of wetlands in this subwatershed were lost before 1967 or between 1967 and 1982. Historical information was not recorded for forest or meadow cover. Although, it is known that land use throughout the 20th century altered the natural heritage systems within this southern Ontario and that 90% of the original upland woodlands were converted to non-forest land uses by 1920 (Larsen et al., 1999). However over the past eighty years many natural areas have regenerated.

Table FLA- 2: Natural Land Cover Statistics

Forest Cover (km ²)	Wetland Cover (km ²)	Meadow Cover (km ²)	Stream Length (km)
3.9	2.9	0.23	27.4

Portions of the provincially significant Hayesland Swamp are located within the Flamborough Creek subwatershed. This is an extensive swamp that extends eastward into Conservation Halton's jurisdiction, and also westward into other subwatersheds in the Spencer Creek watershed (HHSWP, 2008).

The Hayesland Swamp is mostly comprised of extensive swamps with scattered patches of marsh, wet meadow, and tall, shrub thicket swamp communities. The extensive forested area provides a refuge for species requiring large tracts of undisturbed forest, and also includes a small heronry and deeryard. As an aftermath of peat extraction activities, the southeastern portion of the wetland includes a large area of open ponds and marsh habitats, both of which are uncommon communities in the City of Hamilton and support rare and uncommon species (Dwyer et al., 2003).

The Strabane Southwest Drumlin Field study area consists of a strip of riparian habitat along a 2 km segment of the Spencer Creek corridor and two belts of wooded vegetation, which extend east across the Strabane-Westover Drumlin Field. The drumlins on this field are active agricultural lands; natural vegetation is mostly confined to the poorly-drained valleys. This area provides ecological linkages along the Spencer Creek riparian corridor, between the Beverly Swamp and Hayesland Swamp wetland complexes, and across the Spencer Creek-Bronte Creek watershed divide (Dwyer et al., 2003).



FLAMBOROUGH CREEK SUBWATERSHED CHARACTERIZATION

NATURAL HISTORY & SIGNIFICANT SPECIES

Numerous fisheries and benthic macroinvertebrates monitoring stations have been sampled in Flamborough Creek between 1970 and 2011. 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 three ecological monitoring stations in the Flamborough Creek subwatershed. Two of the monitoring stations are in the Upper Flamborough catchment; the third station in the Middle Flamborough catchment. All stations will be monitored in Year 1 of a three year cycle. The first year of fisheries data from the three year cycle are listed in the catchment datasheets in the remainder of this document. The first year of benthic data is not currently available due to the incomplete status of the Ontario Benthos Biomonitoring Network on-line database. However, all other available data for these and other historic monitoring stations are included in Appendix B.

Although the ARMP includes a number of annual monitoring stations throughout HCA's watersheds, there are no annual stations in the Flamborough 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 Flamborough), 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 Upper Spencer Creek, Fletcher Creek and Flamborough Creek subwatersheds have all been historically characterized as coldwater fish habitat (Department of Commerce and Development, 1960). The watercourses in these subwatersheds maintain coldwater conditions throughout the year largely due to the presence of substantial groundwater discharge, extensive intact riparian forest cover, and negligible amounts of impervious cover (Dwyer *et al.*, 2003; HCA, 2005a). As a result, reproducing brook trout populations still persist in these subwatersheds (HCA; 1993, 1995, 1998, 2000, 2005c). Endemic to North America, brook trout (*Salvelinus fontinalis*) occur in clear, cool, well-oxygenated streams and lakes that are heavily fed by groundwater and maintain temperatures below 20°C (Scott and Crossman, 1973).

Other cold to coolwater indicator species, including mottled sculpin (*Cottus bairdi*), northern red belly dace (*Phoxinus eos*), finescale dace (*Phoxinus neogaeus*) and pearl dace (*Margariscus margarita*) have been recorded in these subwatersheds in various studies (HCA; 1993, 1995, 1998, 2000, 2005c). Mottled sculpin occurs in cool streams and lakes across Canada, and are most associated with habitats containing brook trout (Scott and Crossman, 1973) Pearl, finescale and northern redbelly dace are commonly found together and are typically associated with coolwater habitats in bogs, creeks and lakes throughout Ontario (Scott and Crossman, 1973).



FLAMBOROUGH 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 Flamborough Creek subwatershed.

Not at Risk

- Brown Snake
- Caspian Tern
- Eastern Bluebird
- Northern Harrier
- Northern Leopard Frog
- Red-tailed Hawk
- Sharp Shinned Hawk
- Western Chorus Frog

Special Concern

- Canada Warbler
- Eastern Milksnake
- Monarch
- Snapping Turtle

Threatened

- Bobolink
- Canada Warbler
- Cerulean Warbler
- Eastern Meadowlark
- Least Bittern

Endangered

- Acadian Flycatcher
- Cerulean Warbler

The COSEWIC and COSSARO statuses do not 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.

Species with Recovery Strategies

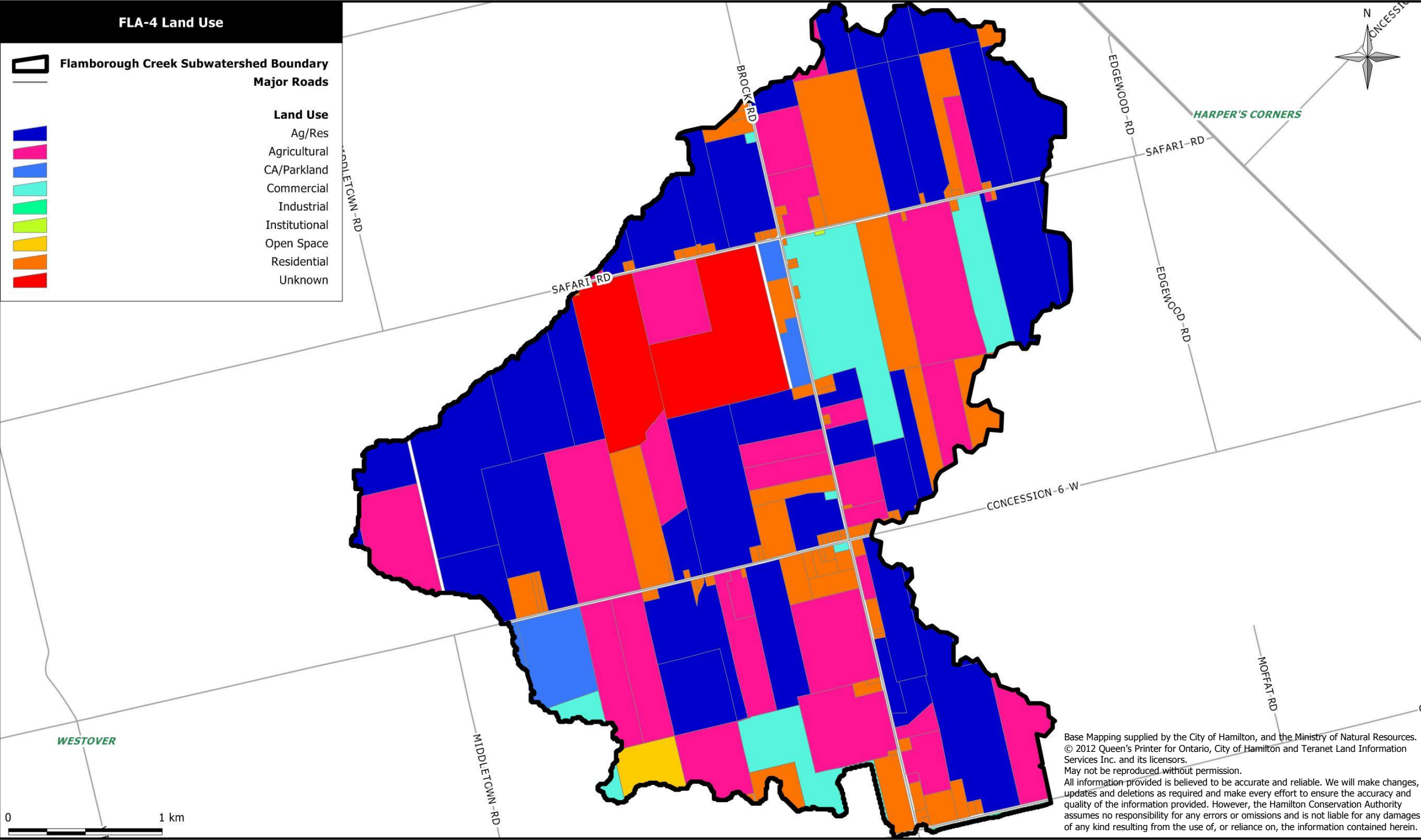
Species

Acadian Flycatcher

Recovery Strategy Status

Completed and available





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). Established in 1792, the Township of Flamborough was named after a prominent geographical formation, the Flamborough Head, and the Town of Flamborough in East Yorkshire, England (Hamilton Public Library Board, 2011).

Surveying of the townships of Ancaster, Beverly and Flamborough started in 1793 and the two Flamboroughs were created 5 years later (Spencer Creek Conservation Authority, 1965). In 1816, Flamborough Township became a part of the newly formed Halton County. With the massive reorganization of the county system completed in 1854, Flamborough was divided into two separate townships, East and West Flamborough, each with their own reeve, township hall, etc. (Hamilton Public Library Board, 2011). Wentworth arose in its present form in 1855.

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 (Spencer Creek Conservation Authority, 1965).

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 was undesirable because it was swampy or it had rock lying close to the surface (Spencer Creek Conservation Authority, 1965).

Table FLA-3: Land Use Statistics

Area (km ²)	Agricultural (km ²)	Commercial (km ²)	Industrial (km ²)	Institutional (km ²)	Open Space (km ²)	Residential (km ²)	Utility (km ²)	Impervious Surfacing (%) 1997 Study Data	Impervious Surfacing (%) 1997 Study Predicted Increase
13.29	9.89	1.08	0.01	0.002	0.47	1.97	1.22	0.2	0

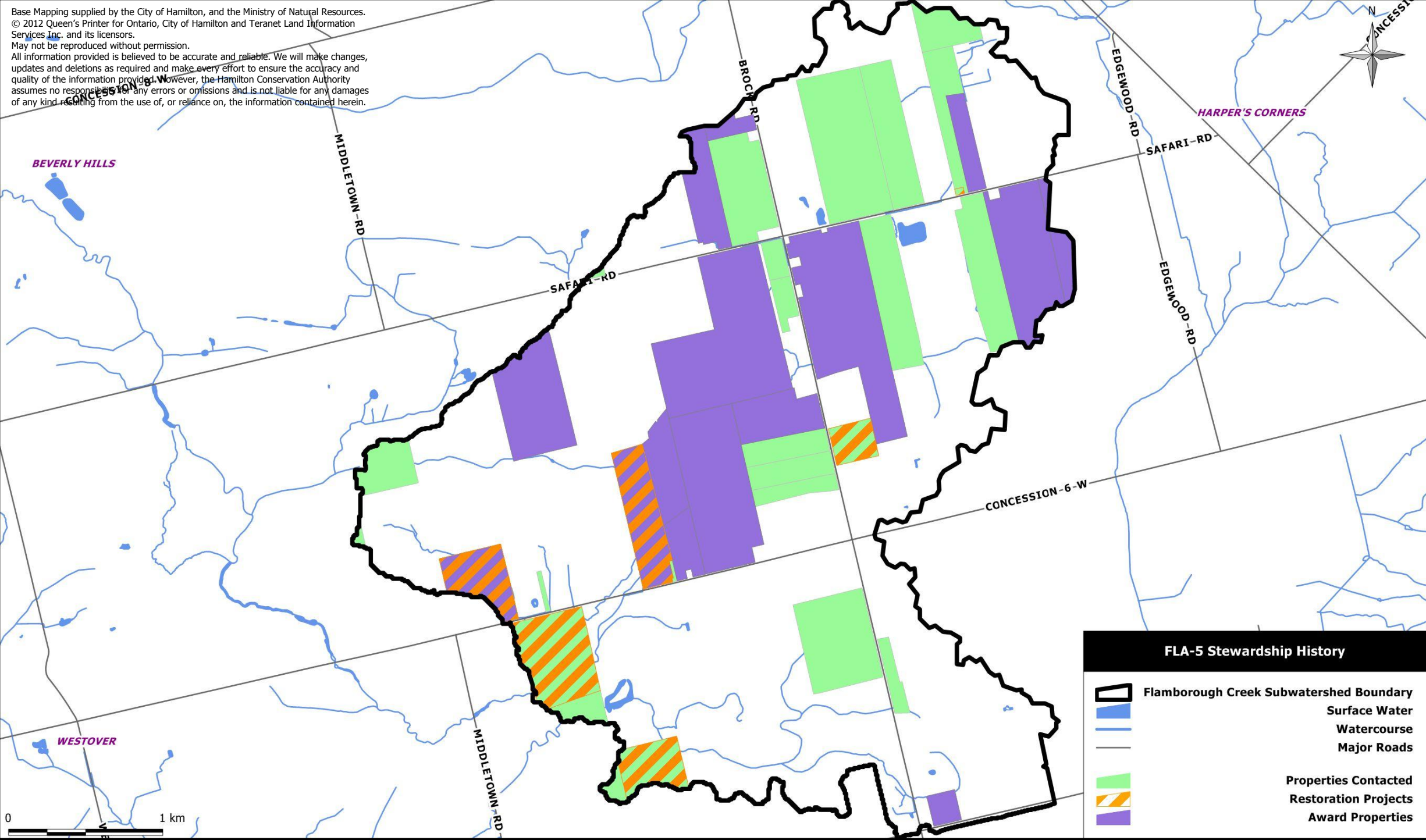
Because West Flamborough was closer to the earlier settlements, was adjacent to a water highway at Cootes Paradise, and had arable soil, settlers were attracted into the area before they went into Beverly (Spencer Creek Conservation Authority, 1965).

By the time the Spencer Creek reached West Flamborough, the water from its many small tributaries so increased the available power that larger mills could be built than those in Beverly. The mills in Beverly were designed primarily to fill the needs of the pioneers; the mills in Flamborough were large enough to produce some surplus goods for export. Instead of only saw and grist mills, West Flamborough had a much greater variety and because it was settled earlier, mills were built sooner than in Beverly (Spencer Creek Conservation Authority, 1965).

Currently, the approximate population of the Flamborough Creek subwatershed is approximately 428 persons with a population density of approximately 32 persons per square kilometer, less than that of the more urbanized subwatersheds within Spencer Creek.

Current land use within the Flamborough Creek subwatershed is predominantly agricultural with residential, utility corridors and commercial lands being the secondary land uses (Table FLA-3). Residential land use is concentrated at the intersections of major transportation routes and in the settlement areas of Strabane and Harper’s Corners, which are immediately outside of the subwatershed boundary. Some institutional lands are distributed throughout the subwatershed to support local residents and the agriculture industry (Map FLA-4).

Base Mapping supplied by the City of Hamilton, and the Ministry of Natural Resources.
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FLAMBOROUGH CREEK SUBWATERSHED CHARACTERIZATION

STEWARDSHIP HISTORY

There are numerous significant properties within this subwatershed that incorporate large tracts of natural features. There are 107 properties that contain forest, wetland, meadow or riparian / aquatic habitat (**Table FLE-4**). Of these landowners, 36 (or 34%) have been contacted by the Hamilton-Halton Watershed Stewardship Program (HHWMS), and 15 (or 14%) of those have become Watershed Stewards (**Table FLE-4**). Therefore, there is considerable potential to reach the remaining 66% of landowners with natural features to create awareness regarding environmental stewardship of 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 lands that have worked with the Watershed Stewardship Program are in the Upper and Middle Flamborough catchments. Therefore, landowner contact would be best focused in the Lower Flamborough catchment. There is a significant tract of natural area, the Hayesland Wetland Complex, in the all three catchments and as such, the Watershed Stewardship Program should consider this area for future outreach initiatives.

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

This subwatershed exceeds Environment Canada’s How Much Habitat is Enough 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 narrowly misses the habitat guidelines for forest cover. Forest cover would need to be increased by 0.13km² 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 32.3 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 FLA-4: Stewardship Statistics

Approximate Population	Population Density (persons / km ²)	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
428	32	107	36	15	43	16

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

PARAMETER	% Wetlands	% Stream Naturally Vegetated	Total Suspended Sediments	% Impervious Surfacing	Fish communities	% Forest Cover	Size of largest Forest patch km ²	% 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 ² & min 500m wide	10% < 100m from forest edge
SUBWATERSHED STATUS	22.0	20.8		0.2	coldwater	29.0	1.35	100m – 4.36% 200m – 0.77%

It is of note that when last evaluated, the area of impervious surfacing within this subwatershed did not exceed the Environment Canada standards recommended for healthy stream systems. Given the protected nature of these natural areas, it is unlikely that the area of impervious surfacing in this subwatershed will ever exceed Environment Canada’s standards. In 2004, the HCA developed the Flamborough Creek Subwatershed Plan to evaluate and expand upon stresses and opportunities identified in the Spencer Creek Watershed Management Plan (1997), in order to recommend management and monitoring strategies at the subwatershed level. This Stewardship Action Plan further builds on the recommendations from the Subwatershed Plan with the continued aim to restore or enhance natural features, improve water quality and water supply, and promote land stewardship.

The Subwatershed Plan recommended that the ecological link between Hayesland Swamp and Westover Lowland Forest and Drumlin Field presents the most significant opportunity for ecological link improvement in the Flamborough Creek subwatershed. The plan noted that there are several small hedgerows that already provide a vegetated corridor for wildlife migration, and there may be potential for future tree planting and naturalization initiatives to increase the natural habitat associated with this corridor. The Implementation Team and the Watershed Stewardship Program should consider this area for future outreach and restoration initiatives.

In 2009, the Department of Rural Planning and Development at the University of Guelph developed the Collaborative Approaches to Stewardship of Rural Water Quality Guidebook. Flamborough Creek subwatershed was a pilot area for the development and implementation of the guidebook. The Flamborough Creek Watershed Stewardship Report summarized the findings of the pilot project.

The report was mainly developed through interviews and workshops with private landholders and land managers who live and/or work the land in the Flamborough Creek watershed. Government agencies such as Conservation Authorities also provided input in the form of knowledge about the watershed, or programs which provide assistance or funding to landowners to do stewardship. Findings included the types of actions landowners are already taking, as well as their views on what the main priorities are for stewardship to maintain water resources in the watershed. These findings were used to come up with a list of priorities for water stewardship. Based on the research results and an understanding of how stewardship can make a difference in the watershed, there are four general areas that were identified: property-level plans for stewardship, maintaining important natural features, protecting ground and surface water supply and protecting ground and surface water quality. During the research process the local landowners who participated in the project developed a vision for the initiative.

“Our vision is to improve the quantity and quality of the water in the watershed through undertaking, and educating others about, sound environmental and conservation practices. This vision includes the continued prosperity of sustainable businesses in the watershed. Natural and changing environmental cycles need to be considered in any and all plans and efforts for watershed improvement” (McKay, 2009). This vision closely relates to the goals of the Stewardship Action Plan. Those implementing the Action Plan will refer to this vision for guidance and direction when developing programs and services for this area.

STRESSES & STEWARDSHIP ACTIONS

There are thirty eight types of *stresses* identified as negatively impacting the Spencer Creek Watershed. Many of the stresses currently affect the Flamborough Creek subwatershed. Those stresses that are not applicable to Flamborough 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 FLA- 7**. The two most prevalent stresses identified in the Flamborough Creek Subwatershed are insufficient riparian buffers and water takings. **Table FLA-8** outlines *Stewardship Actions* that have been developed to mitigate the impacts of these and the remaining stresses listed in **Table FLA-7**.

Specific locations where these stresses are occurring are mapped and inventoried in the subsequent catchment datasheets. Within the Flamborough Creek subwatershed, 133 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. The specific occurrences of many stresses were identified using geographic information systems analyses, using the best available data; however they should be groundtruthed for accuracy before planning for the implementation of related stewardship actions.

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 and wetland boundaries 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 should be a primary focus. 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 seven active permits to take water on Flamborough 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. The Environmental Farm Plan and associated cost-sharing programs that provide technical and financial assistance for water conservation equipment should be promoted throughout this subwatershed.

There are numerous residences and two campgrounds in this subwatershed. The maintenance and care of household and communal septic and wastewater systems and groundwater wells should be a focus of education and outreach programming to preserve the quality and quantity of drinking water as well as aquatic habitat in this area.

Land acquisition and regulatory protection of wetlands should continue in this subwatershed to enhance connectivity and improve wetland function. Wetlands filter water, provide storage for rain water and snow melt, preventing flooding, and release water in low water conditions.

Encroachment into natural areas should be prevented through education and outreach and regulatory enforcement. Where possible, encroachment should be remediated through community volunteer events.

There is a memorandum of understanding between Conservation Ontario (and its 36 member Conservation Authorities) and Hydro One. It is a protocol that is used when Hydro One undertakes maintenance or new service installation work on lands regulated under the Conservation Authorities Act as well as on CA owned-lands. There is a communication process to be followed for both planned and emergency work to allow CA staff to provide early guidance regarding protection of environmentally significant lands. There is also a best management practices section that provides guidelines for Hydro One activities in natural hazard and/or environmentally sensitive lands to minimize any negative impacts to these areas. The protocol is implemented on hydro corridors throughout the subwatershed.

This subwatershed is within the study area for the Niagara GTA Corridor, formerly known as the Mid Peninsula Highway. As a result of the findings of the *Niagara to GTA Corridor Planning and Environmental Assessment Study, Phase 1*, the Province is currently studying the option of a new highway corridor that would run through this subwatershed from Hwy. 403 to Hwy. 401. Members of the implementation team have been, and will continue to provide comment to this study as it progresses in an effort to minimize environmental impacts to the greatest extent possible.

CATCHMENT SUMMARIES

This section of the plan identifies the occurrences of stresses within each catchment of Flamborough 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.

TABLE FLA-7: Stresses Inventory by Catchment

Recent ecological monitoring data for each catchment is also outlined following each catchment map. In total, 133 stresses were identified for the Flamborough Creek Subwatershed and inventory counts are presented in **Table FLA-7**.

STRESS	MAP CODE	NO. IN SUBWATERSHED	NO. IN EACH CATCHMENT		
			Upper Flamborough	Middle Flamborough	Lower Flamborough
Abandoned Groundwater Wells	GW	1		1	
Buried Stream	BS				
Channelization	CH				
Combined Sewer Overflow	CSO				
Dam	DM	2	2		
Debris Jam	DJ				
Detachment from Nature	DT				
Development	DV				
Encroachment	EN				
Erosion	ER				
Faulty Septic System	SS				
Fluctuating Water Level	WL				
Habitat Fragmentation	HF				
Illegal Fill Placement	FP				
Inadequate Stormwater Management	SW				
Increased Impervious Surface	IS				
Insufficient Riparian Buffer	RB	122	59	38	25
Invasive/Introduced Species	IV	1	1		
Landfill Leachate	LL				
Land Maintenance Practices	LM				
Litter	LI				
Migration Barrier	MB				
Nutrient Loading	NL				
Online Pond	OP				
Outdoor Recreation Related Impacts	OR				
Perched Culvert	CP				
Pesticide Use	PS				
Plowed Watercourse	PW				
Runoff Contamination via Transportation Corridors	TC				
Sediment Loading	SL				
Site Clearing Prior to Development	SC				
Stormsewer Outfall	SO				
Transportation Corridor Expansion	TE				
Utility Pipeline	UP				
Watercourse Enclosure	WE				
Water Taking	WT	7	7		
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 FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
Abandoned Groundwater Wells Map Code: GW 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.	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 / GV / HCA
	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.				CITY E&SI / HHWSP	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 / GV / HCA
			Work with landowners to decommission abandoned groundwater wells.		HHWSP	CITY / GV / HCA
Buried Streams Map Code: BS Definition: The structural alteration of a stream channel, involves piping the creek system underground, eliminating aquatic habitat.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy creeks and the benefits of maintaining our creeks and streams in their natural state.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4, F-11, F-12, PAA-2 and ULM-2 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 Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines	HHWSP / HWSC	DFO / HCA / MTO / RAP / WPN
		Undertake a feasibility and prioritization study for “daylighting” buried streams in the study area.			CITY E&SI	DFO / HCA / HHWSP / MNR / MTO / RAP
			Work with landowners to undertake daylighting projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.		HHWSP	CITY / DFO / HCA / HWSC

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
Channelization Map Code: CH Definition: The structural alteration of a stream channel, usually involves straightening of meanders and increasing gradient which increases velocity and erosion potential.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy creeks and the benefits of maintaining our creeks and streams in their natural state.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4, F-11, F-12, PAA-2 and ULM-2 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	HHWSP / HWSC	CITY / FSRT / HCA / RAP / RBG / WPN
		Undertake a feasibility and prioritization study for restoring channelized creeks to those with a natural design.			CITY E&SI	DFO / HCA / HHWSP / MNR / RAP
			Work with landowners downstream of channelized sites to rehabilitate the riparian zone to reduce flow velocities, erosion and sedimentation.		HHWSP	CITY / DFO / HCA / HWSC / RBG
			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	CITY / DFO / HCA / HWSC
Dams Map Code: DM Definition: a barrier to obstruct the flow of water, usually one of earth or masonry, built across a stream or river. (*Also includes weirs formerly map code WR)	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: Recommendations FW-4, F-11 and PAA-2 HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55 Fisheries Act, Section 37 Hamilton Conservation Authority Dam Inventory Project In-stream Barrier Assessment for the Hamilton Harbour AOC.	HHWSP	DFO / HCA / HWSC / MNR
	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.				HHWSP / HWSC	DFO / HCA / MNR
		Undertake a feasibility and prioritization study for the removal of dams inventoried.			HCA Eng. / MNR	HHWSP / HWSC
			Work with landowners to remove/retrofit dams as prioritized in the Barrier Mitigation Plan associated with the Hamilton Harbour Fisheries Management Plan.	Hamilton Harbour Fisheries Management Plan	HHWSP	CITY / DFO / HCA / HWSC / MNR
Debris Jams Map Code: DJ	Incorporate debris jam removal into the City of Hamilton Adopt a Park and Neighbourhood Clean Team.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-4, F-11 and PAA-2	CITY Op. & W. Man.	BARC / DFO / HCA / HHWSP / HWSC / MNR

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
Definition: The accumulation of debris within a watercourse that prevents the flow of water.	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.			Hamilton Harbour Fisheries Management Plan In-stream Barrier Assessment for the Hamilton Harbour AOC.	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.	CITY / MNR
			Work with landowners to remove debris jams using proper sediment and erosion control practices.		HHWSP	CITY / DFO / HCA / HWSC
		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.			HCA Eng.	HHWSP / MNR
Detachment from Nature		Assess barriers to participation in environmental programs to improve program design.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI -1, EPI-2, EPI-3, EPI-5, EPI-6, PAA-1, PAA-2, PAA-3, ULM-7 and ULM-14 Royal Botanical Gardens Back to Nature: Towards a Ontario Strategy for Bringing Children and Nature Together - Event and Workshop Report Evergreen Schoolground Greening Resources: Getting Started	HHWSP	CITY / GV / HWSC
	Continue to implement the Watershed Steward Award Program.				HHWSP	BARC / HCA
	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.				BARC / CITY E&SI / CITY Op. & W. Man. (Outreach) / HCA Ecol. / HHWSP	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.				BARC / GV / HCA / HWSC / RBG	CITY
	Erect creek crossing & ecological corridor signage along roadways.				CITY Planning	BARC / GV / HCA / HWSC / WPN

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	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 / CITY E&SI / GV / HCA Lands / RBG	HHWSP / HWSC
	Support the formation and activities of "Friends of" groups aimed at protecting and rehabilitating natural features.				CITY Op. & W. Man. (Outreach) / HCA Lands / HHWSP / HWSC	BARC / BTC / DFO
	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 / DU / GV / HCA / WPN
		Assess landowner willingness to participate in and/or support water quality improvement and habitat restoration projects.			HHWSP	CITY / HCA / HWSC
		Encourage municipalities and trail managers to coordinate trail plans that improve access between urban centres and provide links to parks and rural areas.			CITY Planning / HCA Lands / RBG	HHWSP / HWSC
			Work with citizen groups to undertake restoration projects on public and private lands, including "Friends of" work days, Adopt a Creek, Fishing Clubs, etc.		BARC / CITY Op. & W. Man. / HCA Ecol. / HHWSP	BTC / HWSC / RBG
			Work with schools and School Boards to implement the School Grounds Naturally Program; undertaking school yard naturalization projects.		HHWSP	CITY / HCA / HWSC
			Work to undertake in-stream rehabilitation projects on sites identified in the Stewardship Action Plans as suitable for the DFO Habitat compensation Program.			
Development Map Code: DV Definition: The process of				Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-12, ULM-2, ULM-3, ULM-8, ULM-13 and ULM-14	HCA Ecol. / HCA Eng.	CITY / DFO / HHHBA / MNR

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
developing populated settlements: including housing and supporting infrastructure.	Host annual training sessions for City staff & development industry 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.).			Credit Valley Conservation and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Manual HCA Planning and Regulation Policies and Guidelines	HCA Plan.	BARC / CITY / DFO / GV / MTO
		Encourage 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 Planning / HCA Eng.	GV / HHHBA
		Encourage 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 Planning	HCA / HHHBA
		Implement stewardship and management recommendations resulting from the HCA development permit application review process.			HCA Plan.	CITY / HHWSP / HWSC
		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
		Revise conflicting municipal by-laws regarding development practices and guidelines to facilitate increased use of Low Impact Development technologies.			CITY Planning / HCA Plan.	DFO / GV / HHHBA
		Work with development industry to initiate a Water Management Task Force to assist in implementing stewardship actions and recommendations from the Stormwater Master Plan.			HCA Eng.	CITY / HHHBA / RAP

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
		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.			CITY E&SI	HCA
Encroachment Map Code: EN Definition: The act of undertaking practices on another person's property, i.e. erecting structures, planting gardens, disposal of waste.	Engage citizen groups to monitor & report areas affected by encroachment that are in need of restoration or that have been restored, to ensure mitigation of encroachment on public lands remains effective & to encourage neighbour-to-neighbour mentoring.			HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55, 60 City of Hamilton Draft Private Tree and Woodland Conservation By-law City of Hamilton By-law No. 03-117 Illegal Dumping	CITY Op. & W. Man. / HCA Lands / RBG	BARC / BTC / GV / HHWSP / HWSC
	Install property demarcation posts (with agency logos) at regular intervals along property boundaries to prevent encroachment into natural areas.				CITY Op. & W. Man. / HCA Lands / RBG	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. & W. Man. / HCA Lands / HHWSP / RBG	BARC / BTC / GV / HWSC
	Work with local nurseries & landscaping co.'s to educate / encourage landowners to use native plants.				HHWSP	CITY / GV / HCA / HWSC / RBG
			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. & W. Man. / HCA Lands / HHWSP / RBG	BARC / GV / HNC / HWSC
	Conduct a direct mailing of an encroachment education brochure to landowners adjacent to Conservation Authority, RBG and City natural areas.				CITY Op. & W. Man. / HCA Lands / HHWSP / RBG	HWSC
Erosion Map Code: ER Definition: The process of soil being scoured or washed away by flowing water.	Conduct a direct mailing to landowners where erosion has been identified through the City of Hamilton GRIDS Plan.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4, ULM-2 and ULM-3	HHWSP	CITY / HCA / HWSC / OSCIA
	Create demonstration sites on public lands that highlight streambank stabilization and natural channel design projects.			HCA Planning and Regulation Policies and Guidelines	HHWSP	CITY / DFO / HCA / HWSC / OSCIA / RBG

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Host training sessions for City staff and development industry to create awareness regarding BMPs & importance of properly maintained erosion / sediment control measures & enforcement.			Pages 68-69 Fisheries Act, Section 35 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142, 159-160 Erosion and Sediment Control Guidelines for Urban Construction OMAFRA Best Management Practices Series – No-Till Making It Work	HCA Eng.	CITY / DFO / HWSC
	Utilize enforcement scheme to enforce appropriate erosion control measures on development sites, including: seeding, avoiding steep slopes, etc.				HCA Plan.	CITY / DFO / MNR
	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
		Expand the City of Hamilton Erosion Hot Spots identification project into rural areas			CITY E&SI	HCA
		Select erosion sites as identified in the City of Hamilton GRIDS Plan for the upcoming HCA Erosion and Sediment Control Pilot Project.			HCA Plan.	CITY / DFO / HHWSP / HWSC
			Work with City staff to install permeable conveyance systems (infiltration trenches) along roadsides as an alternative to the conventional ditch system.		CITY Op. & W. Man.	DFO / HCA / MTO
			Work with landowners to undertake bank stabilization and erosion rehabilitation projects using bioengineering design principles.		HHWSP	BARC / DFO / FSRT / HCA / HWSC / OSCIA
			Work with landowners to undertake erosion rehabilitation projects as identified in the City of Hamilton GRIDS Plan.		CITY E&SI	DFO / HCA / HHWSP / HWSC
		Complete field study of stream morphology, determining erosion hotspots & associated causes			HCA Eng.	CITY
Faulty Septic Systems Map Code: SS Definition: Malfunctioning septic systems; including plugged distribution tiles, infrequent tank		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.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation WQ-d1 City of Hamilton's Greenville Community Subwatershed Study	CITY E&SI / HCA Eng.	RAP

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
pumping, etc. lead to untreated sewage contaminating our ground and surface water.	Create demonstration sites on public lands that highlight properly functioning septic systems.			Ontario New Home Warranty Program – A New Homeowner's Guide to Septic Systems	CITY Bldg. Serv. / CITY Op. & W. Man. / HCA Lands	HHWSP / HWSC
	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	BARC / CITY / HCA
		Conduct an inventory to determine how many households in the Spencer Creek watershed are serviced by on-site treatment systems.			CITY Bldg. Serv.	RAP
		Develop a tax reduction incentive or grant program for upgrading faulty septic systems			CITY Planning	HHWSP / MOE
		Undertake a risk analysis of the potential for old and/or degraded sewer lines to contaminate groundwater.			CITY E&SI	MOE / RAP
			Work with landowners to properly maintain their septic systems or upgrade or decommission faulty or unused septic systems.		HHWSP	CITY / GV / HCA / HWSC
Fluctuating Water Levels Map Code: WL Definition: Irregular occurrences of high and low water levels in the creek system.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage &/or direct landowner contact to explain the purpose, operation and maintenance of HCA flood control structures.				HCA Eng.	CITY / HHWSP / MNR
		Work to determine the cause of water level fluctuations and develop recommendations for altering practices to reduce or eliminate fluctuations.			HCA Eng.	CITY / DFO / HHWSP / MNR
			Work to implement alternative practices as per recommendations resulting from the inquiry into the cause of water level fluctuations in the system.		HCA Eng.	CITY / DFO / HHWSP / MNR
Habitat Fragmentation		Map fisheries information throughout each subwatershed to identify areas at risk and prioritize areas for remediation.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-2, FW-4, FW-12, PAA-1 and ULM-2	HCA Ecol.	CITY / HCA / HHWSP / HWSC / MNR
			Manage public lands for wildlife habitat, including plantation plantings and rented agricultural lands.	HCA Planning and Regulation Policies and Guidelines	HCA Lands	CITY / HHWSP / MNR

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
			Implement the actions outlined in the Dundas Valley 50 Year Vision, Cootes to Escarpment and City of Hamilton Natural Heritage Strategies relating to preserving and enhancing natural heritage systems.	Pages 53-59 City of Hamilton Draft Private Tree and Woodland Conservation By-law Cootes to Escarpment Park System – A Conservation and Land Management Strategy Nature Counts – City of Hamilton Natural Areas inventory City of Hamilton Natural Heritage Strategy City of Hamilton Natural Areas Acquisition Fund Strategy Dundas Valley 50 Year Vision Hamilton Harbour Fisheries Management Plan OMAFRA Best Management Practices Series – Farm Forestry and Habitat Management OMAFRA Best Management Practices Series – Fish and Wildlife Habitat Management	CITY / HCA Lands / RBG	BARC / HHWSP / HWSC
	Create demonstration sites on public lands that highlight various types of terrestrial and aquatic habitat restoration projects.				HHWSP	CITY / DFO / DU / HCA / HNC / HWSC / RBG
	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.				HHWSP	CITY / HCA / HNC / HWSC
	Encourage urban reforestation practices in private properties and reduction of lawn areas.				CITY Op. & W. Man.	HCA / HHWSP / HNC / HWSC
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy ecosystems and the importance of habitat connectivity.				HHWSP / HWSC	CITY / CCC / DU / HCA / HNC / MNR / RBG
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the importance of preserving wetland ecosystems.					
		Continue to complete ecological surveys (using the Ecological Land Classification system) to ensure species at risk habitat or rare ecological areas are not disrupted.			CITY Planning / HCA Ecol.	HHWSP / HWSC / MNR / RAP / RBG
		Develop How Much Habitat is Enough targets for each subwatershed.			HCA Ecol.	CITY / CCC / DFO / DU / HHWSP / HWSC / MNR / RBG
		Establish a Woodlot Owners Association for this area as recommended by Re-Leaf Hamilton			HWSC	HCA / HHWSP / HNC / MNR / RBG
		Protect and enhance natural corridors through parks and public lands by ensuring that naturalization and habitat creation are incorporated into master planning.			CITY Planning / HCA Lands / RBG	HHWSP / HNC / HWSC / MNR
		Work to acquire lands that enhance and further the continuity of the natural heritage			HHWSP / HNC	HCA / HHWSP / HNC / HWSC /

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
		system.				RBG
		Work with the aggregate industry when planning new/expanded pit and quarry operations to minimize impacts on the adjacent natural features.			HCA Ecol.	CITY / MNR
			Work with landowners to undertake habitat creation and enhancement projects which enhance core habitat by infilling areas within or linking existing forested areas		HHWSP	DFO / DU / HCA / HWSC / OSCIA
			Work with the aggregate industry to restore decommissioned pits and quarries into natural habitat through the Management of Abandoned Aggregate Properties Program.		HCA Ecol.	CITY / MNR
Illegal Fill Placement Map Code: FP Definition: The act of dumping fill material into or adjacent to natural areas.	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 City of Hamilton By-law No. 03-117 Illegal Dumping	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.				HCA Plan.	CITY / HHWSP / HWSC
			Work with landowners to rehabilitate fill sites where identified		HCA Plan. / HHWSP	CITY / DFO
Inadequate Stormwater Management Map Code: SWM Definition: Inadequately managing stormwater to control water quality and flooding; often associated with the drainage of developed lands.	Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scout, girl guides and other children's groups, to create awareness regarding stormwater input & the impacts of CSO outfalls on stream systems.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM - 6, ULM-9, ULM-11 and ULM-14 HCA Planning and Regulation Policies and Guidelines Pages 74-77 Fisheries Act, Section 34 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report	BARC	
	Support Sewer-Use Bylaw enforcement (By-law No. 04-150 as amended by By-Law No. 06-228).				CITY E&SI	
		Conduct water quality testing at CSO outfalls pre and post mitigation to support mitigation measures			CITY E&SI	

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	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.			Pages 38-44, 93-97, 122-125, 158-162	CITY E&SI / GV	BARC / DFO / HCA / HHHBA / HHWSP / RAP
	Promote the use of constructed wetland technology and Low Impact Development in the design of stormwater management facilities.				CITY E&SI / HCA Eng.	HHHBA
	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 E&SI / GV	BARC / DFO / HCA / HHHBA / HHWSP / RAP
		Implement recommendations from the City of Hamilton Stormwater Master Plan.			CITY E&SI	BARC / GV / HCA / RAP
		Offer financial incentives to replace driveways and decks with permeable pavement, interlocking brick, etc.			CITY Planning	HCA
		Undertake a study to determine the percentage of landowners with connected downspouts.			CITY E&SI	BARC / GV / RAP
		Work with development industry 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.	BARC / DFO / HHHBA / HHWSP / RAP
			Retrofit existing dry stormwater management ponds to wet ponds where beneficial to water quality, aquatic habitat and erosion control.		CITY E&SI	HCA / RAP
			Retrofit outlet structures to decrease the velocity of stormwater as it flows into the creek system.		CITY E&SI	HCA / HHWSP / HWSC / RAP

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
			Work with landowners to disconnect downspouts and install rain barrels.		CITY E&SI	BARC / GV / HHWSP
Increased Impervious Surfacing Map Code: IS Definition: The decreased potential for rainwater infiltration into the soil as a result of increased paved/impermeable surfacing.	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 EPI-6, FW-4 and ULM-2	HCA Plan.	CITY / GV / HHHBA / HHWSP / HWSC
	Host training sessions for HCA and City staff, development industry 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.			HCA Planning and Regulation Policies and Guidelines Pages 40, 55, 60 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 145-150,162-163 City of Hamilton Natural Heritage Strategy	CITY Planning / HCA Plan.	HHHBA
	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.			Dundas Valley 50 Year Vision Cootes to Escarpment Park System – A Conservation and Land Management Strategy	GV	CITY / HCA / HHHBA / HHWSP
		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 Planning	HCA / RAP
		Measure impervious surfacing of commercial and industrial lands.			CITY Planning	HCA / RAP
			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 Eng.	CITY / GV / HHHBA
Insufficient Riparian Buffer Map Code: RB Definition: Disruption of large continuous tracts of habitat along watercourses.	Conduct a direct mailing to property owners identified as having insufficient riparian buffers, promoting funding and technical assistance available for establishing riparian buffers			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4 and ULM-2	HHWSP / HWSC	CITY / HCA / 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	CITY / HCA / HWSC

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	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	CITY / HCA / HWSC / 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	CITY / HCA / HWSC / 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	CITY / HCA / HWSC / 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	CITY / HCA / HWSC / OSCIA
Invasive/Introduced Species Map Code: IV Definition: The establishment/proliferation of exotic species that have no natural control measures which compete with native species for resources and degrade the ecosystem.		Comment on the re-drafting of the City of Hamilton Litter, Yard Waste and Property Maintenance by-law No. 03-118 to include language regarding the prevention of the introduction of non native and invasive species.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-5	CITY Op. & W. Man.	GV / HCA / HHWSP / HWSC / RBG
	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.	CITY / HHWSP / HNC / HWSC
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the importance of controlling invasive species and planting native species.			HCA Planning and Regulation Policies and Guidelines Pages 53-56, 70-71	HHWSP	CITY / HCA / HWSC
	Work with nurseries to develop a promotional program highlighting native species alternatives for commonly used non-native ornamental species.			Invasive Alien Plant Species Found in the Carolinian Zone – Inventory and Management Options for rare Charitable Research Reserve	HHWSP	CITY / GV / HCA / HWSC / RBG
		Develop an Invasive Species Management Program which includes monitoring sites and management for specific species.		Mistaken Identity – Invasive Plants and their native look-alikes.	HCA Ecol.	CCC / CITY / HHWSP / HNC / HWSC / MNR / RBG
				City of Hamilton Natural Heritage Strategy		

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
		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.			HCA Ecol.	BARC / CITY / HHWSP / HWSC / RBG
			Work with landowners to control invasive species and to plant native species.		HHWSP	CITY / GV / HCA / HWSC
Land Maintenance Practices Map Code: LM Definition: Errant or excessive land maintenance practice which unnecessarily degrade wildlife habitat.		Implement the Hydro One Integrated Land Management protocol on utility corridors that pass through HCA lands and continue to work with utility companies to develop low impact land maintenance practices policies to be implemented throughout utility corridors.		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-2, FW-4 and TSSR-6	HCA Plan.	CITY / HHWSP / HWSC / RBG
		Incorporate the installation of alternative roadside vegetation, such as MTO roadside prairie and wildlife shrub corridors, into existing maintenance plans.			CITY Op. & W. Man.	HCA
		Work with the City to develop guidelines for using native plant species for revegetation projects along roadsides.			CITY Op. & W. Man.	HCA
			Work to naturalize infrequently used areas of municipal parks (Adopt a Park) and Conservation Areas.		CITY Op. & W. Man. / HCA Lands	HHWSP / HNC / HWSC
			Work with the City to ensure roadside maintenance is not done in excess of access standards.		CITY Op. & W. Man.	GV / HCA / HHWSP / HNC / HWSC
Landfill Leachate Map Code: LL Definition: rainwater filtering down through the landfill materials with the potential to contaminate groundwater aquifers.		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 HCA Planning and Regulation Policies and Guidelines Page 60	HCA Eng.	CITY / MOE / RAP
Litter Map Code: LI Definition: The act of illegally disposing of waste into public/natural areas.	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. & W. Man. / HCA Lands / RBG	HHWSP
	Promote the City of Hamilton's Team Up to Clean Up, Adopt a Park, and Neighbourhood Clean Team programs to assist community minded residents to undertake litter clean up projects.				CITY Op. & W. Man. (Outreach)	BARC / GV / HCA / HHWSP / HWSC / RBG

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Utilize literature, websites, public service announcements, & direct landowner contact to create awareness regarding the prevention and clean-up of litter.				CITY Op. & W. Man. / HCA Lands / RBG	BARC / GV / HHWSP / HWSC
	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. & W. Man. / HCA Lands / RBG	GV
		Undertake an inventory of illegal dumping sites throughout the subwatershed. Prioritize sites for the installation of deterrent mechanisms and the implementation of the Clean City Strategy Components.			CITY Op. & W. Man. / HCA Lands	RBG
			Work with local residents to host litter clean up events, such as the Great Canadian Shoreline Clean Up, on public lands; including City parks, Conservation Areas and RBG lands.		CITY Op. & W. Man. / HCA Lands / RBG	BARC / GV / HHWSP / HWSC
Migration Barrier Map Code: MB Definition: Any infrastructure that precludes the passage of wildlife into upstream habitat or the upper reaches of natural corridors.	Erect wildlife crossing signage where known migration corridors cross roadways and trails.			In-stream Barrier Assessment for the Hamilton Harbour AOC. Hamilton Harbour Fisheries Management Plan	CITY Planning / HCA Ecol. / RBG	BARC / HHWSP / HNC / HWSC / RAP / WPN
			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.		CITY Planning / HCA Ecol. / RBG	BARC / HHWSP / HNC / HWSC / RAP / WPN
Nutrient Loading Map Code: NL Definition: Excessive nutrients being inputted into a watercourse; often resulting from the application of manure/fertilizer. (* Also includes Phosphorous Loading formerly map code PL)	Create demonstration sites on public lands that highlight nutrient management BMP projects.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-9, RM-4, RM-7, WQ-1d and ULM-2	HHWSP	HCA / HWSC / OSICA / RAP
	Host a training workshop for local golf course practitioners to discuss BMP's for golf course management, including Audubon Cooperative Sanctuary Program certification standards.			Nutrient Management Act 2002, O. Reg 267/03	HHWSP	HCA / HWSC / RAP / RCGA
	Promote software associated with the Nutrient Management Plan, to agricultural operators to ensure precise fertility programs.			Fisheries Act, Section 34 HCA Planning and Regulation Policies and Guidelines Page 72	HHWSP	HWSC / OMAFRA / OSCIA
	Promote the City of Hamilton Only Rain Down the Drain awareness campaign.			Ministry of the Environment Water Management Policies and Guidelines –	CITY E&SI	BARC / GV / HHWSP / RAP

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	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.			Provincial Water Quality Objectives Appendix A	HCA Eng. / HHWSP	BARC / GV / MOE / OMAFRA / OSCIA / RAP / RBG
		Develop a fertilizer use by-law under the Fertilizer Act, limiting the use of fertilizer for non essential purposes.		OMAFRA Best Management Practices Series – Nutrient Management Planning	CITY Planning	BARC / HCA / HHWSP / RAP / 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.		OMAFRA Best Management Practices Series – Manure Management	HCA Eng.	BARC / CITY / HHWSP / OMAFRA / OSCIA / RAP / 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 Eng.	BARC / CITY / HHWSP / OMAFRA / OSCIA / RAP / 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.			HCA Ecol. / HCA Eng.	MOE / OMAFRA / OSICA / RAP
		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 Ecol. / HCA Eng.	CITY / MOE / RAP
		Encourage the provincial government to develop a policy to ban the use of phosphorous in fertilizer for cosmetic use.			GV	CITY / HCA / MOE
		Establish a nutrient level monitoring program with strategic sampling sites that are land use dependent, to identify specific sources of nutrient loading.			HCA Eng.	BARC / CITY / HHWSP / OMAFRA / OSCIA / RAP / RBG
		Model phosphorus loading in the subwatersheds and compare against RAP objectives			HCA Eng.	
			Work with landowners to reduce nutrient loading by implementing agricultural and urban BMP's related to nutrient management.		HHWSP	CITY / HCA / HWSC / OMAFRA / OSCIA

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
On-line Ponds Map Code: OP Definition: An in-stream structure designed to impound stream flow; leads to increased in-stream temperatures downstream and is often a barrier to fish migration.	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 EPI-6, FW-1, FW-4 and ULM-2 Fisheries Act, Section 37	HHWSP / HWSC	CITY / DFO / HCA / OSCIA / OMAFRA
			Work with landowners to restore or retrofit on-line ponds.	HCA Planning and Regulation Policies and Guidelines Page 63 In-stream Barrier Assessment for the Hamilton Harbour AOC	HCA Eng. / HCA Plan. / HHWSP	CITY / DFO / HCA / HWSC / OMAFRA / OSCIA
Outdoor Recreation Related Impacts Map Code: OR Definition: Recreational activities occurring in natural areas that inadvertently degrade the natural features of the area.	Add “tread lightly” messaging to partner recreation oriented websites.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-8, PAA-1, PAA-2 and PAA-3 The Conservation Lands of Ontario – Three Year Business Plan A Joint Outdoor Tourism Marketing Strategy	CITY Op. & W. Man. / HCA Lands / RBG	BTC / NHC
	Erect signage explaining the environmental significance of natural areas and promoting user “etiquette” for the area.				CITY Op. & W. Man. / HCA Lands / RBG	BTC / HHWSP / HNC
	Install deterrent mechanisms along trails and in off trail areas known to be degraded by trespassing; such as no trespassing signage.			Niagara Escarpment Access Enhancement Plan Dundas Valley 50 Year Vision Strategy Cootes to Escarpment Conservation & Land Management Strategy	CITY Op. & W. Man. / HCA Lands / RBG	BTC / HNC
	Promote the City of Hamilton Adopt-a-Park and Neighbourhood Clean Team Programs.				CITY Op. & W. Man.	BTC / HCA / HHWSP / HNC / RBG
	Support the formation and activities of “Friends of” groups aimed at protecting and rehabilitating natural features.				CITY Op. & W. Man. / HCA Lands / HHWSP / RBG	BARC / BTC / HWSC
		Consider designating days/areas for ATV and snowmobile use as a deterrent to use in prohibited areas.			CITY Op. & W. Man. / HCA Lands / RBG	HHWSP / HNC
		Continue to monitor Category A and B waterfalls on public lands for signs of overuse.			CITY Op. & W. Man. / HCA Lands	BTC
		Develop marketing strategies for sensitive lands that focus on sustainable use.			CITY Op. & W. Man. / HCA Lands / RBG	BTC / HNC
		Refer to the Niagara Escarpment Access Enhancement Plan to design infrastructure for high traffic areas to guide users along approved trails.			CITY Op. & W. Man. / HCA Lands / RBG	BTC
		When undertaking master planning exercises, refer to the Ontario Trails Guidelines and Best Practices for the Design, Construction and Maintenance of Sustainable Trails.			CITY E&SI (L.A.S.) / HCA Lands / RBG	

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STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
			Host annual clean up days for natural areas identified as having excessive amounts of litter.		CITY Op. & W. Man. / HCA Lands / RBG	BARC / BTC / HHWSP / HNC / HWSC
			Rotationally restrict access to degraded areas to allow for the regeneration of vegetation.		CITY Op. & W. Man. / HCA Lands / RBG	BTC / HNC
			When conducting maintenance of existing trails, refer to the Ontario Trails Guidelines and Best Practices for the Design, Construction and Maintenance of Sustainable Trails.		CITY Op. & W. Man. / HCA Lands / RBG	BTC / HHWSP / HNC
Perched Culverts Map Code: CP Definition: In-stream culverts that when improperly designed/installed, create barriers to water flow and fish migration.	Host training sessions for HCA and City staff to promote the proper design and installation of culverts.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-1 and FW-4	CITY Op. & W. Man. / HCA Eng.	DFO / 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.			Fisheries Act, Section 37 HCA Planning and Regulation Policies and Guidelines Page 41 In-stream Barrier Assessment for the Hamilton Harbour AOC	HHWSP / HWSC	CITY / DFO / HCA / MNR
		Undertake an inventory of perched and closed bottom culverts throughout the subwatershed. Prioritize culverts for mitigation or replacement.			CITY Op. & W. Man.	DFO / HCA / HHWSP / 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.		HCA Eng. / HCA Plan. / HHWSP	CITY / DFO / HCA / OMAFRA / OSCIA
Pesticide Use Map Code: PS Definition: The application of pesticides to control perceived pests.	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 EPI-4, EPI-6, TSSR-6 and ULM-2	HHWSP	CITY / GV / HWSC / OMAFRA / OSCIA
	Host a training workshop for local golf course practitioners to discuss BMP's for golf course management, including Audubon Cooperative Sanctuary Program certification standards and the Ministry of the Environment Gold Course IPM Accreditation.			Fisheries Act, Section 34 City of Hamilton By -Law No. 07-282 Pesticides Act Ontario Regulation 63/09	HHWSP	CITY / HWSC / RCGA
	Promote Municipal and Provincial Pesticide By-Laws.			OMAFRA Best Management Practices	CITY Op. & W. Man. / GV	HHWSP / HWSC / OMAFRA / OSCIA

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STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
	Promote Integrated Pest Management principles, Natural Tips for Healthy Lawns and Gardens and alternative turf management techniques.			Series – integrated Pest Management OMAFRA Best Management Practices Series – Pesticide Storage, Handling and Application	CITY Op. & W. Man.	GV / HHWSP / HWSC / OMAFRA / OSCIA
	Promote the Ministry of the Environment ‘Add It Up Program – Going Pesticide Free’ Program				GV	CITY / HHWSP / HWSC
	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	CITY / HCA / HHWSP / OMAFRA / OSCIA
		Undertake a study to determine the current level of pesticide/herbicide use in the subwatershed and develop targets for reduction.			CITY Op. & W. Man.	GV / HHWSP / HWSC / OMAFRA / OSCIA
			Work with landowners to implement alternatives to pesticide use.		GV / HHWSP	CITY / HWSC / OMAFRA / OSCIA
Plowed Watercourse Map Code: PW Definition: Headwater swales or small watercourses that are worked for agricultural production.	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 EPI-6, ULM-2, ULM-3 and ULM-4 Fisheries Act, Section 37 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 44, 145-150 OMAFRA Best Management Practices Series – Soil Management	HHWSP	DFO / HCA / HWSC / OSCIA
	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.				HHWSP	DFO / HCA / HWSC / OMAFRA / OSCIA
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.				HHWSP	DFO / HCA / HWSC / OMAFRA / OSCIA
	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.				HHWSP / HWSC	DFO / HCA / OMAFRA / OSCIA

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STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
			Work with landowners to install effective agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.		HHWSP	DFO / HCA / HWSC / RAP / RBG
Runoff Contamination via Transportation Corridors Map Code: TC Definition: Contamination resulting from stormwater runoff from major arterial roadways; often associated with the application of salts for de-icing and the residual precipitate created by automobile exhaust.	Host training sessions for City Staff and Contractors using the Ministry of the Environment Snow Disposal and De-icing Operations in Ontario Guidelines.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-5b Fisheries Act, Section 34 City of Hamilton 2003 Road Salt Management Plan Municipalities of Wellington County – 2005 Salt Management Plan	CITY Op. & W. Man. (Roads)	MTO
	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. & W. Man. (Roads) / HCA Eng.	DFO / MTO
	Utilize literature, websites, public service announcements & direct landowner contact to promote the use of sidewalk salt alternatives.				CITY Op. & W. Man. / 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.			CITY Op. & W. Man.	MTO
		Support planning for alternative and sustainable transportation strategies including Rapid Transit.			CITY Planning	HCA / HHHBA / MTO / RAP
		Undertake a study to determine the most effective method of snow removal that will reduce contamination of watercourses.			CITY Op. & W. Man.	DFO / HCA / MTO
			Implement improved snow removal methods as recommended by the study to determine effective methods of snow removal which also reduce contamination of watercourses.		CITY Op. & W. Man.	MTO
			Install vegetated filter strips and riparian buffers along medians and roadsides.		CITY Op. & W. Man.	HCA / MTO
Sediment Loading Map Code: SL Definition: Organic and inorganic material that is entrained by the flow of water and is deposited in a creek system.		Develop a total suspended solids target based on the PWQO turbidity recommendation of between 5-50 FTU (Formazin Turbidity Units)		Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW9, RM-4, ULM-2, ULM-3, ULM-5 and WQ-1d	HCA Eng.	DFO / HHWSP / HWSC / MNR / OSCIA / OMAFRA / RAP
	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.			Fisheries Act, Sections 34 and 36 Erosion and Sediment Control Guidelines for Urban Construction	HCA Eng. / HHWSP	DFO / HWSC / MNR / OMAFRA / OSCIA / RAP

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
			Monitor and enforce the proper installation and maintenance of sediment and erosion control measure on construction sites.	City of Hamilton By-law for Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the Removal of Topsoil	HCA Plan.	CITY / DFO / HHHBA
			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)	OMAFRA Best Management Practices Series – No-Till Making it Work	HCA Eng.	DFO / HHWSP / HWSC / MNR / OMAFRA / OSCIA / RAP
			Work to mitigate non point sediment sources identified in the Watershed Planning Network Priority Remediation Report.	Ministry of the Environment Stormwater Management Design Guidelines	HCA Eng.	CITY / DFO / HHWSP / HWSC / MNR
			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 / DFO / HHHBA
			Work with landowners to reduce sediment loading by implementing BMP projects; e.g. streambank stabilization, riparian buffers, natural channel design.		HHWSP	DFO / HCA / HWSC / MNR / OMAFRA / OSCIA
Site Clearing Prior to Development Code: SC Definition: The act of stripping or excavating the vegetation and topsoil from a site prior to construction works.	Map Host training sessions for City staff, development industry and consultants to promote City standards and guidelines related to site preparation prior to development.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-4	CITY Planning / 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			HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69	CITY Planning	DFO / HHHBA / HHWSP / HWSC / MNR / RAP
		Develop a municipal by-law to serve as a guideline for the management of tree species.		City of Hamilton Draft Private Tree and Woodland Conservation By-Law	City Planning	HCA / HWSC / MNR
			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 / DFO / HHHBA

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
Storm Sewer Outfalls Map Code: SO Definition: The point where a sewer system discharges into a watercourse during a storm event.	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 RM-4, RM-7 ULM -6, ULM-9 and ULM-11 Fisheries Act, Section 34 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 138, 158-159	BARC	CITY / GV / HCA / HHWSP / HWSC / RBG
	Promote the City of Hamilton Public Works Stormwater Pollution Solutions for Urban and Rural Residents Outreach Program				CITY E&SI	GV / HCA / HHWSP / HWSC / RBG
	Promote the Municipal Sewer-Use By-law No. 04-150 as amended by By-Law No. 06-228.				CITY E&SI	GV / HCA / HHWSP / HWSC / RBG
		Reduce stormwater load to meet the MOE volumetric target of a 90% overflow capture rate for combined sewer systems			CITY E&SI	BARC / GV / HCA / RAP
		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 E&SI / HCA Eng.	BARC / MOE / RAP
		Work toward achieving the final net loading targets for CSO's outlined in the RAP.			CITY E&SI	BARC / GV / HCA / RAP
		Work with Green Venture to develop a Stormwater Mitigation Program.			GV	BARC / CITY / HCA / RAP
			Work to implement the recommendations in the sewershed water quality study.		CITY E&SI / HCA Eng.	BARC / DFO / HHWSP / HWSC / RAP
			Work with City Staff to retrofit outfalls to incorporate erosion control measures such as plunge pools, rip rap, tree planting etc.		CITY E&SI	BARC / DFO / HCA / HHWSP / HWSC / RAP
			Work with landowners to disconnect downspouts and to install rain barrels.		CITY E&SI / GV	BARC / HHWSP
			Work with landowners to establish riparian buffers and/or erosion protection downstream of storm sewer outfalls; e.g. river stone.		HHWSP	BARC / CITY / DFO / HCA / HWSC / RAP
Transportation Corridor Expansion Map Code: TE Definition: The process by which new roads are built or existing roads are widened.	Host training sessions for City staff, development industry 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 E&SI	HCA / HHHBA / MTO

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

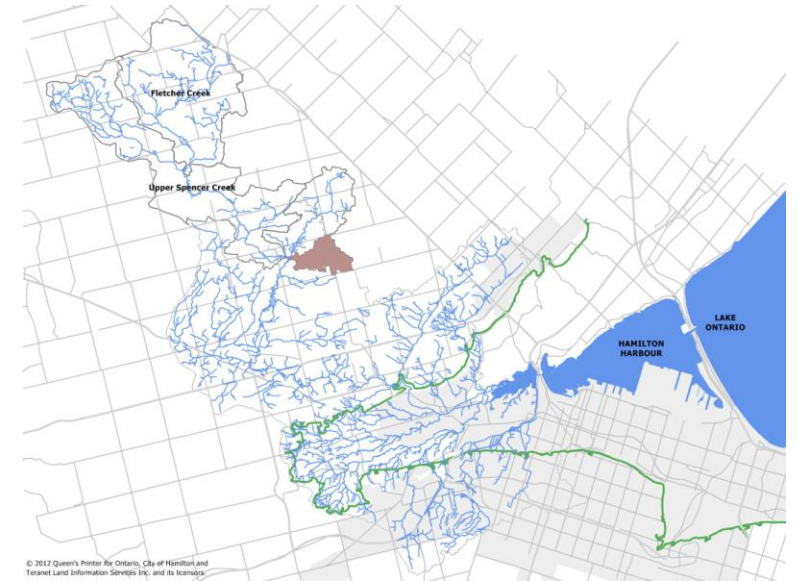
STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
		When planning for major road works, design transportation corridors using new technologies for environmental solutions.		Erosion and Sediment Control Guidelines for Urban Construction	CITY E&SI	HCA / HHHBA / MTO
			When repairing roads, utilize new technologies for road maintenance that are proven to have environmental benefits.		CITY Op. & W. Man.	HCA / HHHBA / MTO
Utility Pipeline		Review individual utility company emergency protocols for identification of issues, reporting protocols and emergency contacts.			HCA Eng.	CITY / MOE
Water Takings Map Code: WT Definition: The process by which surface and groundwater are pumped out of the natural system; for the purposes of irrigation, aggregate extraction, etc.	Encourage landowners with surface water takings to install groundwater systems.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, ULM-2 and ULM-12 Ontario Water Resources Act O. Reg. 387/04 OMAFRA Best Management Practices Series – Irrigation Management	HHWSP	HCA / HWSC / MOE / OMAFRA / OSCIA
	Encourage landowners with water taking needs to establish an Irrigation Advisory Committee to schedule takings alternately.				HHWSP	HCA / HWSC / MOE / OMAFRA / OSCIA
	Host open houses when experiencing Level 1 low water conditions to address landowner concerns and promote recommended reductions in rates and volumes of takings.				HCA Eng. / HHWSP	HCA / HWSC / MOE / OMAFRA / OSCIA
	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 / HWSC / MOE / OMAFRA / OSCIA
		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.			HCA Eng.	MNR / MOE
		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 Eng.	MOE

TABLE FLA-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS AO	STEWARDSHIP ACTIONS SSO	STEWARDSHIP ACTIONS RO	RELATED DOCUMENTS	LEAD AGENCY	PARTNER AGENCIES
			Work with landowners to implement BMP's related to water conservation.		HHWSP	HCA / HWSC / MOE / OMAFRA / OSCIA
			Work with landowners who have groundwater taking systems to decommission unused wells in accordance with the Ontario Water Resources Act.		HHWSP	CITY / HCA / OSCIA
Wildlife Collisions Map Code: WC Definition: Incidences where 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.			British Columbia Wildlife Collision Prevention Program Report City of Ottawa Wildlife/Vehicle Collision Prevention Program	CITY Op. & W. Man. (Roads)	HCA / MNR / MTO / RBG
	Utilize literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding managing human-wildlife conflicts.				CITY Op. & W. Man. (Roads) / HCA Ecol.	HHWSP / HWSC / MNR / MTO / RBG
		Evaluate the effectiveness of the MTO roadside prairie and wildlife shrub corridor projects in preventing wildlife collisions.			CITY Op. & W. Man.	HCA / MNR / MTO
		When planning major road works, consider the incorporation of wildlife over/underpasses, avoiding known migratory corridors and other wildlife accommodations in the design.			CITY E&SI	HCA / MNR / MTO / RBG
			Conduct temporary road closures at known wildlife crossings and nesting sites during peak migration and nesting times.		CITY Op. & W. Man. (Roads)	HCA / MNR / MTO / RBG
			Erect fencing and alternative nesting mounds at known sites for turtle nesting.		CITY Op. & W. Man. (Roads)	HCA / MNR / MTO / RBG
			Produce and distribute window decals for large windows of homes and high rise buildings to prevent bird collisions.		CITY Bldg. Serv. / HCA Ecol.	HHWSP / HWSC / RBG
			Reduce the use of road salt or consider alternatives that do not attract wildlife.		CITY Op. & W. Man. (Roads)	HCA / MNR / MTO
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	CITY Op. & W. Man. / HCA Ecol.	HHWSP / MNR
			Work to implement the recommendations for sustainable populations in the HCA/MNR Deer Management Strategy.		CITY Planning / HCA Ecol.	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 FLAMBOROUGH CATCHMENT

DATA SHEETS

Table FLA-6: Stresses Identified in the Lower Flamborough Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
RB-1119	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1121	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1123	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1124	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1125	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1126	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1127	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1128	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1129	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1130	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1131	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1132	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1133	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1134	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1135	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1136	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1137	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1138	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1139	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1140	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1141	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1517	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1518	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1519	Insufficient Riparian Buffer	☑	☑	☑		☑	
RB-1520	Insufficient Riparian Buffer	☑	☑	☑		☑	

FISHERIES ASSESSMENT

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

BENTHICS ASSESSMENT

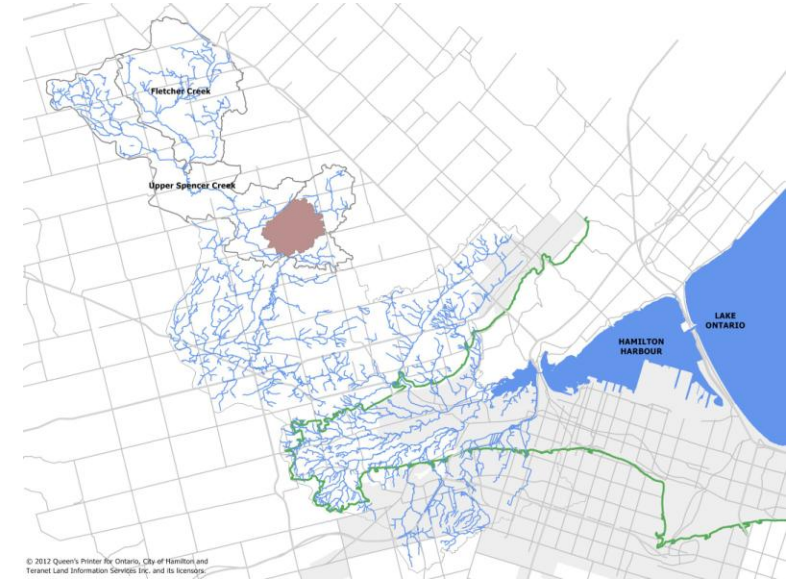
LOCATION	DATE	DESCRIPTION

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT



























LOCATION	DATE	FLOW m³/s

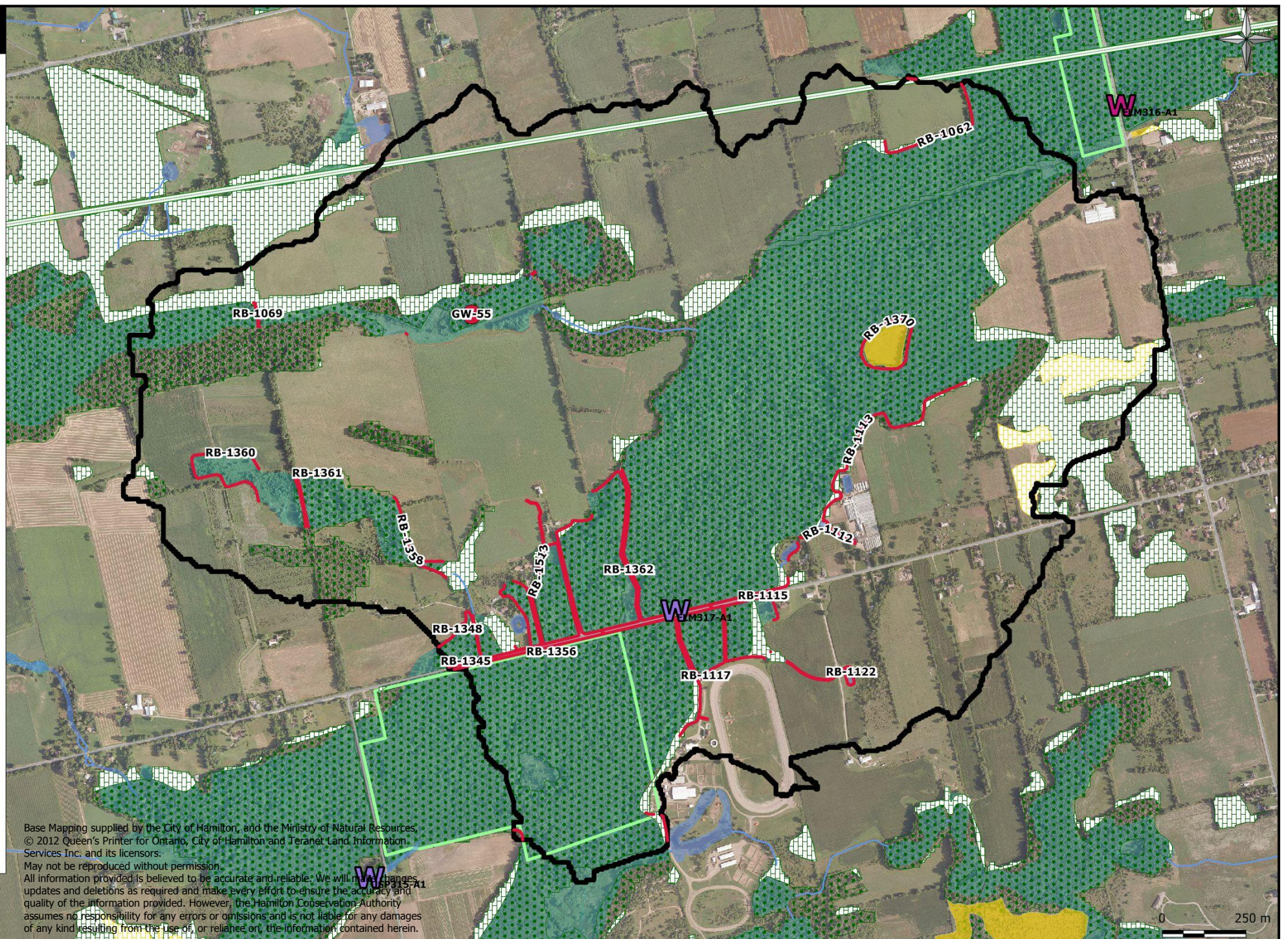


MIDDLE FLAMBOROUGH CATCHMENT

DATA SHEETS

FLA-7 Middle Flamborough

-  Catchment Boundary
-  Environmentally Significant Areas
 -  Wetland
 -  Meadow
 -  Forest
-  Recommended for NAI 2010
 -  Forest
 -  Meadow
-  Open Stream
-  Closed Stream
-  Surface Water
- W** Environmental Monitoring Stations
 - W** HCA Fish and Benthic Invertebrates
 - Water Quality (Benthic Assessment)*
 -  Unimpaired
 -  Potentially Impaired - Unimpaired
 -  Potentially Impaired
 -  Potentially Impaired - Impaired
 -  Impaired
- F** HCA Flow and Precipitation
 - V** SWP Flow Station
 - S** PWQMN Surface Water Quality
 - G** PGMN Groundwater Quality
- Environmental Stresses**
 -  Current
 -  Anticipated
 -  Current
 -  Anticipated
 -  Current
 -  Anticipated
-  HCA Managed Lands
-  Pits and Quarries
-  Hydro Corridor
-  Rail Line



MIDDLE FLAMBOROUGH DATA SHEET

Table FLA-7: Stresses Identified in the Middle Flamborough Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
GW-55	Abandoned Groundwater Well	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
RB-Various (See Appendix)	Insufficient Riparian Buffer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

MIDDLE FLAMBOROUGH DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
FLM317-A1	8/3/2010	Central mudminnow	6		
FLM317-A1	8/3/2010	Creek chub	1		
FLM317-A1	8/3/2010	Pumpkinseed	1		
FLM317-A1	8/3/2010	White sucker	5		

BENTHICS ASSESSMENT

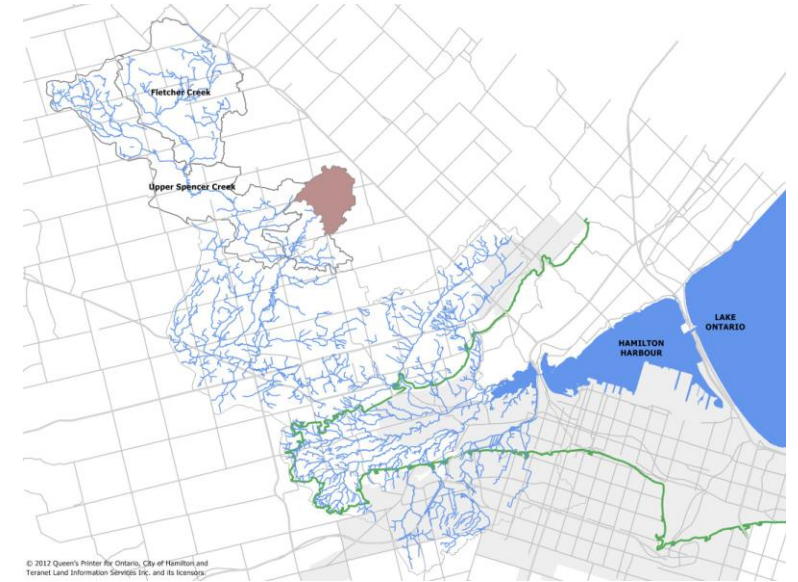
LOCATION	DATE	DESCRPTION
FLM317-A1	2010	Potentially Impaired
FLM317-A1	2007	Potentially Impaired - Unimpaired

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

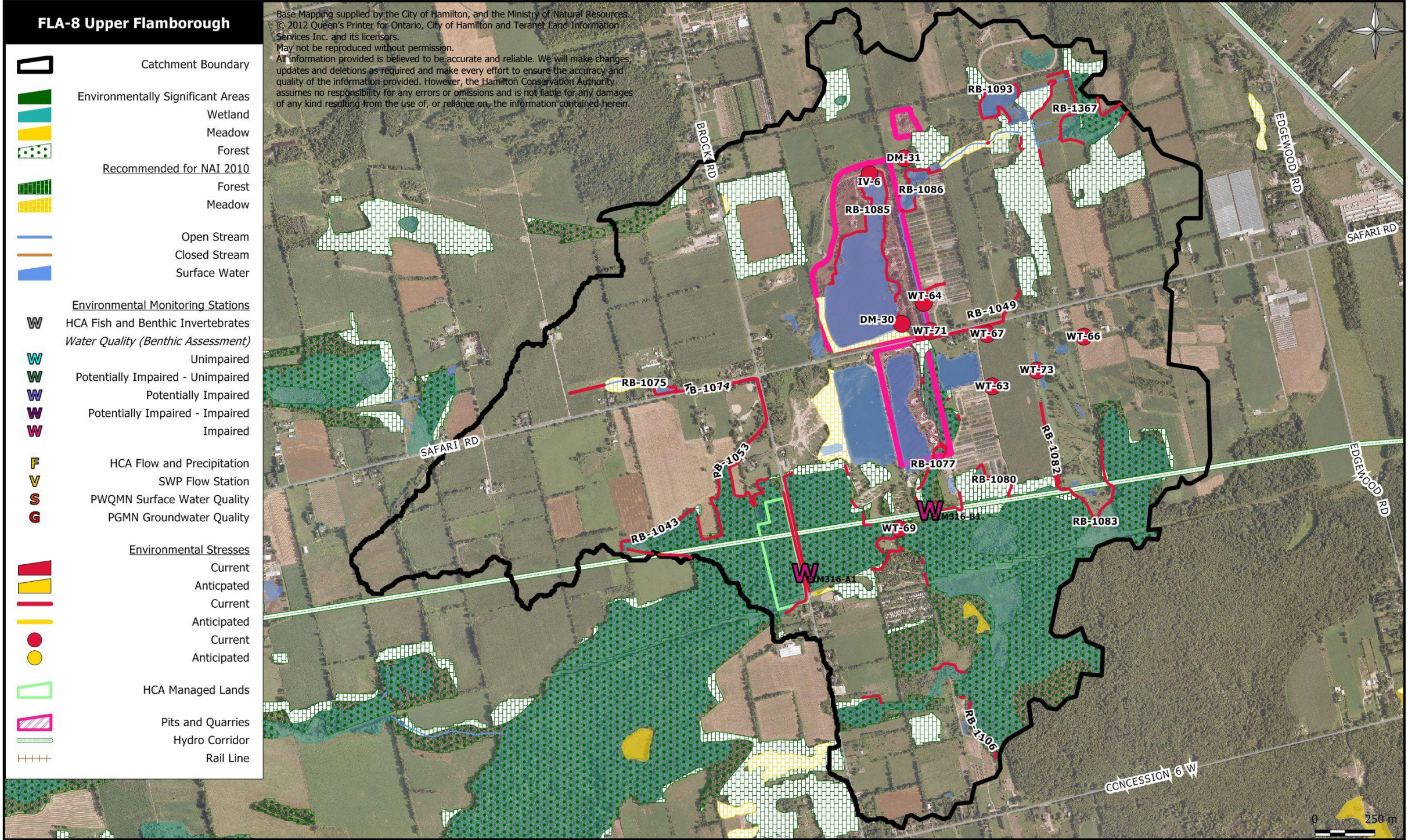
WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m ³ /s



UPPER FLAMBOROUGH CATCHMENT

DATA SHEETS



UPPER FLAMBOROUGH DATA SHEET

Table FLA-8: Stresses Identified in the Upper Flamborough Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
DM-30	Dam	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DM-31	Dam	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RB-Various	Insufficient Riparian Buffer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
IV-6	Invasive Species	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-63	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-64	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-66	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-67	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-69	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-71	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-73	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

UPPER FLAMBOROUGH DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
FLM316-A1	28-Jul-10	Brook stickleback	3		
FLM316-A1	28-Jul-10	Central mudminnow	15		
FLM316-A1	28-Jul-10	Mottled sculpin	2		
FLM316-A1	28-Jul-10	Pumpkinseed	1		
FLM316-A1	28-Jul-10	White sucker	4		
FLM316-B1	31-Dec-00	Central mudminnow	23		
FLM316-B1	31-Dec-00	Pumpkinseed	6		

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
FLM317-B1	2010	Potentially Impaired - Impaired

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS

WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m ³ /s

