

LOGIE'S CREEK SUBWATERSHED

STEWARDSHIP ACTION PLAN 2009

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LOGIE’S CREEK SUBWATERSHED CHARACTERIZATION

GEOGRAPHIC LOCATION

Logie’s Creek subwatershed is 13.3 km² in area and is comprised of two catchment basins. In descending order from the headwaters to the outlet these are: Concession 4 and Highway 5 (**Map LO-1**). This subwatershed lies entirely within the former municipal boundary of Flamborough, and also falls within two City of Hamilton Wards, specifically Wards 14 and 15.

The headwaters of Logie’s Creek originate north of Concession 4 West between Brock Road in the west and Millgrove Side Road in the east. The subwatershed tapers as it flows south and over the escarpment brow. Logie’s Creek creates Tew’s and Lower Tew’s Waterfalls when it flows over the escarpment. The southernmost extent of Logie’s Creek reaches Spencer Gorge, south of Harvest Road.

Highway 5 passes through this subwatershed, intersecting with Moxley Road and Ofield Road. Major transportation routes found within this subwatershed are Millgrove Side Road and Concession 4 West.

A very limited segment of the Niagara Escarpment passes through the Highway 5 catchment of this subwatershed. Additionally, two municipally designated Environmentally Significant Areas (ESAs) are located within this subwatershed: Millgrove South Woodlot and Spencer Gorge. These natural areas act as major ecological corridors for terrestrial species as well as serve to maintain water quality and quantity within the stream reaches that pass through these areas, to the benefit of aquatic species.

HYDROLOGY

Logie’s Creek, which is also known as East Spencer Creek, is located to the northeast of Greensville. The headwaters of this creek commence near the intersections of Concession 4 with Ofield Road and Millgrove Side Road, and join with Middle Spencer Creek to the south of Fallsview Road of West Flamborough. The confluence of Logie’s Creek with Middle Spencer Creek is approximately four kilometers downstream of the Christie Lake reservoir (GIS map, HCA). Logie’s Creek tumbles 41 metres over the Niagara Escarpment to form Tew’s Falls, just a few metres less in height than Niagara Falls (www.hamrca.on.ca/parks/visit/waterfalls.asp).

Downstream of the confluence with Logie’s Creek, As Spencer Creek crosses the Niagara Escarpment it becomes very steep. However, the average slope of the stream, from Greensville to the inlet to the Desjardins Canal, is approximately 16m/km (MacLaren Plansearch, 1990).

Logie’s Creek has been identified in the Tier 1 Water Budget Report as a subwatershed that experiences significant annual and monthly groundwater stress levels with respect to groundwater quantity. The assessment was based on estimates of all permitted and non-permitted water uses.

SOILS

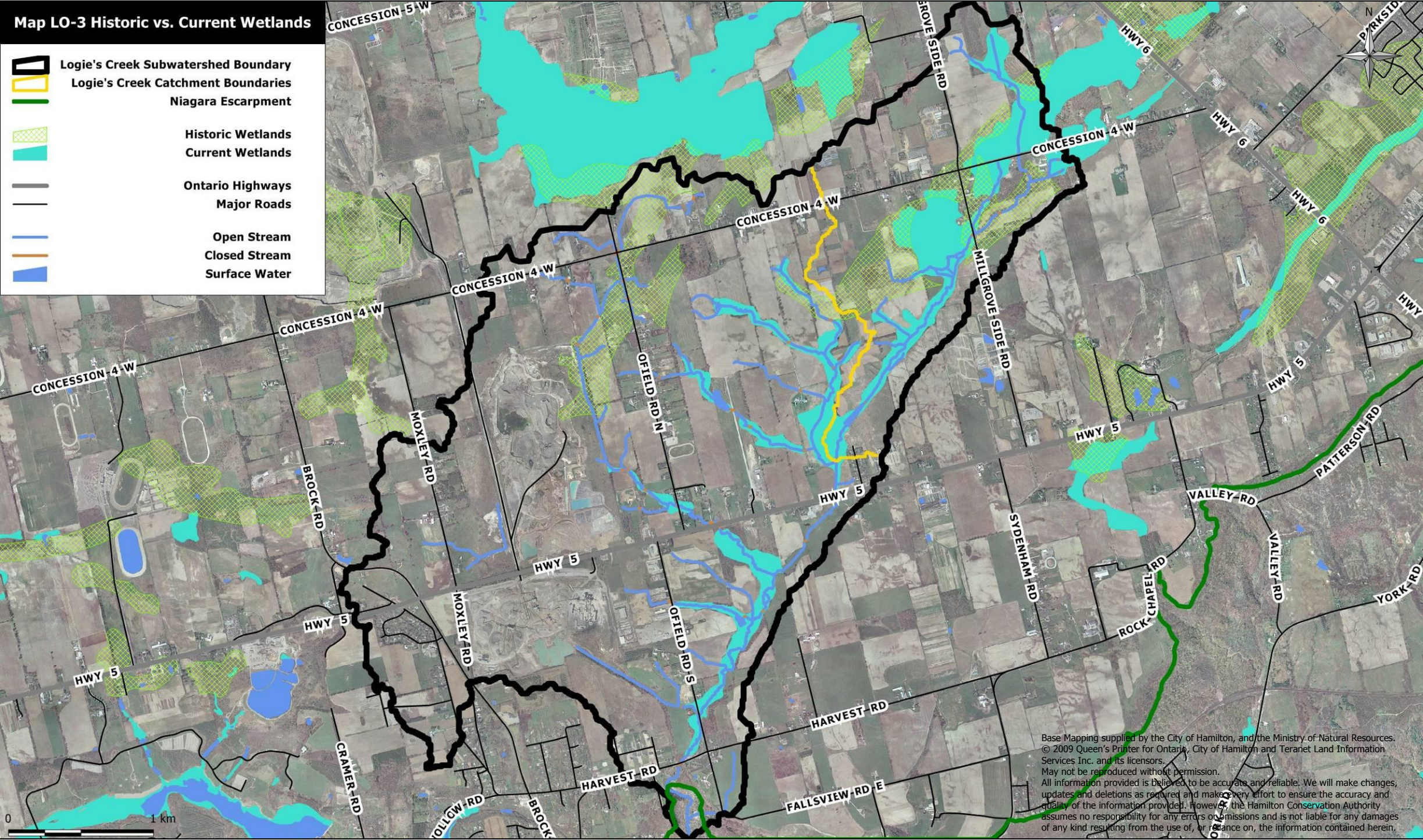
The soil characteristics of the Logie’s Creek subwatershed are shown on **Map LO-2**. Seven soils complexes have been identified within the Logie’s Creek subwatershed, as summarized in **Table LO-1**. The sandy and loamy soils of the subwatershed have relatively large spaces between soil particles, and water percolates quickly through these openings.

Soil characteristics vary throughout the subwatershed. The natural drainage of the soil ranges from poorly drained to well drained and the erosion potential ranges from very low to high (Canadian Department of Agriculture, et. al., 1965).

Table LO-1: Soil and Erosion Potential in the Logie’s Creek Subwatershed

Soil Type	Natural Drainage	Erosion Factor*	Topography (slope)	Erosion Potential
Cl - Chinguacousy Loam	Imperfectly drained	3	2-5%	Low
Gi – Grimsby Sandy Loam	Well drained	4	6-9%	Moderate
Ol – Oneida Loam	Well drained	2	6-9%	High
Vi – Vineland Sandy Loam	Imperfectly drained	4	2-5%	Very Low
Fo – Flamborough Sandy Loam	Poorly drained	4	0.5-2%	Very Low
An – Ancaster Silt Loam				
Tp – Tuscola Silt Loam	Imperfectly drained	2	0.5-2%	Very Low

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



NATURAL HISTORY & SIGNIFICANT SPECIES

Wetlands that existed within the Logie’s Creek subwatershed prior to the mid-1980’s as well as those wetlands that are still present today are displayed within **Map LO-3**. It is apparent that hydrological alterations have occurred within this subwatershed in order to accommodate aggregate extraction and agricultural practices. Historically, wetland followed much of the stream corridor until reaching the Niagara Escarpment.

There is only one remaining designated wetland complex in the Logie’s Creek subwatershed; the Logie’s Creek Parkside Drive Swamp. The Logie’s Creek Parkside Drive Swamp is classified as a Provincially Significant Wetland by the Ontario Ministry of Natural Resources (OMNR). Ontario’s wetlands are evaluated through the OMNR Wetland Evaluation System (1993) for their biological, social, and hydrological components and special features. A wetland that is scored high in all four categories will receive a higher class ranking, with Class 1 being the highest. The Logie’s Creek Parkside Drive Woodlot emerges in the headwaters of the Borer’s Creek drainage basin north of Waterdown and encompasses the headwaters of Logie’s Creek subwatershed north of Highway 5. This highly fragmented system consists primarily of deciduous swamp and riparian meadow communities, improving water quality and augmenting flows in Borer’s and Logie’s Creeks

during dry periods. A recent hydrogeological study has revealed that this wetland serves as a groundwater recharge zone due varying depths of sandy and gravelly soils which overlay highly fractured dolostone bedrock (Philips Engineering Ltd., 2005). Few natural areas of this size remain within this subwatershed; therefore this wetlands’ ability to regulate surface flow in a developed area is significant (Dwyer et al., 2003).

Small pockets of wetlands in the Highway 5 catchment still remain along the stream corridor; a small percentage of the wetlands in this watershed have been cleared and filled for agricultural and aggregate extraction purposes. Historically, wetland cover made up 1.2 km², or 9%, of the subwatershed area. Only 1.14 km² of wetland area remain, which is 8.6% of the subwatershed area. Therefore, this subwatershed has only lost 5% of its historical wetland cover.

Historical information was not recorded for forest or meadow cover, however current natural land cover statistics are noted within **Table LO-2**. Forest cover accounts for 3.5% of this subwatershed, while meadow cover is 0.83% of the land base. Based on the digital data provided for this analysis, stream length of Logie’s Creek and all its tributaries is 30 km.

Table LO- 2: Natural Land Cover Statistics

Forest Cover (km ²)	Wetland Cover (km ²)	Meadow Cover (km ²)	Stream Length (km)
0.46	1.14	0.11	30

NATURAL HISTORY & SIGNIFICANT SPECIES

Limited benthic monitoring data has been collected for Logie’s Creek. Immediately upstream of Tew’s Falls, benthic fauna suggested unimpaired water quality conditions (Griffiths, 2001). The presence of sensitive mayflies and true flies suggests at least cool water conditions prevail in this reach. However, beetle and caddisfly species suggestive of nutrient enrichment found in this area are suggestive of a source of nutrient discharge upstream, likely attributed to agricultural land use that is prevalent in the headwaters of this creek. It is

likely that water quality conditions are impaired in the upper reaches of Logie’s Creek, similar to Borer’s Creek, due to similar land use practices in their headwaters.

Although the upper reaches of this subwatershed have been substantially impacted by urban and agricultural land uses, cooler water conditions have been documented in both of these watercourses in the vicinity of the Niagara Escarpment, where ground water inputs are much greater (Griffiths; 2000, 2001). Finescale, pearl and northern redbelly dace have been observed in Logie’s Creek immediately above the escarpment in 1991 (HRCA, 2000; Schlutt and Freeman, 1991).

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 the Committee on the Status of Species at Risk in Ontario (COSSARO) and listed by the Ontario Ministry of Natural Resources (MNR) 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 the OMNR under the Ontario Endangered Species Act and can be found within the Logie’s Creek subwatershed.

It will be important to create awareness and undertake habitat restoration activities related to preserving and restoring ecological linkages in order to support these species that have been designated by the OMNR, especially those species that are endangered (not regulated).

Endangered (not regulated)

- American Chestnut
- Butternut
- Ginseng

Not at Risk

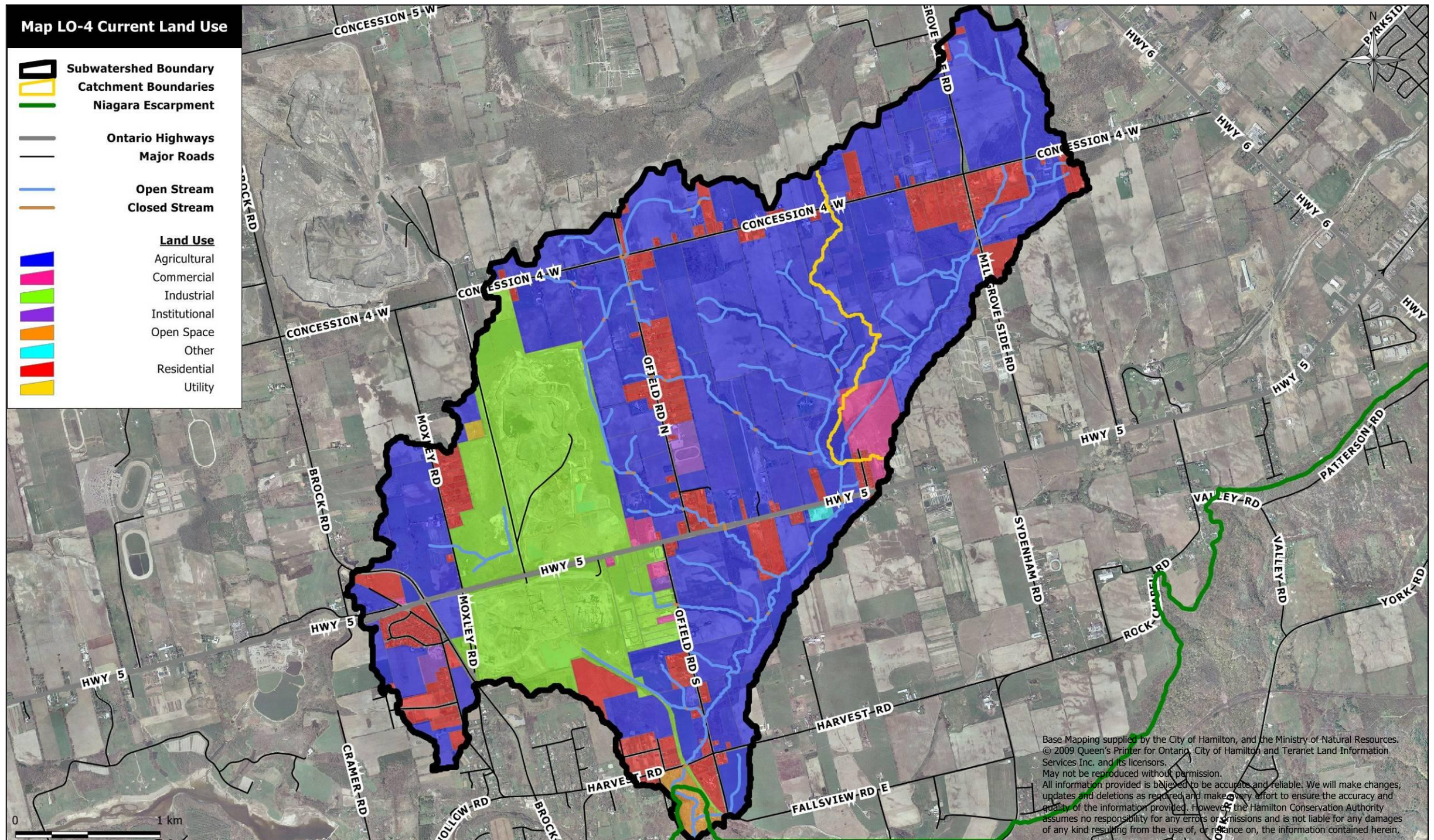
- Western Chorus Frog
- Sharp Shinned Hawk
- Brown Snake
- Northern Leopard Frog
- Red-tailed Hawk

Endangered

- Red Mulberry

Special Concern

- Eastern Milksnake
- Monarch
- Southern Flying Squirrel
- Louisiana Waterthrush



CULTURAL HISTORY

“Settlement of the Greensville area ultimately began in 1799 when William Green purchased 129 acres of farm land; however, the town’s population did not begin to grow until Mr. Green subdivided his farm into town lots in 1840. He and his wife were long remembered fondly by the inhabitants because as Justice of the Peace he married many young couples, and his wife, who was licensed to practice medicine and surgery, probably saved the lives of many of them.” (Spencer Creek Conservation Authority, 1965).

Tew’s Falls, located at the eastern end of Greensville, was named for the Tew family. Johnson Tew came to Canada in 1874. He purchased a parcel of land which included the then unnamed waterfalls and associated ravine. Mr. Tew was elected a Municipal Councilor in 1905 and was Reeve of the Township of Flamborough for seven years between 1913 and 1926. He was elected Warden of Wentworth County for the year 1924. The Spencer Creek Conservation Authority, forerunner of the HCA, purchased the land from the family in the 1960’s; however members of the Tew’s family still reside in the area. (Spencer Creek Conservation Authority, 1965).

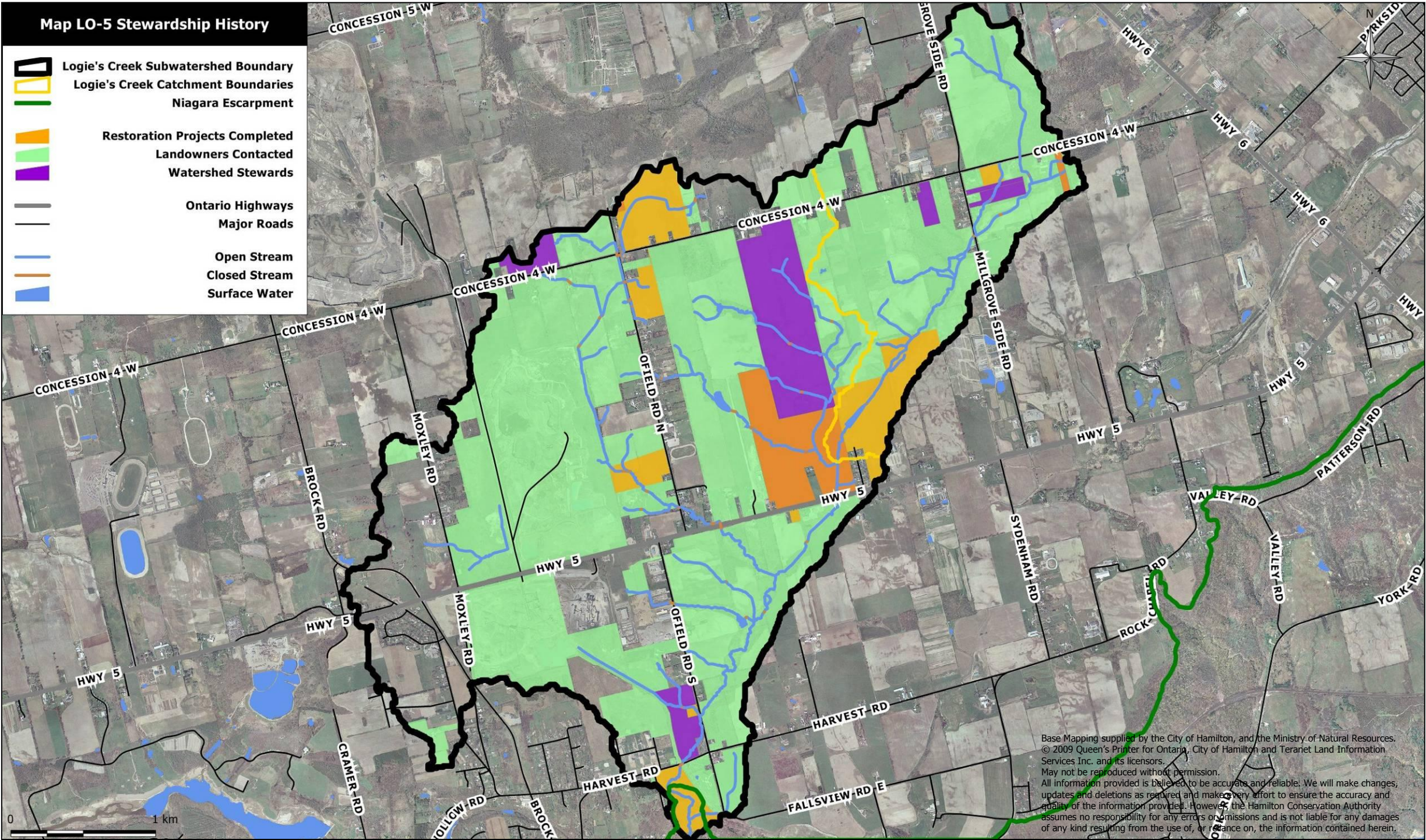
The approximate population of the Logie’s Creek subwatershed is 1110 persons with a population density of about 535 persons per square kilometer in the residential areas and 36 persons per square kilometer in the rural areas.

Current land use within the Logie’s Creek subwatershed is predominantly agricultural, with industrial land use for aggregate extraction being the second most prominent land use. **(Table LO-3).** Residential land use is largely limited to the portions of the subwatershed that fall within the hamlet of Greensville as well as below the Escarpment within the boundary of the former Town of Dundas. Agricultural land use is prominent throughout the remainder of the subwatershed. There is little significant open space in this subwatershed, the majority of which falls within the Millgrove South Woodlot and the Spencer Gorge ESAs **(Map LO-4).**

Commercial and industrial land use is concentrated along major transportation routes, specifically Highway 5. One utility corridor transects this subwatershed as it follows the length of Millgrove Side Road. Also of note, the area of impervious surfacing within this subwatershed exceeds Environment Canada standards recommended for healthy stream systems.

Table LO-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 (%)
13.3	8.11	0.26	2.64	0.11	0.11	1.53	0.02	21.2



LOGIE’S CREEK SUBWATERSHED CHARACTERIZATION

STEWARDSHIP HISTORY

Although there are many properties that do not incorporate a portion of a natural feature, there are 205 properties that do contain forest, wetland, meadow or riparian / aquatic habitat (Table LO-4). Of these landowners, 85 (or 42%) have been contacted by the Hamilton-Halton Watershed Stewardship Program (HHWSP), and 8 (or 4%) have become Watershed Stewards (Table LO-4). Therefore, there is considerable potential to reach the remaining 58% of landowners with natural features to create awareness regarding Best Management Practices (BMP’s) for natural areas and agricultural operations. Through this contact there is also great potential to engage more landowners in the Watershed Steward Program. Watershed Stewards are landowners who have agreed to protect and maintain the natural features that fall within their property. In addition to landowners who have natural features on their properties, landowners who do not have natural features on their properties can also act as Watershed Stewards as they can be advocates of stewardship messaging in other capacities. There is also a significant opportunity in this subwatershed to contact all landowners without natural areas to create awareness regarding urban BMP’s as they relate to urban wildlife, water conservation, storm water management practices, etc.

Currently, Watershed Stewards are evenly distributed between the Concession 4 and Highway 5 catchments. There are a few key landowners in this subwatershed who are Watershed Stewards who could potentially be approached for stewardship activities. Landowner contact would be best focused in the eastern portion of the Highway 5 and Concession 4 catchments as Lafarge Lime Canada is the principal landowner in the western portion of this subwatershed.

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

Table LO-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
1110	Rural - 36 Urban - 535	205	85	8	101	11

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

PARAMETER	% Wetlands	% Stream Naturally Vegetated	Total Suspended Sediments	% Impervious Surfacing	Fish communities	% Forest Cover	Size of largest Forest patch	% Forest Cover 100m & 200m from Forest edge
GUIDELINE	6	75% with 30m buffer on either side	Below 25 mg/L	< 10	Based on historical data / watershed characteristics	30	2km ² & min 500m wide	10% < 100m from forest edge
SUBWATERSHED STATUS	8.6	45%	n/a	21.2	Warm water fishery	3.5	0.12 km ²	100m – 1.3% 200m – 0%

out by this agency. Table LO-5 displays the status of the Logie’s Creek subwatershed when compared to these Federal guidelines.

Due to the current aggregate extraction industry in this subwatershed, planning and management strategies for the natural system should include rehabilitation of the quarry sites once they are decommissioned to reestablish wildlife habitat and connectivity. The Management of Abandoned Aggregate Properties (MAAP) Program should be approached a year in advance of the decommissioning of these quarry sites to undertake preliminary plans for rehabilitation. Also, agriculture is a dominant land use in this subwatershed. BMP’s relating to improving agricultural practices must be encouraged and exemplified by partner agencies in an effort to prevent sedimentation and contamination within the system.

This subwatershed does not meet the Environment Canada’s How Much Habitat is Enough Guidelines for forest cover. Forest cover would need to be increased by approximately 3.5km² to meet this guideline, with an emphasis being placed on forest patch shape. Additionally, it should be determined whether or not the percentage of forest cover from the forest edge supports interior forest breeding birds.

In this subwatershed there is potential to naturalize an additional 2 hectares by enhancing utility corridors to serve as terrestrial habitat. It is important to work with our large landowners to restore terrestrial and aquatic habitat in the subwatershed. Additionally, it is equally important to work with our ward councilors to generate support for local stewardship initiatives with the public and private sectors as well as our development industry.

STRESSES & STEWARDSHIP ACTIONS

There are twenty seven *stresses* identified as negatively impacting the Logie’s Creek subwatershed. There are three dominant activities occurring throughout this subwatershed that many of the stresses can be attributed to. These activities and their associated stresses are listed in **Table LO-6**.

Table LO-8 outlines the *Stewardship Actions* that have been developed to mitigate the impacts of each of the stresses listed in **Table LO-6**. Specific locations where these stresses are occurring are mapped and inventoried in the subsequent catchment datasheets. Within the Logie’s Creek subwatershed, 29 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.

An inventory count of the number of located stresses in each catchment basin of the subwatershed is listed in **Table LO- 7**. The three most prevalent stresses identified in the Logie’s Creek Subwatershed are: On-line Ponds, Water Takings and Habitat Fragmentation. These stresses are associated with Agriculture, Industry and Development activities.

TABLE LO-6: Land Use Activities and their Associated Stresses

ACTIVITY	DEVELOPMENT	AGRICULTURE/NURSERY OPERATIONS	URBAN AND RURAL LIVING
ASSOCIATED STRESSES	Buried Streams	Channelization	Detachment From Nature
	Channelization	Dams	Encroachment
	Erosion	Erosion	Faulty Septic Systems
	Habitat Fragmentation	Habitat Fragmentation	Illegal Fill Placement
	Inadequate Stormwater Management	Invasive/Introduced Species	Inadequate Stormwater Management
	Increased Impervious Surfaces	Insufficient Riparian Buffer	Increased Impervious Surfacing
	Invasive/Introduced Species	Nutrient Loading	Invasive/Introduced Species
	Insufficient Riparian Buffer	On-line Ponds	Insufficient Riparian Buffer
	Litter	Pesticide Use	Litter
	Perched Culverts	Plowed Watercourses	Nutrient Loading
	Sediment Loading	Sediment Loading	Outdoor Recreation Related Degradation
	Site Clearing Prior to Development	Water Takings	Perched Culverts
	Transportation Corridor Expansion		Pesticide Use
			Runoff Contamination via Transportation Corridors
			Stormsewer Outfalls
			Wildlife Collisions

In summary, on-line ponds, water takings and habitat fragmentation are all relatively of equal concern in both catchments of this subwatershed. Each of these stresses can be attributed to agricultural and industrial activities. On-line ponds are also associated with urban and rural living as are often aesthetic property features. Thermal effects associated with on-line ponds as well as base flow fluctuations resulting from ground and surface water takings directly relate to the health of the local fishery as they affect the quality and quantity of water available in-stream. The Tier 1 Water Budget Report, completed by the Hamilton-Halton Region Source Water Protection Team, recommends that the groundwater levels in this subwatershed be monitored regularly to maintain healthy ecosystems. Restoration efforts should be focused on retrofitting and decommissioning on-line ponds and their control structures as well as promoting water conservation and new irrigation technologies.

The natural systems within this subwatershed have been altered and reduced in order to accommodate different land uses. The natural systems within both the Highway 5 and Concession 4 catchments are limited and as such serve little function with respect to wildlife habitat. Also, insufficiently sized riparian buffers have also been noted as a concern in this subwatershed. It is important to highlight the potential to expand riparian buffers throughout this subwatershed in an effort to re-establish habitat connectivity between larger tracts of habitat, specifically the Millgrove South Woodlot and the Spencer Gorge ESAs to ensure that these systems function optimally to support ecological biodiversity.

CATCHMENT SUMMARIES

This section of the plan identifies the occurrences of stresses within each catchment of Logie’s Creek subwatershed. A summary of these stresses and an indication of the stewardship actions available to mitigate the impacts of the stresses are outlined in the data

sheets following each catchment map. Ecological monitoring data for each catchment basin is also outlined following each catchment map. In total, 29 stresses were identified for the Logie’s Creek Subwatershed and inventory counts are presented in **Table LO-7**.

TABLE LO-7: Stresses Inventory by Catchment

STRESS	MAP CODE	NO. IN SUBWATERSHED	NO. IN EACH CATCHMENT	
			Highway 5	Concession 4
Buried Streams	BS	1	1	
Channelization	CH	1	1	
Dams	DM			
Detachment from Nature	DT			
Encroachment	EN			
Erosion	ER			
Faulty Septic Systems	SS	1		
Habitat Fragmentation	HF	5	3	2
Illegal Fill Placement	FP			
Inadequate Stormwater Management	SW			
Increased Impervious Surfacing	IS	1	1	
Invasive/Introduced Species	IV			
Insufficient Riparian Buffer	RB	4	3	1
Litter	LI			
Nutrient Loading	NL			
On-line Ponds	OP	7	6	1
Outdoor Recreation Related Degradation	OR	2	2	
Perched Culverts	CP			
Pesticide Use	PS			
Plowed Watercourses	PW			
Sediment Loading	SL	1	1	
Site Clearing Prior to Development	SC			
Stormsewer Outfalls	SO			
Runoff Contamination via Transportation Corridors	TC			
Transportation Corridor Expansion	TE			
Water Takings	WT	6	4	2
Wildlife Collisions	WC			

* 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 LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
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: Recommendation FW-4 Page 107 HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55	HCA / HWSC / HHWSP / RAP / WPN / DFO	HHWSP / HWSC	2010-2014
		Undertake a feasibility and prioritization study for “daylighting” buried streams in the study area.		Fisheries Act, Section 37	HCA / CITY / DFO / MNR / HHWSP / RAP	CITY	2010-2012
			Work with landowners to undertake daylighting projects as recommended by the feasibility and prioritization study.	City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158	HHWSP / HCA / DFO / CITY / HWSC	HHWSP	2012-2014
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: Recommendation FW-4 Page 107 HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55	HCA / HWSC / HHWSP / RAP / WPN / CITY / RBG / FSRT	HHWSP / HWSC	2010-2014
		Undertake a feasibility and prioritization study for restoring channelized creeks to those with a natural design.		Fisheries Act, Section 37	HCA / CITY / DFO / MNR / HHWSP / RAP	CITY	2010-2012
			Work with landowners to undertake natural channel design projects as recommended by the feasibility and prioritization study.	City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158	HHWSP / HCA / DFO / CITY / HWSC	HHWSP	2012-2014
			Work with landowners downstream of channelized sites to rehabilitate the riparian zone to reduce flow velocities, erosion and sedimentation.		CITY / DFO / HHWSP / HCA / RBG / FSRT / HWSC /	HHWSP	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
Dams Map Code: DM Definition: a barrier to obstruct the flow of water, usually one of earth or masonry, built across a stream or river.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the detrimental effects of dams as fish barriers and to promote the removal/retrofitting of dams.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-4 Page 107 MNR Fish Barrier Inventory	HCA / HWSC / HHWSP / MNR / DFO	HHWSP / HWSC	2010-2014
		Undertake a feasibility and prioritization study for the removal of dams inventoried.		HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55	HCA / HWSC / HHWSP / MNR	HCA / MNR / HWSC	2010-2012
			Work with landowners to remove/retrofit dams as recommended by the prioritization study.	Fisheries Act, Section 37	HCA / HWSC / HHWSP / MNR / LO's / DFO / CITY	HHWSP	2010-2014
Detachment from Nature Map Code: DT  Definition: The condition of people disassociating their existence from nature.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote BMP's and the ecological significance of natural features.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations PAA-2, PAA-3, EPI -1, EPI-2, EPI-5 Pages 129-138	BARC / CITY / FSRT / GV / HCA / HHWSP / HWSC / WPN / DU	HHWSP / HWSC	2010-2014
	Erect creek crossing & ecological corridor signage along roadways.				HCA / CITY / RAP / WPN / BARC	CITY / WPN	2010-2014
	Implement education outreach programs for school-aged children, including: Yellow Fish Road, Stream of Dreams, Mini Marsh, Envirothon, Children's Water Festival, Eco-House Tours, etc.				BARC / HCA / CITY / GV / RBG	BARC / GV / HCA / CITY / RBG	2010-2014
	Support the formation and activities of "Friends of" groups aimed at protecting and rehabilitating natural features.				HWSC / HHWSP / CITY / HCA / BARC / FSRT / DFO / BTC	HHWSP / HWSC / HCA / CITY	2010-2014
		Assess landowner willingness to participate in and/or support water quality improvement and habitat restoration projects.			HHWSP / CITY / HCA / HWSC	HHWSP	2010-2012

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
		Engage citizen groups to conduct local subwatershed monitoring & reporting projects, including: water quality, base flow, litter hot spots, etc.			HHWSP / CITY / HCA / GV / BARC/ HWSC / RBG / FSRT	HHWSP / CITY / HCA / GV / BARC/ HWSC / RBG / FSRT	2010-2014
			Work with schools to undertake school yard naturalization projects.		HHWSP / HCA / CITY / HWSC	HHWSP	2010-2014
			Work with citizen groups to undertake restoration projects on public and private lands, including “Friends of” work days, Adopt a Creek, Fishing Clubs, etc.		HHWSP / HCA / CITY / HWSC / BARC / RBG / FSRT /BTC	HHWSP	2010-2014
Encroachment Map Code: EN Definition: The act of undertaking practices on another person’s property, i.e. erecting structures, planting gardens, disposal of waste.	Utilize workshops, information sessions, literature, websites, public service announcements, signage & direct landowner contact to promote healthy creeks to create awareness regarding how encroachment negatively impacts habitat.			HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55, 60	CITY / HHWSP / HCA / BARC / GV / HWSC / RBG / BTC	CITY / HCA / HHWSP / RBG	2010-2014
		Engage citizen groups to monitor & report areas affected by encroachment that are in need of restoration.		City of Hamilton Draft Private Tree and Woodland Conservation By-law	CITY / HHWSP / HCA / BARC / RBG / GV / HWSC / BTC	HCA / CITY / RBG	2010-2014
			Work with citizen groups to remove encroaching material on public and private lands, including “Friends of” work days, Adopt a Creek, Fishing Clubs, etc.	City of Hamilton By-law No. 03-117 Illegal Dumping	HHWSP / HCA / CITY / HWSC / BARC / GV / RBG / HNC	CITY / HHWSP / RBG / HCA	2010-2014
Erosion Map Code: ER Definition: The process of soil being scoured or washed away by flowing water.	Host erosion and sediment control training sessions for City staff, developers, contractors and landscapers to create awareness regarding recommended E&SC methods.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-2, ULM-3, FW-4 Pages 69, 70, 107	CITY / HCA / HHWSP / HWSC / Landscape Ontario / HHHBA	HCA	2010-2014
	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.			HCA Planning and Regulation Policies and Guidelines Pages 68-69 Fisheries Act, Section 35	CITY / DFO / HCA / HWSC / HHWSP / HHHBA / Landscape Ontario / OSCIA	HHWSP / HWSC	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
	Create demonstration sites on public lands that highlight streambank stabilization and natural channel design projects.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142, 159-160 Erosion and Sediment Control Guidelines for Urban Construction	CITY / HCA / HHWSP / DFO / HWSC / RBG / OSCIA	HHWSP	2010-2014
		Select erosion sites as identified in the City of Hamilton GRIDS Plan for the upcoming Erosion and Sediment Control Pilot Project.			HCA / CITY / HHHBA / DFO	HCA	2010-2014
			Work with landowners to undertake erosion rehabilitation projects as identified in the City of Hamilton GRIDS Plan.		HHWSP / HWSC / HCA / CITY / DFO /	CITY	2010-2014
			Utilize enforcement scheme to enforce appropriate erosion control measures on development sites, including: seeding, avoiding steep slopes, etc.		HCA / CITY / HHHBA / DFO	HCA	2010-2014
			Work with landowners to reduce erosion by implementing BMP projects; e.g. streambank stabilization, riparian buffers, natural channel design.		HHWSP / HWSC / HCA / BARC / DFO / OSCIA / FSRT	HHWSP	2010-2014
Faulty Septic Systems Map Code: SS Definition: Malfunctioning septic systems; including plugged distribution tiles, infrequent tank pumping, etc. lead to untreated sewage contaminating our ground and surface water.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the proper maintenance of existing septic systems.				HCA / BARC / HHWSP / HWSC / CITY	HHWSP	2010-2014
	Create demonstration sites on public lands that highlight properly functioning septic systems.				CITY / HHWSP / HCA / HWSC	CITY / HCA	2010-2012
		Conduct an inventory to determine how many households in Old Dundas are serviced by on-site treatment systems.			CITY / RAP	CITY	2010-2011
		Analyze existing water quality data for high levels of bacteria, chlorides, nitrates and TKN to prioritize areas for education outreach and restoration.			CITY / HCA / RAP	CITY / HCA	2010-2011

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
		Undertake a risk analysis of the potential for old and/or degraded sewer lines to contaminate groundwater.			CITY / MOE / RAP	CITY	2010-2011
			Work with landowners to properly maintain their septic systems or upgrade faulty septic systems.		HHWSP / CITY / HCA / HWSC / GV	HHWSP	2010-2014
Habitat Fragmentation Map Code: HF  Definition: Disruption of large continuous tracts of habitat.	Establish a Woodlot Owners Association for this area as recommended by Re-Leaf Hamilton			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-12 Page 123 HCA Planning and Regulation Policies and Guidelines Pages 53-59 City of Hamilton Draft Private Tree and Woodland Conservation By-law Cootes to Escarpment Conservation & Land Management Strategy	HHWSP / HCA / HWSC / RBG / HNC / MNR	HWSC	2010
	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 / HCA / RBG / CITY / HWSC / DU / MNR / HNC / CC	HHWSP / HWSC	2010-2014
	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 / HCA / HWSC / CITY / HNC	HHWSP	2010-2014
	Create demonstration sites on public lands that highlight various types of terrestrial and aquatic habitat restoration projects.				HHWSP / HCA / CITY / HWSC / RBG / DU / HNC / DFO / FSRT	HHWSP	2010-2014
		Develop How Much Habitat is Enough targets for each subwatershed.			HCA / CITY/ HHWSP / DU / CC / HWSC / RBG / MNR / DFO	HCA	2010-2014
			Work with landowners to undertake habitat creation and enhancement projects.		HHWSP / OSCIA / DU / HWSC / HCA / DFO / FSRT	HHWSP	2010-2014
					HHWSP / HWSC / HCA / CITY	HCA	2011
Illegal Fill Placement Map Code: FP Definition: The act of	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding the adverse effects of "fill" on natural systems and promote compliance with the HCA Regulations and the City's Site Alteration By-law.			HCA Planning and Regulation Policies and Guidelines Pages 61-62 City of Hamilton By-law No. 03-117 Illegal Dumping	HHWSP / HWSC / HCA / CITY	HCA	2011

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
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 / CITY / DFO	HCA	2010
			Work with landowners to rehabilitate fill sites as recommended by the HCA Inventory.		HCA / CITY / HHWSP / DFO	HCA	2012-2014
Inadequate Stormwater Management Map Code: SWM  Definition: Inadequately managing stormwater to control water quality and flooding; often associated with the drainage of developed lands.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote stormwater management BMP's including: disconnected downspouts, roof gardens, rain barrels, biofilters, permeable pavement, rain gardens, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -6, ULM-9, ULM-11 Pages, 72, 75, 77 HCA Planning and Regulation Policies and Guidelines Pages 74-77 Fisheries Act, Section 34 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162	GV / CITY / BARC	CITY	20102014
	Promote the use of constructed wetland technology and Low Impact Development in the design of stormwater management facilities.						
		Undertake a study to determine the percentage of landowners with connected downspouts.			CITY / GV / RAP / BARC	CITY	2010-2011
			Implement recommendations from the City of Hamilton Stormwater Master Plan.		CITY / HCA / RAP / BARC / GV	CITY	2010-2014
			Work with landowners to disconnect downspouts and install rain barrels.		CITY / HHWSP / BARC / GV	CITY	2010-2014
			Retrofit existing stormwater management ponds to wet ponds where beneficial to water quality, aquatic habitat and erosion control.		CITY / RAP / HCA	CITY	2010-2014
			Offer financial incentives to replace driveways and decks with permeable pavement, interlocking brick, etc.		CITY	CITY	2010-2011
Increased Impervious Surfacing Map Code: IS	Host training sessions for HCA and City staff, developers and consultants to promote the incorporation of development related BMP's into planning applications; e.g. permeable pavement, green roofs, on-site wastewater treatment, etc.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -5b, ULM-6 Page 71, 72 HCA Planning and Regulation Policies	HCA / CITY / HHHBA / Landscape Ontario	HCA / CITY	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
 Definition: The decreased potential for rainwater infiltration into the soil as a result of increased paved/impermeable surfacing.	Lobby the Provincial government to amend the building code to include and favour “green” technology; e.g. green roofs, multilevel parking, interlocking pavement, etc.			and Guidelines Pages 74-77 Fisheries Act, Section 34	HCA / CITY / EH / HHHBA / GV / Landscape Ontario	CITY	2010-2014
	Create demonstration sites in subdivisions that highlight development related BMP’s and new environmentally friendly technologies; e.g. permeable pavement, green roofs, on-site wastewater treatment, etc.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162	HCA / CITY / EH / HHHBA / GV / HHWSP / HWSC	HHHBA	2010-2014
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote the implementation of development related BMP’s and new environmentally friendly technologies when undertaking home renovations.				HCA / CITY / GV / HHHBA / HHWSP	GV	2010-2014
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.	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.			HCA Planning and Regulation Policies and Guidelines Pages 53-56, 70-71 Action Plan for Addressing Terrestrial Invasive Species within the Great Lakes Basin	HHWSP / HCA / HWSC / CITY / HNC / Landscape Ontario	HCA	2010-2011
	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.				HHWSP / HCA / HWSC / CITY	HHWSP	2010-2014
		Develop an Invasive Species Management Program which includes monitoring sites and management for specific species.			HCA / HHWSP / MNR / HWSC / CITY / HNC / RBG / CC	HCA	2010-2013
			Work with landowners to control invasive species and plant native species.		HCA / CITY / HHWSP / RBG	HHWSP	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
Insufficient Riparian Buffer Map Code: RB  Definition: Disruption of large continuous tracts of habitat along watercourses.	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.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-2 Page 69	DFO / HCA / HHWSP / BARC / HWSC / OSCIA / OMAFRA	HHWSP	2010-2014
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			HCA Planning and Regulation Policies and Guidelines Pages 40, 55, 60	HCA / HHWSP / HWSC / OSCIA / OMAFRA	OSCIA	2010-2014
	Create demonstration sites that highlight riparian buffers.			City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 145-150, 162-163	DFO / HCA / HHWSP / BARC / HWSC / OSCIA / OMAFRA	HHWSP	2010-2012
			Work with landowners to naturalize and plant riparian buffers adhering to How Much Habitat is Enough guidelines of a15m width adjacent to warm water streams and a 30m width adjacent to cold and cool water streams.	Cootes to Escarpment Conservation & Land Management Strategy	HCA / HHWSP / HWSC / OSCIA / FSRT / DFO	HHWSP / OSCIA	2010-2014
Litter Map Code: LI Definition: The act of illegally disposing of waste into public/natural areas.	Utilize literature, websites, public service announcements, & direct landowner contact to create awareness regarding the prevention and clean-up of litter.			City of Hamilton By-law No. 03-118 Litter, Yard Waste and Property Maintenance	HCA / RBG / CITY / GV	CITY	2010-2014
		Undertake an inventory of illegal dumping sites throughout the subwatershed. Prioritize sites for the installation of deterrent mechanisms and the implementation of the Keep Hamilton Clean Program.			HCA / CITY / RBG	CITY	2010-2014
			Participate in the Keep Hamilton Clean Program by working with citizen groups to host litter clean up events.		HCA / HHWSP / HWSC / RBG / CITY	CITY	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
Nutrient Loading Map Code: NL  Definition: Excessive nutrients being inputted into a watercourse; often resulting from the application of manure/fertilizer.	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.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-9, RM-7. Pages 116, 158 Nutrient Management Act 2002, O. Reg 267/03 Fisheries Act, Section 34 HCA Planning and Regulation Policies and Guidelines Page 72	HCA / BARC / GV / RBG / OSCIA / MOE / OMAFRA / RAP	HCA	2010-2014
	Create demonstration sites on public lands that highlight nutrient management BMP projects.				HCA / HHWSP / HWSC / OSICA / RAP	HHWSP	2010-2012
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.				DFO / HCA / OMAFRA / OSCIA / HHWSP / HWSC	OSCIA	2010-2014
		Establish a nutrient level monitoring program with strategic sampling sites that are land use dependent, to identify specific sources of nutrient loading.			HCA / CITY / BARC / RBG / MOE / OMAFRA / RAP	HCA	2010-2011
		Develop a plan to reduce nutrient levels as determined by the land use dependent nutrient level monitoring program.			HCA / CITY / BARC / RBG / DFO / OSCIA / HHWSP / HWSC / RAP	HCA	2012-2014
			Work with landowners to reduce nutrient loading by implementing agricultural and urban BMP's related to nutrient management.		HHWSP / OSCIA / HCA / CITY / OMAFRA / HWSC	HHWSP	2010-2014
On-line Ponds Map Code: OP	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and pond retrofit options.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-1, FW-4 Page 104, 107	DFO / HCA / OSCIA / OMAFRA / HHWSP / CITY	HHWSP	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
<p>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.</p>			Work with landowners to restore or retrofit on-line ponds.	Fisheries Act, Section 37 HCA Planning and Regulation Policies and Guidelines Page 63	DFO / HCA / OSCIA / OMAFRA / HHWSP / CITY / HWSC	HHWSP	2010-2014
<p>Outdoor Recreation Related Impacts</p> <p>Map Code: OR</p>  <p>Definition: Recreational activities occurring in natural areas that inadvertently degrade the natural features of the area.</p>	Support the formation and activities of “Friends of” groups aimed at protecting and rehabilitating natural features.			<p>Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-8, PAA-1, PAA-2, PAA-3 Pages 115, 126-130</p> <p>The Conservation Lands of Ontario – Three Year Business Plan</p> <p>A Joint Outdoor Tourism Marketing Strategy</p> <p>Niagara Escarpment Access Enhancement Plan</p> <p>Dundas Valley 50 Year Vision Strategy</p> <p>Cootes to Escarpment Conservation & Land Management Strategy</p>	HWSC / HHWSP / CITY / HCA / BARC / FSRT / BTC	HHWSP / CITY / HCA / RBG	2010-2014
	Erect signage explaining the environmental significance of natural areas and promoting user “etiquette” for the area.				HCA / CITY / RBG / HHWSP / HNC / BTC	HCA / RBG / CITY	2010-2014
	Add “tread lightly” messaging to our recreation oriented websites.				HCA / CITY / RBG / HNC / BTC	HCA / CITY / RBG / HNC / BTC	2010-2012
		When undertaking master planning exercises, design trails to meet guidelines as set in HCA’s Planning and Regulation Policies and Guidelines.			HCA / CITY / RBG	HCA / CITY / RBG	2010-2014
		Develop marketing strategies for sensitive lands that focus on sustainable use.			HCA / CITY / RBG	HCA / CITY / RBG	2010-2012
		Continue to monitor Category A and B waterfalls on public lands for signs of degradation.			HCA / CITY	HCA / CITY	2010-2014
		Refer to the Niagara Escarpment Access Enhancement Plan to design infrastructure for high traffic areas to guide users along approved trails.			HCA / CITY / RBG / BTC	HCA / CITY / RBG / BTC	2010-2014
			Host annual clean up days for natural areas identified as having excessive amounts of litter.		HCA / RBG / CITY / HHWSP / HWSC / HNC / BARC	CITY / HCA / RBG	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
			Increase the amount of poison ivy caution signage along trails and in areas known to be degraded by trespassing.		HCA / CITY / RBG / HNC / BTC	HCA / CITY / RBG	2010-20111
			When conducting maintenance of existing trails, seek guidance from the HCA Planning and Engineering Department with respect to materials and design.		HCA / CITY / HHWSP / RBG / HNC	HCA / CITY / RBG	2010-2014
Perched Culverts Map Code: CP Definition: In-stream culverts that when improperly designed/installed, create barriers to water flow and fish migration.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and create awareness regarding the detrimental effects of perched and closed bottom culverts.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-1, FW-4 Pages 104, 107 Fisheries Act, Section 37 HCA Planning and Regulation Policies and Guidelines Page 41	DFO / HCA / OSCIA / OMAFRA / HHWSP / CITY	HHWSP	2010-2014
	Host training session for HCA and City staff to promote the proper installation of culverts.				DFO / HCA / OSCIA / OMAFRA / HHWSP / CITY	CITY	2010-2014
		Undertake an inventory of perched and closed bottom culverts throughout the subwatershed. Prioritize culverts for mitigation or replacement.			DFO / HCA / OSCIA / OMAFRA / HHWSP / CITY	CITY	2010-2014
			Work with landowners to remove/retrofit perched and closed bottom culverts.		DFO / HCA / OSCIA / OMAFRA / HHWSP / CITY	HHWSP	2010-2014
Pesticide Use Map Code: PS 	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 alternatives.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations TSSR-6, EPI-4 Pages 99, 137 Fisheries Act, Section 34 City of Hamilton By-Law No. 07-282	HCA / OSCIA / OMAFRA / HHWSP / CITY / GV / HCPI / Landscape Ontario	GV	2010-2014
	Host Audubon Cooperative Sanctuary Program information sessions for local golf course owners and managers.				HHWSP / Landscape Ontario / CITY / HWSC / HCPI / RCGA	HHWSP	2010-2011
	Promote Municipal and Provincial Pesticide By-Laws.				CITY / GV / HCPI / HWSC / HHWSP / OSCIA / OMAFRA	CITY / GV	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
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.				CITY / GV / HCPI / HWSC / HHWSP / OSCIA / OMAFRA	HHWSP	2010-2014
		Undertake a study to determine the current level of pesticide/herbicide use in the subwatershed and develop targets for reduction.			CITY / GV / HCPI / HWSC / HHWSP / OSCIA / OMAFRA	CITY	2010-2012
			Work with landowners to implement Integrated Pest Management practices as alternatives to pesticide use.		CITY / GV / HCPI / HWSC / HHWSP / OSCIA / OMAFRA	HHWSP	2010-2014
Plowed Watercourses Map Code: PW Definition: Headwater swales or small watercourses that are worked for agricultural production.	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote drainage related BMP's; e.g. Water and Sediment Control Basins and grassed waterways.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-4 Pages 70, 71, Fisheries Act, Section 37 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 44, 145-150	DFO / HCA / OMAFRA / OSCIA / HHWSP / HWSC	HHWSP / OSCIA	2010-2014
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.				DFO / HCA / OMAFRA / OSCIA / HHWSP / HWSC	OSCIA	2010-2014
	Create demonstrations sites that highlight BMP's that promote good agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.				DFO / HCA / OMAFRA / OSCIA / HHWSP / HWSC	HHWSP / OSCIA	2010-2012
			Work with landowners to install effective agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.		DFO / HCA / OSCIA / HHWSP / HWSC	HHWSP / OSCIA	2010-2014
Sediment Loading Map Code: SL	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote healthy streams and BMP's related to preventing sedimentation.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-5, FW9 Pages 70, 71, 116 Fisheries Act, Sections 34	DFO / HCA / HHWSP / BARC / HWSC / RBG / FSRT / RAP	HCA	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
<p>Definition: Organic and inorganic material that is entrained by the flow of water and is deposited in a creek system.</p>			Work with landowners to reduce sediment loading by implementing BMP projects; e.g. streambank stabilization, riparian buffers, natural channel design.	and 36 Erosion and Sediment Control Guidelines for Urban Construction	DFO / HCA / HHWSP / BARC / HWSC / OSCIA / FSRT / RAP	HHWSP	2010-2014
			Utilize an enforcement scheme to ensure the proper use of sediment control measures, including: silt fencing, etc.		DFO / HCA / HHHBA/ CITY		
			Work with contractors to ensure that site clearing prior to development is phased out as the project phases unfold to reduce the area and length of time bare soil is exposed.		CITY / HCA/ HHHBA / DFO	HCA	2010-2014
<p>Site Clearing Prior to Development</p> <p>Map Code: SC</p> 	Host training sessions for City staff, developers and consultants to promote City standards and guidelines related to site preparation prior to development.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-4 Page 71	DFO / HCA / HHHBA / CITY / Landscape Ontario	CITY	2011-2012
			Work with contractors to ensure that only necessary areas of development sites are cleared prior to development to eliminate the unnecessary destruction of habitat.	HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69 City of Hamilton Draft Private Tree and Woodland Conservation By-Law City of Hamilton By-Law No. 03-126 Site Alteration By-Law Erosion and Sediment Control Guidelines for Urban Construction	CITY / HCA / HHHBA / DFO	HCA	2010-2014
<p>Definition: The act of stripping or excavating the vegetation and topsoil from a site prior to construction works.</p>							

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
Stormsewer 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 ULM -6, ULM-9, ULM-11, RM-7 Pages, 72, 75, 77, 158 Fisheries Act, Section 34 City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 43, 138, 158-159	HCA / BARC / GV / CITY / HWSC / FSRT	BARC	2010-2014
	Promote the Municipal Sewer-Use By-law.				HCA / CITY / GV / FSRT / BARC	CITY	2010-2014
		Undertake a water quality study evaluating water quality and temperature at a representative sampling of storm sewers to prioritize sewersheds to target for education outreach and remediation.			HCA / BARC / RAP / CITY / GV	CITY	2010-2012
		Undertake a water temperature monitoring study at a representative sampling of storm sewers to determine the impact of storm flows on creek temperature.			HCA / CITY / DFO	HCA	2010-2012
			Work to implement the recommendations in the sewershed water quality study.		HCA / RAP / CITY / DFO	CITY	2012-2014
			Work with landowners to establish riparian buffers and/or erosion protection downstream of storm sewer outfalls; e.g. riverstone.		HCA / CITY / HHWSP / BARC / FSRT	HHWSP	2010-2014
			Work with landowners to disconnect downspouts and to install rain barrels.		HHWSP / GV / CITY BARC	GV	2010-2014
Runoff Contamination via Transportation Corridors Map Code: TC Definition: Contamination resulting from stormwater runoff from major arterial roadways; often associated	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.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-5b Page 71 Fisheries Act, Section 34	CITY / DFO / HCA / MTO	CITY / HCA	2010-2014
	Utilize literature, websites, public service announcements & direct landowner contact to promote the use of sidewalk salt alternatives.				CITY / DFO / HCA / MTO / GV / HWSC / HHWSP	GV	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
with the application of salts for de-icing and the residual precipitate created by automobile exhaust.		Undertake a study to determine the most effective method of snow removal that will reduce contamination of watercourses.			CITY / DFO / HCA / MTO	CITY	2010-2012
			Implement improved snow removal methods as recommended by the study that will reduce contamination of watercourses.		CITY / MTO	CITY	2012-2014
			Install vegetated filter strips and riparian buffers along medians and roadsides.		CITY / HCA / MTO / DFO / RAP	CITY	2010-2014
Transportation Corridor Expansion Map Code: TE Definition: The process by which new roads are built or existing roads are widened.	Host training sessions for City staff, developers and consultants to promote BMP's and new environmental technologies relating to transportation corridors; e.g. permeable pavement, wildlife under/overpasses, vegetated filter medians and rights of way, light coloured aggregate in hot mix, etc.			HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69 Ontario Provincial Standards for Roads and Public Works Erosion and Sediment Control Guidelines for Urban Construction	CITY / HCA / MTO / HHHBA	CITY	2010-2014
		When planning for major road works, design transportation corridors using new technologies for environmental solutions.			CITY / HCA / MTO / HHHBA	CITY	2010-2014
			When repairing roads, utilize new technologies for road maintenance that are proven to have environmental benefits.		CITY / HCA / MTO / HHHBA	CITY	2010-2014
Water Takings Map Code: WT	Host open houses when experiencing low water conditions to address landowner concerns and promote recommended reductions in rates and volumes of takings.			Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-12 Page 77 Ontario Water Resources Act O. Reg. 387/04	HCA / MOE / CITY	HCA	2010-2014
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage & direct landowner contact to promote BMP's relating to water conservation technology.				HCA / MOE / CITY / OMAFRA / OSCIA / HHWSP / HWSC	HHWSP	2010-2014
	Encourage landowners with surface water takings to install groundwater systems.				HHWSP / OSCIA / MOE / OMAFRA	HHWSP	2010-2014

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS


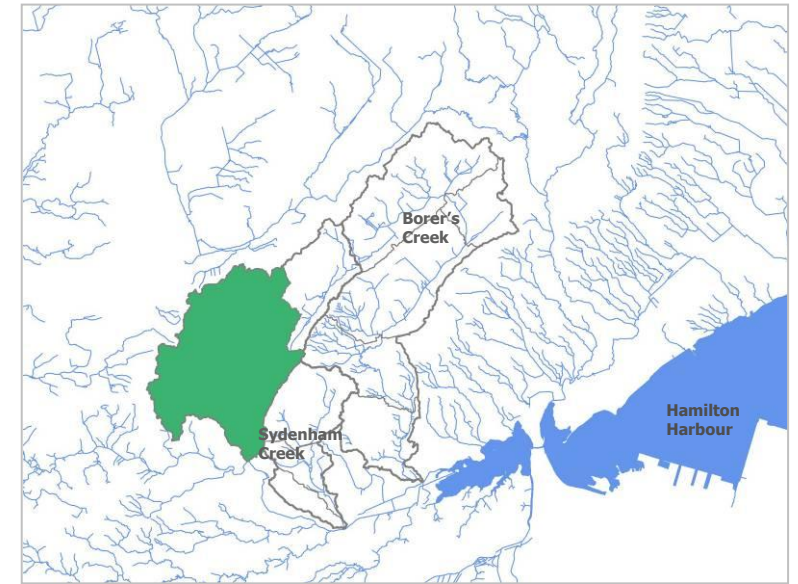
STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
 <p>Definition: The process by which surface and groundwater are pumped out of the natural system; for the purposes of irrigation, aggregate extraction, etc.</p>	Encourage landowners with water taking needs to establish an Irrigation Advisory Committee to schedule takings alternately.				HHWSP / OSCIA / MOE / OMAFRA	OMAFRA	2010-2014
		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 / MOE / CITY	HCA	2010-2014
			Work with landowners to implement BMP's related to water conservation.		HCA / OSCIA / CITY / HWSC / HHWSP / OMAFRA	OSCIA	2010-2014
			Work with landowners to decommission unused wells.		HCA / HHWSP / OSCIA / CITY	HHWSP	2010-2014
<p>Wildlife Collisions</p> <p>Map Code: WC</p> <p>Definition: Incidences where animals are struck by vehicles or where animals collide with buildings, often occurring with buildings with large windows.</p>	Utilize literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding managing human-wildlife conflicts.				CITY / MNR / HHWSP / HWSC / HCA	MNR	2010-2014
	Erect additional wildlife caution signage that is species specific, along roadways at known points of frequent collisions.				CITY / HCA / RBG / MTO	CITY / MTO	2010-2014
		When planning major road works, consider the incorporation of wildlife over/underpasses, avoiding known migratory corridors and other wildlife accommodations in the design.			CITY / HCA / MTO	CITY	2010-2014
		Evaluate the effectiveness of the MTO roadside prairies and wildlife shrub corridors project in preventing wildlife collisions.			CITY / HCA / MTO	MTO	2010-2012

TABLE LO-8: STRESSES AND STEWARDSHIP ACTIONS

STRESSES	STEWARDSHIP ACTIONS			RELATED DOCUMENTS	PARTNER AGENCIES	LEAD AGENCY	TIMELINE
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity				
			Reduce the use of road salt or consider alternatives that do not attract wildlife.		CITY / HCA / MTO	CITY	2010-2011
			Produce and distribute window decals for large windows of homes and high rise buildings to prevent bird collisions.		CITY / HCA / HNC / GV	CITY	2010-2011

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		



HIGHWAY 5 CATCHMENT

DATA SHEETS

HIGHWAY 5 DATA SHEET

Table LO-9: Stresses Identified in the Highway 5 Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
BS-1	Buried Stream	☑	☑	☑	☑	☑	☑
CH-5	Channelization	☑	☑	☑	☑		☑
HF-1	Habitat Fragmentation	☑	☑	☑		☑	
HF-10	Habitat Fragmentation	☑	☑	☑		☑	
HF-11	Habitat Fragmentation	☑	☑	☑		☑	
IS-1	Increased Impervious Surface	☑				☑	
OP-1	On-line Pond	☑		☑		☑	☑
OP-14	On-line Pond	☑		☑		☑	☑
OP-2	On-line Pond	☑		☑		☑	☑
OP-3	On-line Pond	☑		☑		☑	☑
OP-4	On-line Pond	☑		☑		☑	☑
OP-5	On-line Pond	☑		☑		☑	☑
OR-8	Outdoor Recreation Related Degradation	☑	☑	☑	☑	☑	
OR-9	Outdoor Recreation Related Degradation	☑	☑	☑	☑	☑	
RB-1	Insufficient Riparian Buffer	☑		☑		☑	
RB-10	Insufficient Riparian Buffer	☑		☑	☑	☑	
RB-3	Insufficient Riparian Buffer	☑		☑		☑	
SL-1	Sediment Loading	☑		☑		☑	☑
SS-1	Faulty Septic Systems	☑	☑	☑		☑	
WT-1	Water Taking	☑	☑	☑		☑	
WT-2	Water Taking	☑	☑	☑		☑	
WT-3	Water Taking	☑	☑	☑		☑	
WT-5	Water Taking	☑	☑	☑		☑	

HIGHWAY 5 DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	COMMON NAME	NO. IDENTIFIED	IN-STREAM TEMPERATURE	TEMPERATURE CLASSIFICATION
LOG326-A1	31-Dec-84	Northern redbelly dace	1	no temp taken	cool to warm
LOG326-A1	31-Dec-84	Blacknose dace	47	no temp taken	cool to warm
LOG326-A1	31-Dec-84	Longnose dace	1	no temp taken	cool to warm
LOG326-A1	31-Dec-84	Creek chub	65	no temp taken	cool to warm
LOG326-A1	31-Dec-84	Pearl dace	86	no temp taken	cool to warm
LOG326-A1	31-Dec-84	Brook stickleback	6	no temp taken	cool to warm
LOG326-A1	25-Jul-91	Finescale dace	(+)		
LOG326-A1	25-Jul-91	Common shiner	1		
LOG326-A1	25-Jul-91	Fathead minnow	2		
LOG326-A1	25-Jul-91	Blacknose dace	(+)		
LOG326-A1	25-Jul-91	Creek chub	(+)		
LOG326-A1	25-Jul-91	Pearl dace	2		
LOG326-A1	25-Jul-91	Brook stickleback	2		
LOG326-A1	31-Dec-73	Central mudminnow	2		
LOG326-A1	31-Dec-73	Northern redbelly dace	17		
LOG326-A1	31-Dec-73	Blacknose dace	1		
LOG326-A1	31-Dec-73	Longnose dace	2		
LOG326-A1	31-Dec-73	Creek chub	13		
LOG326-A1	31-Dec-73	Pearl dace	8		
LOG326-A1	31-Dec-73	Brook stickleback	12		
LOG326-A2	20-Aug-03	Blacknose dace	1	19.7	cool to warm
LOG326-A2	20-Aug-03	Brook stickleback	59	19.7	cool to warm
LOG326-A2	20-Aug-03	Central mudminnow	1	19.7	cool to warm
LOG326-A2	20-Aug-03	Creek chub	243	19.7	cool to warm
LOG326-A2	20-Aug-03	Fathead minnow	17	19.7	cool to warm
LOG326-A2	20-Aug-03	Finescale dace	13	19.7	cool to warm
LOG326-A2	20-Aug-03	White sucker	8	19.7	cool to warm
LOG326-A2	08-Aug-05	Central mudminnow	3	26.6	
LOG326-A2	08-Aug-05	Common shiner	1	26.6	
LOG326-A2	08-Aug-05	Creek chub	46	26.6	
LOG326-A2	08-Aug-05	Northern redbelly dace	1	26.6	

HIGHWAY 5 DATA SHEET

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
LOGI_0.34	2001	Unimpaired

WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS
LOGS_01	8/29/2006 11:06	Conductivity	1021	µs/cm
LOGS_01	8/29/2006 11:06	Dissolved Oxygen	87.9	%
LOGS_01	8/29/2006 11:06	Dissolved Oxygen mg/L	8.3	mg/L
LOGS_01	8/29/2006 11:06	pH	7.94	
LOGS_01	8/29/2006 11:06	TDS	0.664	g/L
LOGS_01	8/29/2006 11:06	Temperature	18.03	°C
LOGS_01	9/12/2006 12:34	Conductivity	1060	µs/cm
LOGS_01	9/12/2006 12:34	Dissolved Oxygen	91.1	%
LOGS_01	9/12/2006 12:34	Dissolved Oxygen mg/L	9.13	mg/L
LOGS_01	9/12/2006 12:34	pH	8	
LOGS_01	9/12/2006 12:34	TDS	0.689	g/L
LOGS_01	9/12/2006 12:34	Temperature	15.13	°C
LOGS_01	10/4/2006 12:18	Conductivity	1191	µs/cm
LOGS_01	10/4/2006 12:18	Dissolved Oxygen	91.7	%
LOGS_01	10/4/2006 12:18	Dissolved Oxygen mg/L	9.09	mg/L
LOGS_01	10/4/2006 12:18	pH	7.81	
LOGS_01	10/4/2006 12:18	TDS	0.774	g/L
LOGS_01	10/4/2006 12:18	Temperature	15.64	°C
LOGS_01	10/12/2006 12:17	Conductivity	1099	µs/cm
LOGS_01	10/12/2006 12:17	Dissolved Oxygen	87.9	%
LOGS_01	10/12/2006 12:17	Dissolved Oxygen mg/L	9.42	mg/L
LOGS_01	10/12/2006 12:17	pH	7.95	
LOGS_01	10/12/2006 12:17	TDS	0.714	g/L
LOGS_01	10/12/2006 12:17	Temperature	12.07	°C
LOGS_01	11/24/2006 10:00	Conductivity	1282	µs/cm

HIGHWAY 5 DATA SHEET

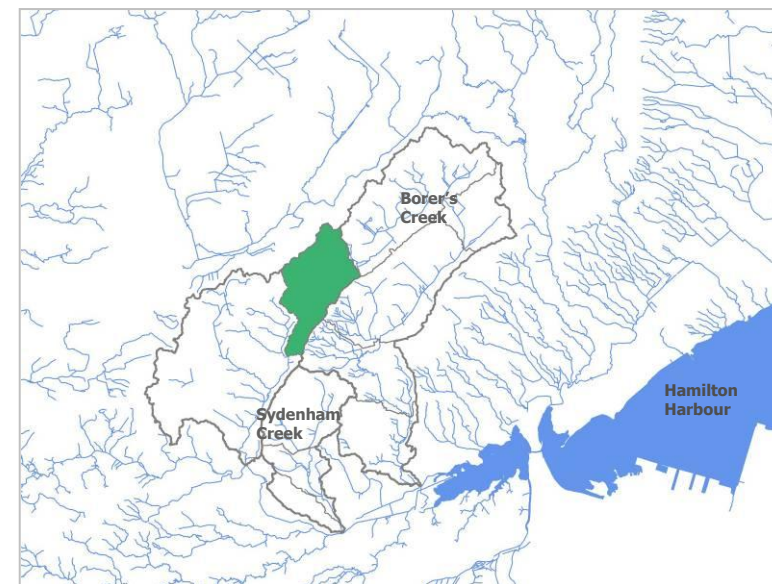
LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS
LOGS_01	11/24/2006 10:00	Dissolved Oxygen	102.8	%
LOGS_01	11/24/2006 10:00	Dissolved Oxygen mg/L	13.01	mg/L
LOGS_01	11/24/2006 10:00	pH	8.03	
LOGS_01	11/24/2006 10:00	TDS	0.833	g/L
LOGS_01	11/24/2006 10:00	Temperature	5.18	°C
LOGS_01	5/31/2007 9:22	Conductivity	835	µs/cm
LOGS_01	5/31/2007 9:22	Dissolved Oxygen	87.1	%
LOGS_01	5/31/2007 9:22	Dissolved Oxygen mg/L	8.04	mg/L
LOGS_01	5/31/2007 9:22	pH	7.7	
LOGS_01	5/31/2007 9:22	TDS	0.542	g/L
LOGS_01	5/31/2007 9:22	Temperature	19.14	°C
LOGS_01	6/18/2007 10:22	Conductivity	1603	µs/cm
LOGS_01	6/18/2007 10:22	Dissolved Oxygen	97.3	%
LOGS_01	6/18/2007 10:22	Dissolved Oxygen mg/L	8.51	mg/L
LOGS_01	6/18/2007 10:22	pH	8.05	
LOGS_01	6/18/2007 10:22	TDS	1.042	g/L
LOGS_01	6/18/2007 10:22	Temperature	21.7	°C
LOGS_01	7/23/2007 12:15	Conductivity	1562	µs/cm
LOGS_01	7/23/2007 12:15	Dissolved Oxygen	99.9	%
LOGS_01	7/23/2007 12:15	Dissolved Oxygen mg/L	8.72	mg/L
LOGS_01	7/23/2007 12:15	pH	8.12	
LOGS_01	7/23/2007 12:15	TDS	1.015	g/L
LOGS_01	7/23/2007 12:15	Temperature	21.87	°C
LOGS_01	8/15/2007 13:24	Conductivity	1677	µs/cm
LOGS_01	8/15/2007 13:24	Dissolved Oxygen	98.8	%
LOGS_01	8/15/2007 13:24	Dissolved Oxygen mg/L	8.9	mg/L
LOGS_01	8/15/2007 13:24	pH	8.14	
LOGS_01	8/15/2007 13:24	TDS	1.09	g/L
LOGS_01	8/15/2007 13:24	Temperature	21.45	°C

HIGHWAY 5 DATA SHEET

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS
LOGS_01	9/20/2007 14:44	Conductivity	1695	µs/cm
LOGS_01	9/20/2007 14:44	pH	8.16	
LOGS_01	9/20/2007 14:44	TDS	1.102	g/L
LOGS_01	9/20/2007 14:44	Temperature	19.09	°C
LOGS_01	10/15/2007 9:21	Conductivity	1550	µs/cm
LOGS_01	10/15/2007 9:21	Dissolved Oxygen	91.5	%
LOGS_01	10/15/2007 9:21	Dissolved Oxygen mg/L	9.79	mg/L
LOGS_01	10/15/2007 9:21	pH	7.96	
LOGS_01	10/15/2007 9:21	TDS	1.007	g/L
LOGS_01	10/15/2007 9:21	Temperature	12.11	°C

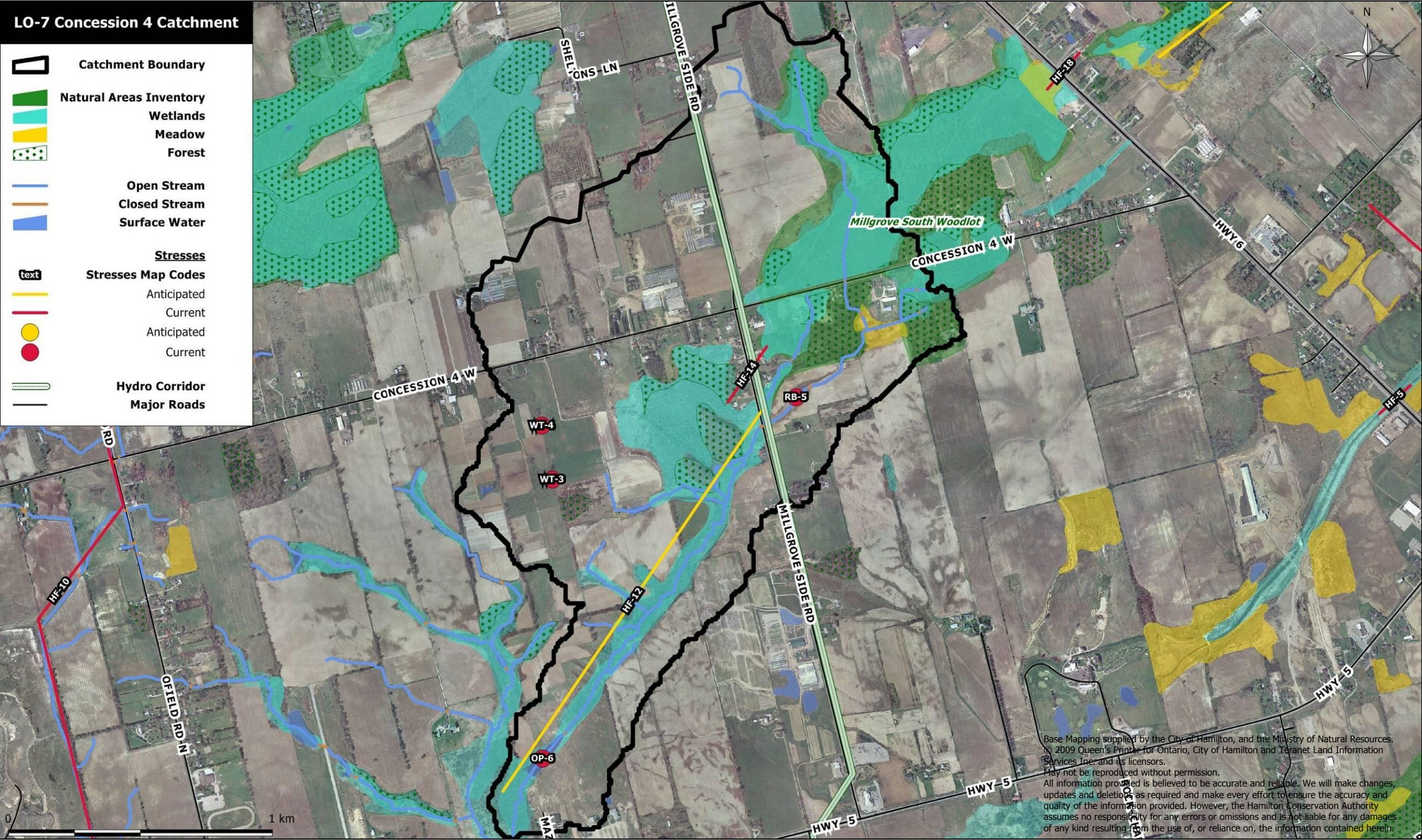
WATER FLOW ASSESSMENT

LOCATION	DATE	FLOW m3/s
LOGS_01	8/15/2007 0:00	0.01198
LOGS_01	5/31/2007 0:00	0.02458
LOGS_01	6/18/2007 0:00	0.15357
LOGS_01	7/23/2007 0:00	0.2846
LOGS_01	7/25/2006 0:00	0.04954
LOGS_01	8/29/2006 0:00	0.01768
LOGS_01	9/12/2006 0:00	0.01103
LOGS_01	9/18/2006 0:00	0.30584
LOGS_01	10/12/2006 0:00	0.57192
LOGS_01	11/24/2006 0:00	0.35178
LOGS_01	10/15/2007 0:00	0.01393
LOGS_01	9/20/2007 0:00	0.02814



CONCESSION 4 CATCHMENT

DATA SHEETS



CONCESSION 4 DATA SHEET

Table LO-10: Stresses Identified in the Concession 4 Catchment

CURRENT STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS			PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY			
HF-12	Habitat Fragmentation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
HF-14	Habitat Fragmentation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
OP-6	On-line Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RB-5	Insufficient Riparian Buffer	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-3	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
WT-4	Water Taking	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	

CONCESSION 4 DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRPTION
n/a		

WATER QUALITY ASSESSMENT

LOCATION	DATE	DESCRPTION
n/a		

WATER FLOW ASSESSMENT

LOCATION	DATE	DESCRPTION
n/a		

