



***UPPER DAVIS CREEK SUBWATERSHED  
STEWARDSHIP ACTION PLAN 2013***



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## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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### GEOGRAPHIC LOCATION

Upper Davis Creek subwatershed is 7.59 km<sup>2</sup> in area and is comprised of two catchment basins. From the headwaters to the outlet these are: Upper and Lower (**Map UD-1**). These catchments are 3.04km<sup>2</sup> and 4.6km<sup>2</sup> in size, respectively.

This majority of this subwatershed falls within the former municipal boundary of Stoney Creek, with small areas within the former municipalities of Glanbrook and Hamilton. The majority of the subwatershed is within City of Hamilton Ward 9, with small portions in Wards 11 and 6. The majority of the subwatershed is within Saltfleet Township, with a small portion in Binbrook Township.

The boundaries of the Upper Davis Creek subwatershed and its associated catchments have recently been updated to include the sewer system into the overall drainage system for the subwatershed. No significant changes to the subwatershed boundaries have occurred as a result. An attempt was made to generally retain the number and size of catchments previously delineated by HCA for this subwatershed so that reference between previous uses is possible.

The southernmost point of the Upper Davis Creek subwatershed originates at Fletcher Road, south of Rymal Road. The subwatershed boundary follows a northeastward direction

toward its easternmost point at Mud Street West, between First Road West and Upper Centennial Parkway. From the southernmost point, the subwatershed boundary also follows a northwestward direction toward its westernmost point at Pritchard Road, between Rymal Road East and Highland Road West.

At Mud Street West the subwatershed boundary tapers northwest, while at Highland Road, the subwatershed boundary tapers northeast. The subwatershed boundary reaches its northern most point at Felker's Falls, where it flows over the Niagara Escarpment and confluences with Lower Davis Creek, followed by Montgomery Creek, before ultimately flowing into the main branch of Red Hill Creek.

Portions of several neighbourhoods fall within the Upper Davis subwatershed. They include: Albion, Felker, Highland, Nash North, Nash South, Trinity and Valley Park.

Some major arterial roads traverse this subwatershed. Mud Road West, Highland Road West and Rymal Road East cross the subwatershed in an East-West direction. Upper Mount Albion Road and First Road West cross the subwatershed in a North-South direction. Paramount Drive is another major transportation route within this subwatershed. It follows the subwatershed boundary in the north western area of the subwatershed.



# UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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## HYDROLOGY

### Surface Water

The Halton Hamilton Source Water Protection Preliminary Draft Watershed Characterization Report for the Hamilton Conservation Authority Watershed, 2008 describes Red Hill Creek as having approximately 87 km of watercourses, excluding storm sewers, drainage swales or ditches. The report states that the watershed has a drainage density of 1.3 km / km<sup>2</sup>, and describes it as “quite low compared with other watersheds of similar physical characteristics (area, shape, geology)”. The report attributes the low drainage density to three reasons, including: urbanization and substitution of the surface drainage network with storm sewer networks; the existence of agricultural tile drains; and the quality of the software package used in delineating ephemeral or intermittent channels and produced digital information (HHSWP, 2008). The report also asserts that urbanization has produced a dramatic effect upon the stream network within the urban drainage area (HHSWP, 2008).

Upper Davis Creek is one of 7 subwatersheds of Red Hill Creek that drain a 68 km<sup>2</sup> area into Hamilton Harbour and ultimately, Lake Ontario. Upper Davis Creek subwatershed has a drainage area of 7.59 km<sup>2</sup>. A portion of the drainage in this subwatershed is conveyed through the City of Hamilton sewer system. There is 41.07 km of storm sewer within this subwatershed with 22.28 km of open watercourse, primarily headwater streams. The combined length of conveyance infrastructure, natural and built is 63.99 km (**Table UD-1**).

**Table UD - 1: Watercourse and Sewer System Length**

Feature	km
Open Watercourse	22.28
Culvert	0.64
Combined Sewer	0.00
Storm Sewer	41.07

The 2008 Halton Hamilton Source Protection Region Preliminary Draft Watershed Characterization Report for the Hamilton Conservation Authority Watershed and the 2012 HHSWP Hamilton Assessment Report indicate the following about the Upper Davis Creek Subwatershed:

This subwatershed has three headwater tributary streams. One of the three headwaters originates near the subwatershed’s boundary with the Hannon Creek subwatershed. The other two headwaters are located near Rymal Road and the Grand River Conservation Authority (GRCA) boundary. According to the surficial geology-features, some first order creeks along the GRCA boundary in this subwatershed are being recharged by the Eramosa Karst. The tributary streams cross Highland Road. The confluence of the two streams is near Stoneywood Park and Winterberry Road. After the confluence, Upper Davis Creek passes through a residential area and crosses Mud Street. Downstream of Mud Street, the right bank of the creek has Heritage Green and residential development on the left bank. The creek then crosses the Niagara Escarpment (HHSWP, 2008).

Tributaries of Upper Davis Creek drain the Niagara Falls Moraine, Eramosa Karst Environmentally Significant Area (ESA) and the Earth Science Areas of Natural and Scientific Interest: Eramosa Karst Feeder Area, Eramosa Karst Core Area, and Eramosa Karst Developed Area. Downstream of the karst area, a tributary has been assessed as having coldwater conditions, indicating groundwater discharges in the area (HHSWP, 2012).

Surrounding this area are residential properties. Tributaries have been altered to flow through the developed areas. At the escarpment edge, the creek enters the Felker’s Falls Escarpment Environmentally Significant Area (ESA) and the Felker’s Falls Area of Natural and Scientific Interest. Felker’s Falls is 22 metres high and is six metres wide at its crest. Upper Davis Creek flows over this waterfall year round (HHSWP, 2012).

The 2005 Davis Creek Subwatershed Study notes:

Within Upper Davis, the main watercourse is open; however significant portions have been channelized, predominately using gabion baskets and concrete lining in close proximity of several of the watercourse crossings. Flow upstream of the escarpment is perennial. The bed is generally exposed consisting of the local limestone bedrock surface. It flows primarily through unforested municipal parkland and appears to be slightly to moderately entrenched (Philips, 2005).

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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For a more detailed description of the hydrology of Red Hill Creek refer to the Halton Hamilton Source Protection Region Preliminary Draft Watershed Characterization Report for the Hamilton Conservation Authority Watershed, 2008 and the Davis Creek Subwatershed Study, 2005 and any subsequent updates thereof.

There are no flow or precipitation monitoring stations for the HCA hydrometeorological network in the Upper Davis Creek subwatershed. There are no surface water quality sampling stations for the Provincial Water Quality Monitoring Network within this subwatershed.

The 2012 Halton-Hamilton Source Water Protection (HHSWP) Hamilton Assessment Report identified Upper Davis Creek as having a surface water quality score of 'Good'. The surface water stress assessment yielded a low stress level result for this subwatershed. For more details of the source protection planning process refer to the Halton Hamilton Source Protection Region Hamilton Assessment Report (HHSWP, 2012).

Field sampling completed for the 2005 Davis Creek Subwatershed Study found that fecal coliforms exceeded the Provincial Water Quality Objective (PWQO) of 100 fecal coliforms per 100ml of water for recreational uses at all wet weather sampling locations. The results indicated that contamination was "very high in the watercourse within the headwater area and was three times the PWQO in the water from a spring". The study offered that the "high coliform values in areas with ample groundwater discharge may be the result of local karst features providing conduits for contaminated surface water to enter the groundwater system" (Philips, 2005).

The 2005 field sampling also found that "fecal coliforms exceeded the PWQO of 100 fecal coliforms per 100ml of water for recreational uses at all but four of the dry weather sampling locations. According to the study, "the dry weather results had a greater range of fecal coliform contamination which was not unexpected". The report explains that "locations with a direct contamination source will tend to have very high numbers of fecal coliforms per 100ml of water, due to the lack of dilution by stormwater and that locations without a direct contamination source will tend to have lower numbers of fecal coliforms, due to the lack of contamination from runoff or from overflow from contaminated areas". The study surmised that "the dry weather results for fecal coliforms indicated that outfall discharge at some locations are potentially impacted by cross connections with sanitary sewers or other sources of contamination". Previous documents were cited as also having found similar fecal coliform results (Philips, 2005).

The 2012 Land Use and Water Quality Linkages in Red Hill Creek Report examined the spatial and temporal linkages between water quality and impervious surface area and flow conditions in a portion of the Red Hill Creek watershed (Hutchinson Environmental Sciences Ltd., 2012).

Two subcatchments of the Red Hill Creek watershed were defined for the purpose of the study, upstream of Albion Falls and between the Albion Falls and Queenston Road stations. The remaining area of the watershed is located downstream of Queenston Road. The findings for the subcatchment between Albion Falls and Queenston Road apply to the Upper Davis subwatershed rather than the findings for upstream of Mount Albion as Upper Davis flows into Red Hill Creek below Albion Falls.

The report found that "a large increase in impervious surface area occurred between 1985 and 2010 upstream of Albion Falls, at which time imperviousness in the area between Albion Falls and Queenston Road increased only slightly, as the area was already highly developed in 1985" (Hutchinson Environmental Sciences Ltd., 2012).

The report also found that:

While water quality in Red Hill Creek has generally improved since the 1960s-1990s, median concentrations of some parameters exceed guidelines, particularly at Albion Falls. Nutrient concentrations have generally declined during 2002–2011, whereas concentrations of certain metals have recently increased. *E. coli* and several nutrients & metals increased dramatically during periods of high flow, and were significantly correlated with TSS, suggesting that surface runoff and/or erosion negatively affect surface water quality in the creek (Hutchinson Environmental Sciences Ltd., 2012).

The report did not find a clear correlation between land use (as % impervious surface area) and water quality in Red Hill Creek.

The water quality at Albion Falls has generally been worse during the past decade than further downstream at Queenston Rd., even though impervious surface area is lower in the Albion Falls subcatchment area than Queenston Rd. subcatchment area. Concentrations of nutrients have declined in the creek in recent years despite increases in impervious surfaces in the watershed (although the concentrations of some metals have increased). Improved stormwater management practices may be responsible for the declines in nutrients, and increased impervious surfaces (e.g., the Red Hill Valley Parkway) may be responsible for the increases in metals, but more information is needed to draw firm conclusions (Hutchinson Environmental Sciences Ltd., 2012).



## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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### Groundwater

The 2005 Davis Creek Subwatershed Study indicates the following about the Upper Davis Creek Subwatershed:

Above the escarpment, where the overburden is generally less than 8 metres thick, precipitation infiltrates through the overburden to the upper bedrock. The groundwater moves horizontally through the fractured dolostones of the Guelph, Eramosa and Gasport units and discharges to the creek and local tributaries, generally where topographic breaks occur and the bedrock outcrops (Philips, 2005).

In the upper watershed, groundwater adjacent to the Niagara Escarpment tends to discharge as diffuse seeps at the escarpment face, generally at the contacts of the dolostone and shale units. Groundwater at depth, in the Queenston shale, tends to move toward the lake (Philips, 2005).

A core karstic area exists within an area bounded by Highland Road, Rymal Road, Upper Mount Albion Road and an area just west of Second Road West. Due to the karstic nature of the shallow bedrock in certain areas of the subwatershed, there is significant subsurface flow of water during storm events. As water enters the major sinkholes it is transmitted northward where it discharges at various locations along the Eramosa escarpment and to spring discharges in the vicinity of, and just north of Highland Road. A detailed description of the karstic features can be found in Buck, M.J., S.R.H. Worthington and D.C. Ford, 2003 (Philips, 2005).

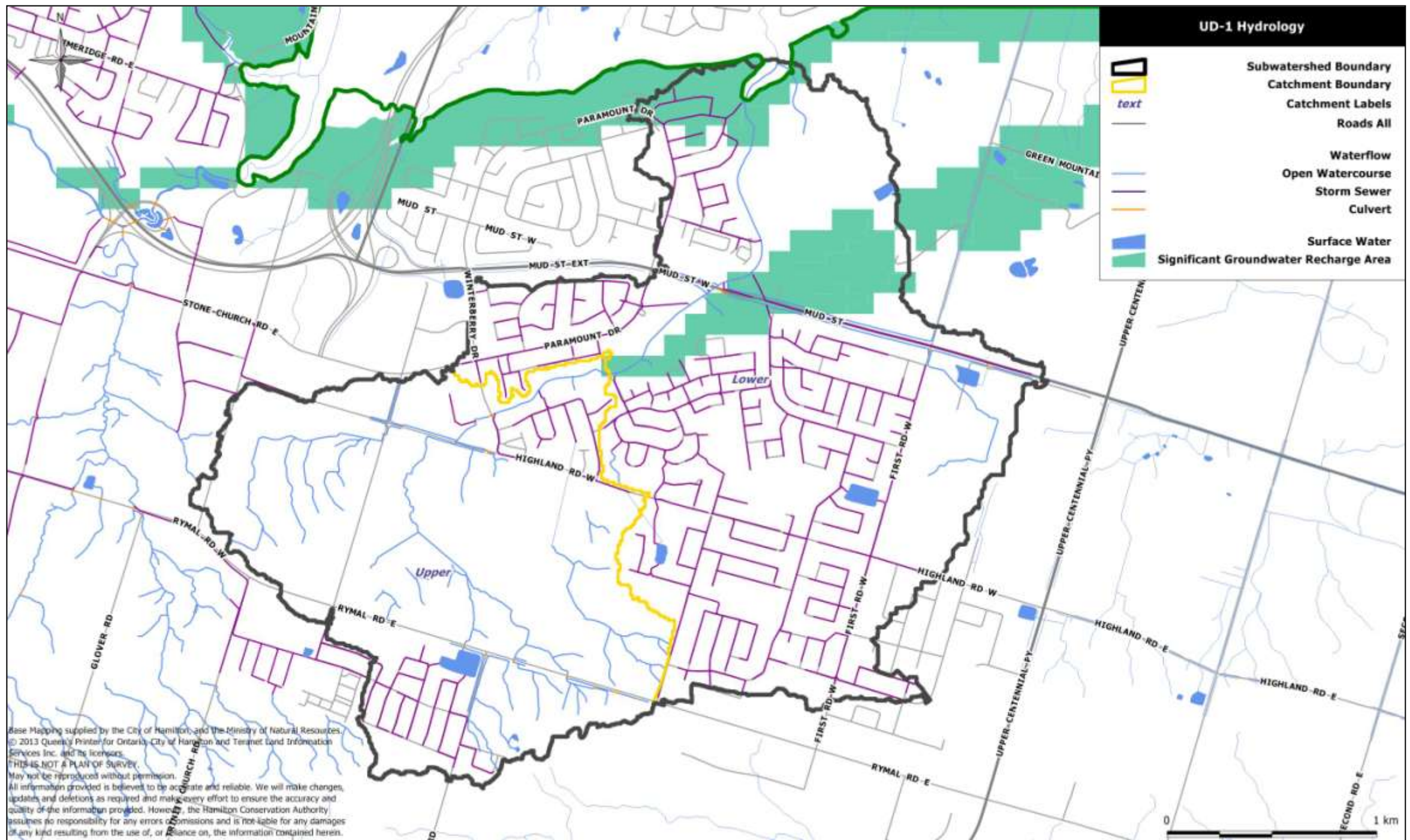
Permanent base flow in Davis Creek originates from springs generally located along the 200m above sea level contour, from a point located immediately southwest of the intersection of Upper Mount Albion Road and Highland Road, northeast of Mud Street West. Besides being fed by groundwater, these springs also discharge stormwater that initially drops into a number of sinkholes located in the block of land bounded by Highland Road on the north, Rymal Road on the south, and Upper Mount Albion Road and the Second Road West on the west and east respectively (Philips, 2005).

Surface flow and habitat utilized by fish appears to start in the vicinity of Upper Mount Albion Road and Highland Road where a readily identifiable spring and a marsh, fed by groundwater, exist. From these points downstream to Mud Street West, watercress exists throughout sections of streambed, which is indicative of groundwater input. Most of Davis Creek has been heavily impacted by the intentional alteration of channel form. Though the headwaters has abundant in-stream vegetation and groundwater input, ditching and channel straightening has occurred in almost all areas (Philips, 2005).

There are no Provincial Groundwater Monitoring Network stations in the Upper Davis Creek subwatershed.

The HHSWP 2012 Hamilton Assessment Report identified portions of the Upper Davis subwatershed, specifically the central area of the Lower catchment, as a significant groundwater recharge area. The report also identifies the Upper catchment and southern half of the Lower catchment as a highly vulnerable aquifer.

The 2012 Hamilton Assessment Report included an evaluation of the annual and monthly percent water demand. Annual and groundwater stress assessments for the Upper Davis Creek subwatershed yielded low stress levels for both existing and future conditions. For more details of the source protection planning process refer to the Halton Hamilton Source Protection Region Hamilton Assessment Report (HHSWP, 2012).



Map UD - 1: Hydrology

## **SOILS AND PHYSIOGRAPHY**

The Niagara Escarpment is a prominent feature extending through Hamilton's watersheds in a westerly direction. It is characterized by steep cliffs on the eastern side and gently sloping terrain to the west (SNC Lavalin and Charlesworth & Associates, 2006).

The Niagara Escarpment is characterized by a number of bedrock re-entrant valleys that are believed to have been created by pre-glacial rivers and were subsequently modified during glaciation of the area (Tovell, 1992). Many of the present day major rivers that drain the uplands of the Niagara Escarpment flow in these re-entrant valleys (HHSWP, 2008). Red Hill Creek flows in one of the significant reentrant valleys.

Chapman and Putnam (1984) suggested that three physiographic regions straddle the Red Hill Creek Watershed. These physiographic regions are: 1) Haldimand Clay Plain; 2) Niagara Escarpment; and 3) The Iroquois Plain. The Haldimand Clay Plain's soils, which lie on top of a series of subdued moraines, consist of clay and silt sediments. The plain has generally flat to rolling topographic characteristics. In the Red Hill Creek Watershed, the Vinemount Moraine and Niagara Falls Moraine run parallel to the Niagara Escarpment and cut the Haldimand Clay Plain transversely. This area of the watershed has subdued relief except near the Escarpment (HHSWP, 2008).

The watershed is intersected by the Niagara Escarpment, which is characterized as a significant physiographic region. The top of the Escarpment has dolostone bedrock of the Lockport Formation. The bedrock possesses erosion-resistant properties. The Escarpment also has a steep rock bluff followed by a talus till covered slope below its bluff. Along the Escarpment, soil thickness is low on the crest; however, the thickness at its base is on the order of 30 m (HHSWP, 2008).

The Red Hill Watershed has total surface relief on the order of 150 m. Most of the relief occurs due to the height of the Niagara Escarpment, which is approximately 70 m (Blackport & Associates, 2003). In the upper portion of the watershed the bedrock topography slopes toward the escarpment and the Felker's Falls cut in the upper watershed. The Eramosa escarpment is an east/west trending relatively well-defined scarp in the upper portion of the watershed (Philips, 2005).

Red Hill Creek occupies much of the re-entrant valley in the Niagara Escarpment, which is encompassed by the Red Hill Creek Escarpment Valley. This area is located within a broad northeast-opening notch carved into the 50 m high cuesta of the Escarpment. At the head of this notch, waterfalls are present, and two small creeks cross the Escarpment (Hamilton Naturalists' Club, 2003). At the head of the Mount Albion re-entrant valley, Red Hill Creek has created a small gorge into the Escarpment (HHSWP, 2008). Davis Creek has also cut a small gorge into the Niagara Escarpment at Felker's Falls.

The glaciolacustrine clay and silt deposits overlying the Vinemount and Niagara Falls Moraines cover most of the Red Hill Creek watershed. These moraines consist of Halton Till which was deposited during the late Wisconsinan glaciations (HHSWP, 2008).

The Halton Till deposited onto the Queenston Shale or the Escarpment rock during the same era as the moraines above the Escarpment. Following retreat of the Ontario glacial lobe, the area below the Escarpment was exposed and submerged on various occasions. King Street was built along a sand and gravel bar, which represents a historic Lake Iroquois shoreline. Red Hill Creek flows through this shoreline (Blackport & Associates, 2003).

Within the Davis Creek watershed much of the surficial overburden consists of clay material which typically is of a low permeability, that is, it does not transmit water readily. When the clay overburden is thin (i.e. less than 8 metres) and overlies a more permeable unit, which acts to underdrain the overburden, extensive fracturing in the clay generally occurs. Through the upper portion of the watershed, above the escarpment, the underlying dolostone bedrock is highly fractured in the upper 10-15 metres. This bedrock fracturing allows for ready transmittal of groundwater both in the vertical and horizontal direction and has given rise to the karst features (Buck, M.J., S.R.H. Worthington and D.C. Ford, 2003).

Silty loam soils are prominent in the Upper Davis Creek subwatershed. However, along the top of the Escarpment and the east boundary of this subwatershed, silty clay soils have developed. Due to the steep, unstable slopes in the Felker's Falls Escarpment area, soil development is limited along the Escarpment and small ravines. Below the Escarpment, the main soil type is Oneida loam; along the Escarpment edge, Farmington loam occurs on the shallow overburden. A patch of imperfectly-drained Winona sandy loam is present in this area at the western end by Mount Albion Road (Hamilton Naturalists' Club, 2003).

**UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION (excerpts from the Hamilton Source Protection Region Preliminary Draft Watershed Characterization Report for the Hamilton Conservation Authority Watershed, 2008)**

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The main types of soils within the Red Hill Creek Watershed are silty loam, silty clay loam, loam and sandy loam (HHSWP, 2008). The soil characteristics of the Upper Davis Creek subwatershed are shown on **Map UD-2**. Eleven types of soils have been identified within this subwatershed, as summarized in **Table UD-2**.

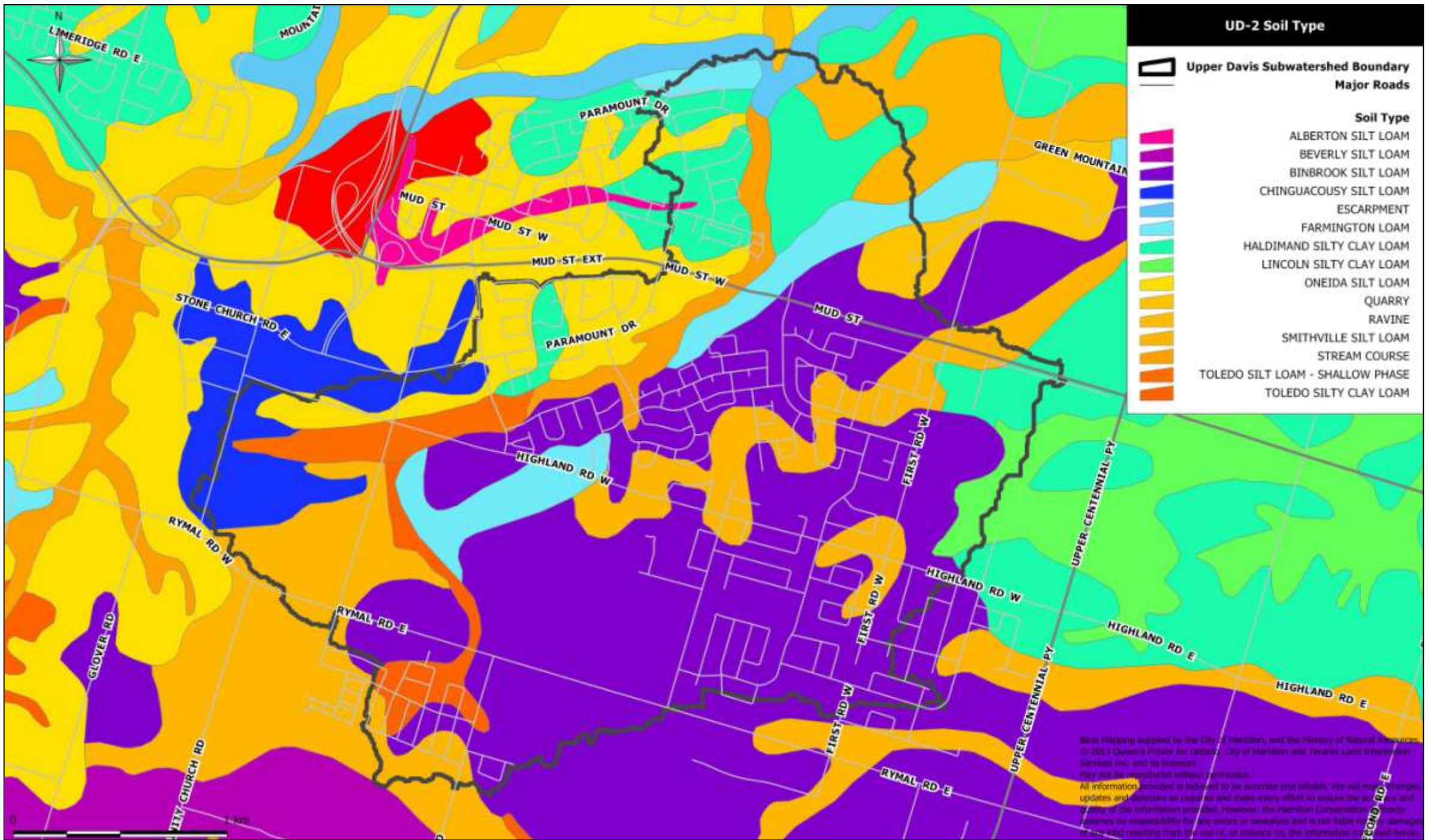
**Table UD - 2: Soil and Erosion Potential in the Upper Davis Creek Subwatershed**

<b>Soil Type</b>	<b>Natural Drainage</b>	<b>Erosion Factor*</b>	<b>Topography (slope)***</b>	<b>Erosion Potential**</b>
Al - Alberton Silt Loam	Variable	n/a	1.2	n/a
Bl - Beverly Silt Loam	Imperfect	2	3.5	Moderate
Bi - Binbrook Silt Loam	Imperfect	3	3.5	Low
Ci - Chinguacousy Silt Loam	Imperfect	3	3.5	Low
Escarpment	n/a	n/a	n/a	n/a
Fl - Farmington Loam	Well	1	8.7	High
Hl - Haldimand Silty Clay Loam	Imperfect	3	3.1	Low
Ln - Lincoln Silty Clay Loam	Poor	3	1.2	Very Low
Oi - Oneida Silt Loam	Well	2	9.5	High
Quarry	n/a	n/a	n/a	n/a
Ravine	n/a	n/a	n/a	n/a
Sm - Smithville Silt Loam	Well	2	7.5	High
Stream Course	n/a	n/a	n/a	n/a
Ts - Toledo Silt Loam - Shallow	Poor	2	1.2	Very Low
To - Toledo Silty Clay Loam	Poor	3	1.2	Very Low

\* 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



Map UD - 2: Soils



# UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

## NATURAL HISTORY AND SIGNIFICANT SPECIES

### AQUATIC

Prior to the introduction of the HCA Aquatic Resources Monitoring Program (ARMP) in 2004, data collection 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. However, there is no ecological monitoring station in the Upper Davis Creek subwatershed. The nearest downstream monitoring station is within Red Hill Creek Valley subwatershed at the King's Forest Golf Course. No ecological monitoring stations were sampled in Upper Davis Creek subwatershed between 1970 and 2009; therefore there is no HCA historical fisheries or benthic data for this subwatershed.

The headwater catchment area of Davis Creek is drained by ephemeral swales through agricultural fields. None provide any permanent surface water, and that many of these ephemeral watercourses drop into sinkholes, and are therefore isolated from downstream habitats. The watercourses within this area likely do not contribute directly to downstream fish production. However, the groundwater recharge function of this area is likely significant due to the karst features and abundance of sinkholes. This groundwater is essential to the maintenance of fish habitat downstream and the permanent flow in Davis Creek (Philips, 2005).

The 2005 Davis Creek Subwatershed Study indicates the following about the Davis Creek Subwatershed:

The fish community of Davis Creek (Upper and Lower Davis Creek subwatersheds) consists of six species that are commonly found in urbanized watersheds. White sucker, fathead minnow, blacknose dace, longnose dace, and creek chub occur downstream of the first complete barrier to fish movement. No fish occur upstream, between this barrier and the Niagara Escarpment. No individuals, populations, or habitat, of nationally, provincially, or regionally significant fish species, have been found in the Davis Creek subwatershed (Philips, 2005).

### TERRESTRIAL

**Table UD - 3: Natural Land Cover Statistics**

	Forest	Successional	Wetland	Meadow	Historic Wetlands	Environmentally Significant Area	Significant Woodland	City NHS Core Areas	Open Watercourse (km)
km <sup>2</sup>	0.47	0.35	0	0.88	0.10	0.17	0.37	2.17	22.28
% of subwatershed area	6.19	4.61	0	11.59	1.32	2.24	4.83	28.59	n/a

**Table UD - 4: Percent of Total Open Watercourse Length with Riparian Buffer**

% by Width Range					Overall %	
0m < Width < 5m	5m ≤ Width < 15m	15m ≤ Width < 30m	0m < Width < 30m	Width ≥ 30m	Naturally Vegetated	No Buffer
9.05	10.67	3.48	0.00	17.87	41.07	58.93

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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Natural vegetation covers 1.7km<sup>2</sup> or 22.4% of the Upper Davis Creek subwatershed. **Map UD-3** illustrates the natural heritage of the Upper Davis Creek subwatershed. The current natural land cover statistics for the area are noted within **Table UD-3**.

Based on the digital data available for this analysis, forest cover accounts for 6.19% of this subwatershed, while successional cover is 4.61% of the land base. Meadow habitat accounts for 11.59% of the subwatershed area. The total stream length of Upper Davis Creek and all of its tributaries is 22.28 km. GIS analyses have determined that 41.07% of the total watercourse length has established riparian vegetation. The percent of watercourse length with riparian buffer, per riparian buffer width range, is outlined in **Table UD-4**.

There are no wetlands mapped within this subwatershed. However, the Davis Creek Subwatershed Study identifies six wetland units within this subwatershed (Philips, 2005). Historical wetlands mapping showed 0.1km<sup>2</sup> of wetlands in this subwatershed before 1967 or before 1982, representing 1.32% of the subwatershed area. Historical information was not recorded for forest or meadow cover. Although, it is known that land use throughout the 20<sup>th</sup> century altered the natural heritage systems within southern Ontario and that 90% of the original upland woodlands were converted to non-forest land uses by 1920 (Larsen et al., 1999).

The 2005 Davis Creek Subwatershed Study found that a total of 371 species of vascular plants have been observed in the subwatershed's natural areas. Of this total, 20 species are considered to be significant on a National, Provincial, Regional or local level (Philips, 2005).

Based on the field work conducted for the Subwatershed Study (mainly completed in 2000) and the results of the two Natural Areas Inventories, 128 species of wildlife have been recorded and are on file for the entire Davis Creek (Upper and Lower Subwatersheds) Subwatershed. This includes: 8 damselflies and dragonflies, 33 butterfly species, 14 amphibian or reptile species, 61 bird species, and 12 mammal species (including domestic dog) (Philips, 2005).

The Subwatershed Study characterized the vegetation community types within Upper Davis Creek to include: Natural woodland / Forest including immature to mature Upland and Lowland Woodland and Forest, Floodplain Forest and Escarpment Complex Woodland and Forest communities, Successional areas including Early Successional Communities (old field, shrub thickets, hedgerows, regeneration areas, etc.) and Riparian Successional Communities (riparian shrub thickets, etc.), Anthropogenic Woodlands / Forest including

immature to mature Plantation Forests, Non-Native Forest, Maintained Ornamental Plantings, Anthropogenic Open Space including Maintained Lawn with or without Ornamental Plantings, typically associated with parks, recreational areas and institutional lands, Agricultural communities including Cultivated Fields, Orchards, Vineyards, and Nurseries and Non-vegetated areas referring to areas in an early stage of primary succession (Philips, 2005).

The Subwatershed Study states:

Successional vegetation cover type is the most prevalent cover type in the upper subwatershed and the subwatershed as a whole. This habitat contributes to one significant core natural area near the southwestern part of the upper subwatershed, and also functions as a riparian linkage between the Escarpment and areas to the south (Philips, 2005).

Six wetland units have been identified within the Upper Davis subwatershed, including meadow marsh and shallow marsh. They have not been evaluated according to the Ontario Wetland Evaluation System (Philips, 2005).

Available data on vegetation communities in the subwatershed indicate that rare plant and animal species are extant in association with specialized environments on the Escarpment. Remaining Regional corridors and site-level functions help to sustain these attributes, but urbanization and related alteration of physical conditions in the subwatershed, threaten them. Historically, these features were sustained by diversity of available habitats and dynamics including succession, erosion, seepage, flooding, drought and fire. Encroachment by human habitation has restricted habitat availability and greatly reduced the range of dynamic processes. Critical thresholds in these dynamics may limit the ongoing sustainability of historic populations of flora and fauna in the subwatershed, particularly in the case of specialized communities such as those associated with the Niagara Escarpment (Philips, 2005).

The subwatershed and its environs contain a number of primary and secondary linkage features. These include the Escarpment and the valley systems of Davis Creek. Linkages describe the way in which components of the ecosystem are connected. Linkages may be aquatic (such as stream



## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

corridors), connections between ground water and surface water, or they may be land-based corridors offered by a series of natural habitats in close proximity. Their primary function is to connect core habitat areas in the landscape and to facilitate the movement of plants and wildlife species, permitting genetic exchange amongst populations and maintaining their viability. The forested slopes of the Niagara Escarpment form a relatively continuous primary linkage system that is of regional and provincial significance. Felker's Falls is linked to the Red Hill Creek valley via the Escarpment (Philips, 2005).

Upper Davis Creek is an area of active urbanization. Provincial and municipal legislation exists to ensure that certain natural features are protected from land use changes and activities. Some of the relevant pieces of legislation which are applicable to this subwatershed include the: Conservation Authorities Act, Greenbelt Plan, Hamilton Urban Official Plan, Niagara Escarpment Plan and Provincial Policy Statement. **Tables UD-5 and UD-6** outline the percentage of the subwatershed area that falls within these provincially and municipally legislated areas. **Tables UD-7 and UD-8** outline the percentage of natural features that are outside the provincially and municipally legislated areas.

**Table UD - 5: Subwatershed Area within Provincially Legislated Areas**

Provincially Designated Lands	km2	% area
Greenbelt Designation (Niagara Escarpment Commission)	0.61	8.04
NEP Development Control Area	0.04	0.53
NEP Designated Area	0.61	8.04
HCA Regulated Area	2.76	36.36

**Table UD - 6: Subwatershed Area within Municipally Legislated Areas**

Municipally Designated Lands	km2	% area
Environmentally Significant Area	0.17	2.24
NHS Core Areas	2.17	28.59
Significant Woodland	0.37	4.83

**Table UD - 7: Natural Features Located Outside of Provincially Legislated Areas**

Natural Feature	km2	% area	km
Watercourse			3.93
Forest	0.06	0.75	
Meadow	0.50	6.53	
Successional	0.07	0.87	
Wetland	0.00	0.00	

**Table UD - 8: Natural Features Located Outside of Municipally Legislated Areas**

Natural Feature	km2	% area	km
Watercourse			10.85
Forest	0.09	1.19	
Meadow	0.72	9.49	
Successional	0.16	2.11	
Wetland	0.00	0.00	

A portion of Felker's Falls Escarpment Valley, municipally designated Environmentally Significant Area (ESA) is within the Upper Davis Creek subwatershed. The Red Hill Creek Escarpment Valley ESA is immediately adjacent to the western boundary of the subwatershed. Felker's Falls is within the Felker's Falls Escarpment Valley ESA. The waterfall has been classified as an Earth Science Area of Natural and Scientific Interest (ANSI) by the Ontario Ministry of Natural Resources (OMNR).

These natural areas are critical habitat and migratory corridors for terrestrial and aquatic species. Biophysical attributes of these areas were assessed in the 2003 Hamilton Natural Areas Inventory (NAI) Nature Counts Project, (Dwyer, et al., 2003).

The Davis Creek Subwatershed Study describes Felker's Falls ESA as "representing the most densely wooded area in the subwatershed and notes that the forest communities associated with the Escarpment plain and talus slopes are well documented and known to support species considered significant in the City of Hamilton" (Philips, 2005).

The significance of the natural features within the ESA, with respect to earth sciences, ecological function, hydrological function, local significance, restoration potential, aesthetic or historical value and educational or research value were itemized in the 2003 NAI, in support of the area's status as an important natural area to be identified for preservation and

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

management. The area was identified as: encompassing regionally significant features, representative of the landforms and natural communities associated with the Niagara Escarpment, serving as a link in the Niagara Escarpment corridor, providing habitat for significant species, having high aesthetic value, useful for interpretive purposes and having educational or scientific potential (Dwyer, et al., 2003).

The Nature Counts Hamilton Natural Areas Inventory of 2003 indicates the following about the Felker's Falls ESA:

Felker's Falls ESA is made up of broadleaf upland woods, wooded talus slope and disturbed non-forested old field and tall shrub thicket communities. The forest area is comprised of Sugar Maple, Red Maple, White Ash, American Beech, Butternut, Basswood and a variety of plant species. A total of 178 species of plants were documented at this site, 43 species of breeding birds and 4 species of mammals (Dwyer, et al., 2003).

The broadleaf upland woods along the escarpment slopes are a link in the corridor of natural greenspace along the Niagara Escarpment. The ESA also extends south of the escarpment brow and includes one of the few remaining woodlots on the Vinemount Moraine. Several significant species have been found here in recent years. Communities on the steep escarpment face are generally undisturbed while communities elsewhere range from slightly to moderately disturbed" (Dwyer, et al., 2003).

Based on the above-noted findings, the NAI recommended that this area should be protected from development or other impacts; that existing linkages with other natural areas should be maintained and enhanced; that the continuity of the entire study area, including greenspace areas which serve as buffers to more natural areas, should be maintained, and enhanced, that habitat requirements, particularly the breeding sites, for the significant herpetofaunal populations present in this area should be identified and protected, that site management problems, including refuse dumping, localized trampling, impaired water quality and the cumulative impacts of adjacent developments, should be remedied and that future studies should include monitoring of significant populations and additional coverage of the flora, butterflies and mammals (Dwyer, et al., 2003).

**Tables UD-9 and UD-10** are summaries of the species found in HAMI – 72, and STCK-135 to 2012 (Hamilton Natural Heritage Database, 2013).

**Table UD - 9: Summary of HAMI - 72 Felker's Falls Escarpment Valley ESA**

Animal Type	Total #	Total Native	Total Non Native	% Native	% Non Native
Birds (B)	82	75	7	91.46	8.54
Herptiles (H)	16	16	0	100.00	0.00
Lepidoptera (L)	35	33	2	94.29	5.71
Mammals (M)	14	14	0	100.00	0.00
Odonates (O)	18	18	0	100.00	0.00
Plants (P)	484	342	142	70.66	29.34
TOTAL SPECIES	649	498	151	76.73	23.27

The Eramosa Karst/Escarpment is a provincially significant geological feature approximately 3m in height, found within the Upper Davis Creek subwatershed. It is bordered by Highland Road West, Second Road West, Rymal Road and Upper Mount Albion Road.

Karsts are geological formations including underground drainage, caves and passages caused by dissolving rock, found in limestone formations like the Niagara Escarpment. The Ministry of Natural Resources designated the Eramosa Karst lands as a Provincial Earth Science Area of Natural and Scientific Interest in 2003, because it is believed to have the largest number of unique karst features in any single area in the province. Several of its karst features are provincially significant. These include: soil pipes, a high concentration of suffosion dolines and sinking streams, overflow sinks, dry valleys and a 335 metre-long cave (the tenth longest in all of Ontario). There is also a natural dolomitic limestone bridge at the entrance of one of the sinkholes (HCA a, 2013).

The Nature Counts Hamilton Natural Areas Inventory of 2003 indicates the following about the Eramosa Karst natural area:

The Eramosa Karst natural area is made up of meadow, thicket, woodland and forest remnant communities. The forest area is made up of sugar maple, ironwood, hawthorn, gray dogwood, white ash, pin cherry, black cherry, American beech, red oak, butternut and shagbark hickory and a variety of plant species. A total of 129 species of plants were documented at this site, 13 species of butterfly, 2 species of herpetofauna, 42 species of breeding birds and 6 species of mammals (Dwyer, et. al., 2003).

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

**Table UD - 10: Summary of STCK-135 Eramosa Karst Natural Area**

Animal Type	Total #	Total Native	Total Non Native	% Native	% Non Native
Birds (B)	66	61	5	92.42	7.58
Herptiles (H)	6	6	0	100.00	0.00
Lepidoptera (L)	21	19	2	90.48	9.52
Mammals (M)	12	12	0	100.00	0.00
Odonates (O)	3	3	0	100.00	0.00
Plants (P)	180	128	52	71.11	28.89
<b>TOTAL SPECIES</b>	<b>288</b>	<b>229</b>	<b>59</b>	<b>79.51</b>	<b>20.49</b>

The 2005 Davis Creek Subwatershed Study described the “mosaic of forested (including hawthorn cultural alvar woodland), successional and meadow vegetation communities associated with the karst as supporting several uncommon wildlife species”. The study also described discharge from the base of the Eramosa escarpment as contributing to the hydrology of adjacent wetlands. The karst area is connected to the Niagara Escarpment via a tertiary linkage along Davis Creek and its tributaries (Philips, 2005).

The Eramosa Karst is an important component of the 2004 City of Hamilton Open Space Replacement Strategy. The strategy aims to connect an approximately 240 hectare parkland system of new and existing open space and trail systems, linking the Eramosa Karst, Mount Albion and Felker’s Falls Conservation Areas, in an effort to replace open space lost during the construction of the Red Hill Valley Parkway (City of Hamilton, 2004).

Opened in 2006, the Eramosa Karst Conservation Area is the newest Conservation Area within HCA’s jurisdiction. In 2012, the Provincial government agreed to lease the 36 hectare Eramosa Karst feeder lands to Hamilton Conservation Authority for the term of 20 years, with an option to renew the lease at that time (HCA a, 2013).

The Eramosa Karst Feeder Lands are designated as a Provincial Earth Science Area of Natural and Scientific Interest. The property is also habitat for three threatened bird species, including the bobolink, nighthawk and the chimney swift (HCA a, 2013).

The long-term lease of the Eramosa Karst feeder lands has protected the lands from potential development. These lands are important as the drainage from these lands contributes to the maintenance and formation of the karst features in the Eramosa Karst CA (HCA a, 2013).

The 2013 Ecological Land Classification (ELC): Eramosa Karst Conservation Area and report found that the Eramosa Karst natural area, which includes the feeder lands, is comprised of old-field meadow, deciduous thickets, savannah, woodlands and forests, meadow marshes, hedgerows, and cultural communities. A total of 140 native species of plants were documented at this site in 2013 (HCA b, 2013).

The 2013 ELC assessment found that retired farm fields within the Eramosa Karst natural areas have naturally succeeded into meadow ecosystems.

This is the largest continuous ecosystem in the conservation area, encompassing over two thirds of the property. Smooth brome, cow vetch, grey dogwood, and Canada thistle are co-abundant in the understory (the dominant layer). At the time of survey, Canada goldenrod, bittersweet nightshade, reed-canary grass, common strawberry, and tall goldenrod are all abundant in the ground layer (HCA b, 2013).

Meadow habitats support a number of bird, small mammal, amphibian, reptile and insect species that require the specific conditions that meadows provide. Meadow habitats are not as protected through legislation and policy as other types of habitat and therefore stewardship efforts to preserve and enhance these habitats is important.

The ELC assessment also determined that the forested areas within the Conservation Area are dominated by sugar maple but also include Carolinian species such as shagbark hickory, black maple, and running strawberry bush (HCA b, 2013).

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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All species found within the Felker's Falls ESA and Eramosa Karst Natural Area 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 in **Table UD-11** have been designated by COSEWIC under the Species at

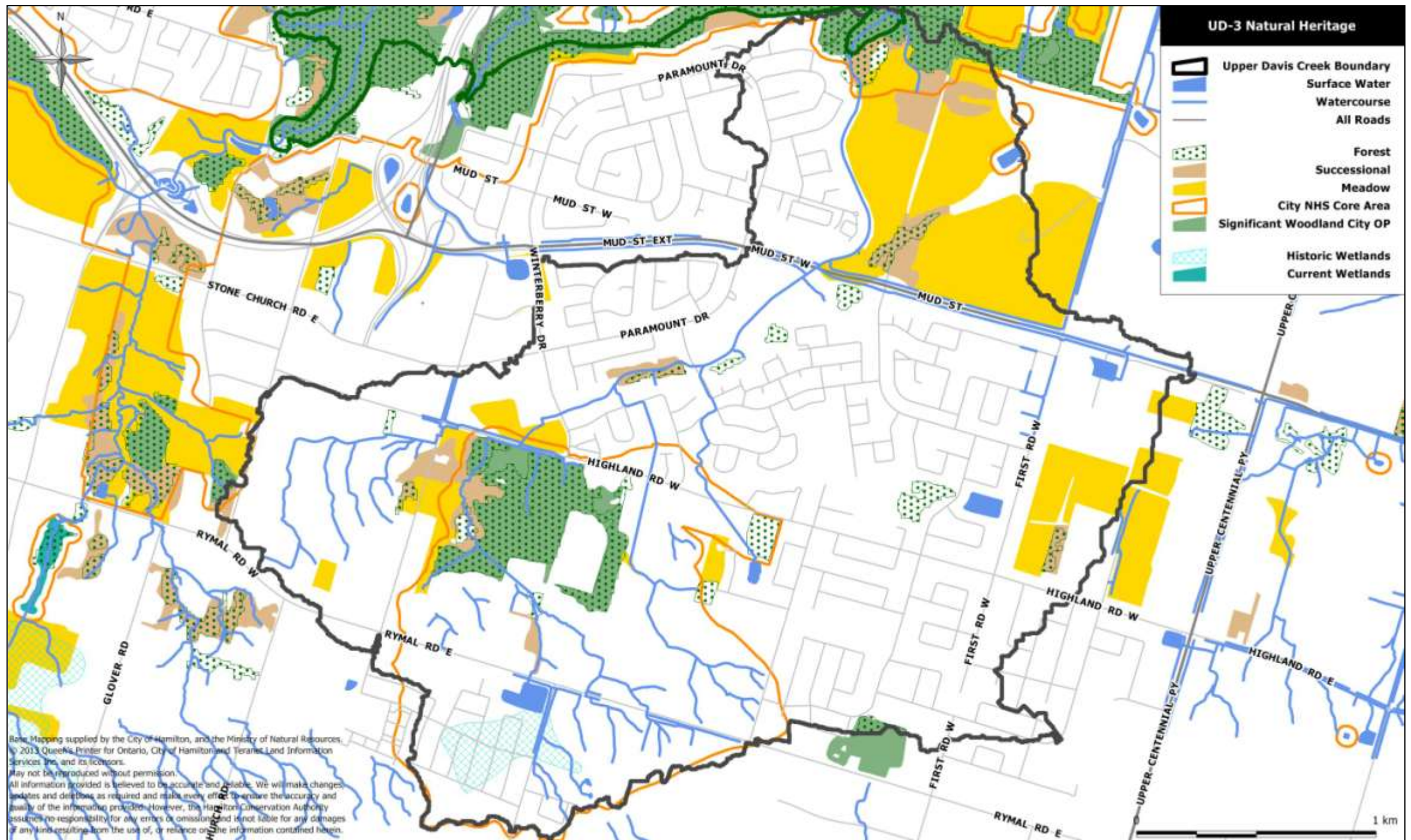
Risk Act and COSSARO under the Ontario Endangered Species Act and have been observed in the natural areas in the Upper Davis Creek subwatershed. The COSEWIC and COSSARO statuses do not always coincide for each species therefore some species will be on more than one list.

It will be important to create awareness and undertake habitat restoration activities related to preserving and restoring these natural areas and associated ecological linkages in order to support these at risk species. Some of these species have recovery strategies in place or in development. Species with recovery strategies are indicated in the list below.

**Table UD - 11: Species at Risk inventoried in HAMI – 72**

Brown Snake	Eastern Wood-Pewee	Canada Warbler	Eastern Flowering Dogwood *
Cooper's Hawk	Eastern Milksnake	Chimney Swift	Hoary Mountain-mint*
Northern Leopard Frog	Monarch	Wood Thrush	Jefferson Salamander*
Red-tailed Hawk	Snapping Turtle		
Western Chorus Frog			

\* indicates a recovery strategy is in place



Map UD - 3: Natural Heritage



## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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### CULTURAL HISTORY

The Hamilton Wentworth County Atlas of 1875 describes the nature and character of the community in and around the Upper Davis Creek subwatershed as it was during early settlement.

The first assessment of Saltfleet was made in the year 1815, when there were 102 house holders in the township, and the total value of property assessed was £10,151. The assessment shows that there were then 33 log houses, 20 one-storey frame houses, a two-storey log and a two-storey frame house, but not a stone or a brick house in the township. The assessment roll contained a column for “Merchant Shops,” but this was blank, the only buildings not being used as residences being two water-power saw mills. The annals of the township from this period afford little matter worthy of record till about the year 1830, when a freshet similar to that of 1805 occurred which nearly swept away the village of Stoney Creek. From about the year 1840, the growth of the village, or hamlet, of Stoney Creek became marked. (Page and Smith, 1875).

The land on which the Felker’s Falls Conservation Area is situated also has a long history and local significance. The Hamilton Waterfalls and Cascades Research and Inventory Report, 2007, describes the history of the property on which Felker’s Falls is situated.

The Felker family owned the property on which Felker’s Falls waterfall is located for over 140 years. Born Johann Friedrich Voelkel, John Frederick Felker (1757-1838) emigrated from Prussia to America before purchasing Lot 30, 6th Concession and Lot 27, 7th Concession, Saltfleet Township, Wentworth County in February 1820. Mr. Felker and his wife, Mary, raised seven children on this land until he passed away in November 1838. At that time, his eldest son, John Frederick Felker II, (1794-1880) inherited the farm where he and his wife, Mary, raised their thirteen children (HCA, 2007).

Following Frederick’s possession of the land his sons divided the land and Frederick’s youngest son, Hiram Albert Felker (1844-1911), inherited the property on which the falls is located, Lot 30, 6th Concession. Joseph Benjamin Felker (1880-1956) was one of Hiram and Mary’s children. His wife, nine children and he lived all his life on the Felker’s Falls property, farming the land. In 1961,

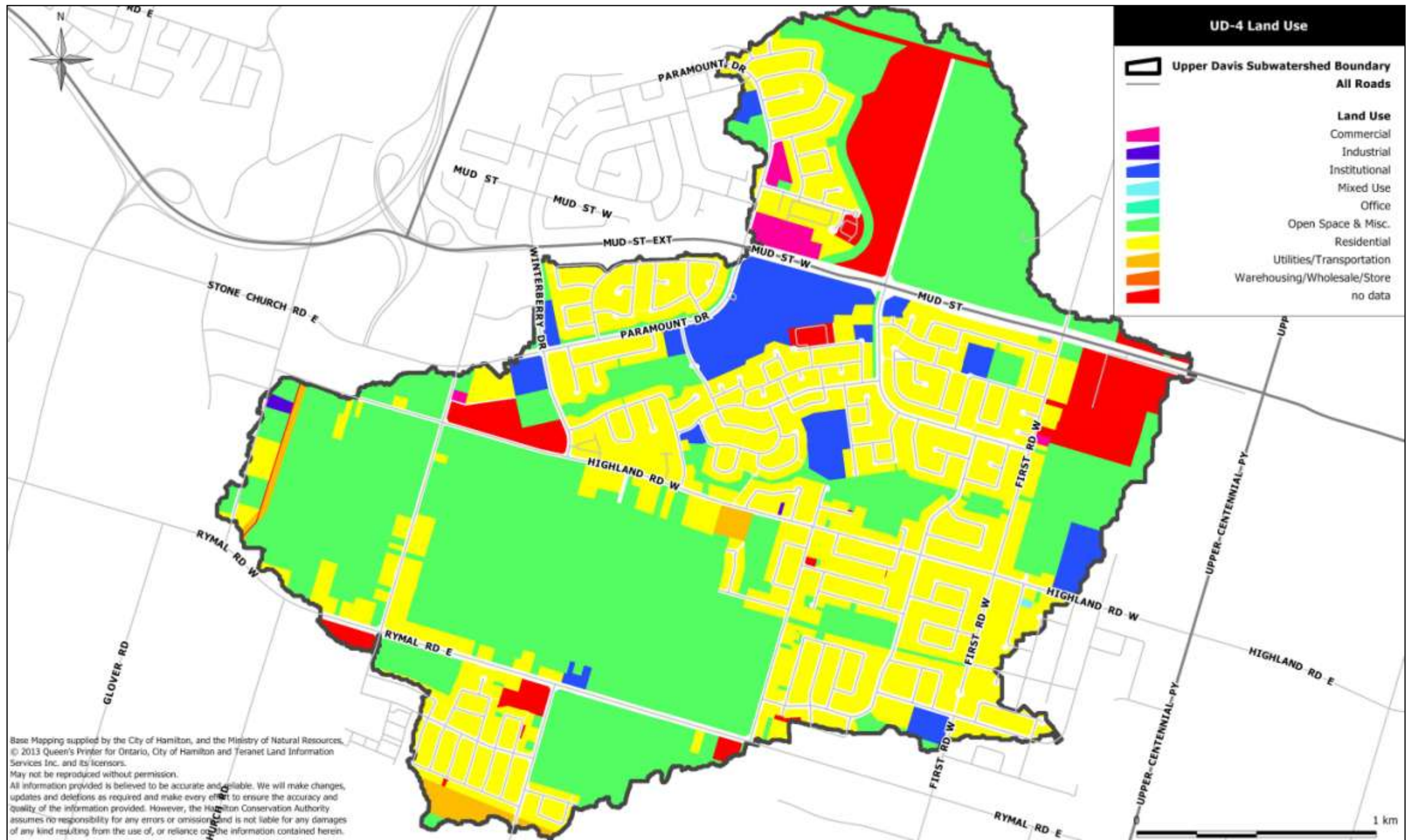
Joseph passed away and his children sold the property to a construction company, However the land later became part of an acquisition program along the Niagara Escarpment to save and protect the natural land. Hamilton Conservation Authority now owns and manages this land. The Felker Family Cemetery still remains on the old homestead on Mud St. at First Rd. W. and here you can find all those who originally lived on the land that Felker’s Falls is located (HCA, 2007).

According to 2006 census data, the approximate population of the Upper Davis Creek subwatershed is 11,091 persons, with a population density of approximately 1,530 people per square kilometer. The projected population for 2031 is approximately 17,351 persons, with a population density of 2,393 people per square kilometer, resulting in a fifty-six percent population density increase in that time (HHSWP, 2012).

Current land use within the Upper Davis Creek subwatershed is predominantly Open Space & Miscellaneous with the secondary land use being Residential (**Table UD-12**). There are institutional and commercial lands distributed throughout the subwatershed which support the community (**Map UD-4**). Land Use was determined using Oasys primary land use classification (City of Hamilton, 2012). Land use zoning was determined using zoning description within City of Hamilton PED Zoning Boundary mapping (City of Hamilton, 2012) (**Map UD-5**).

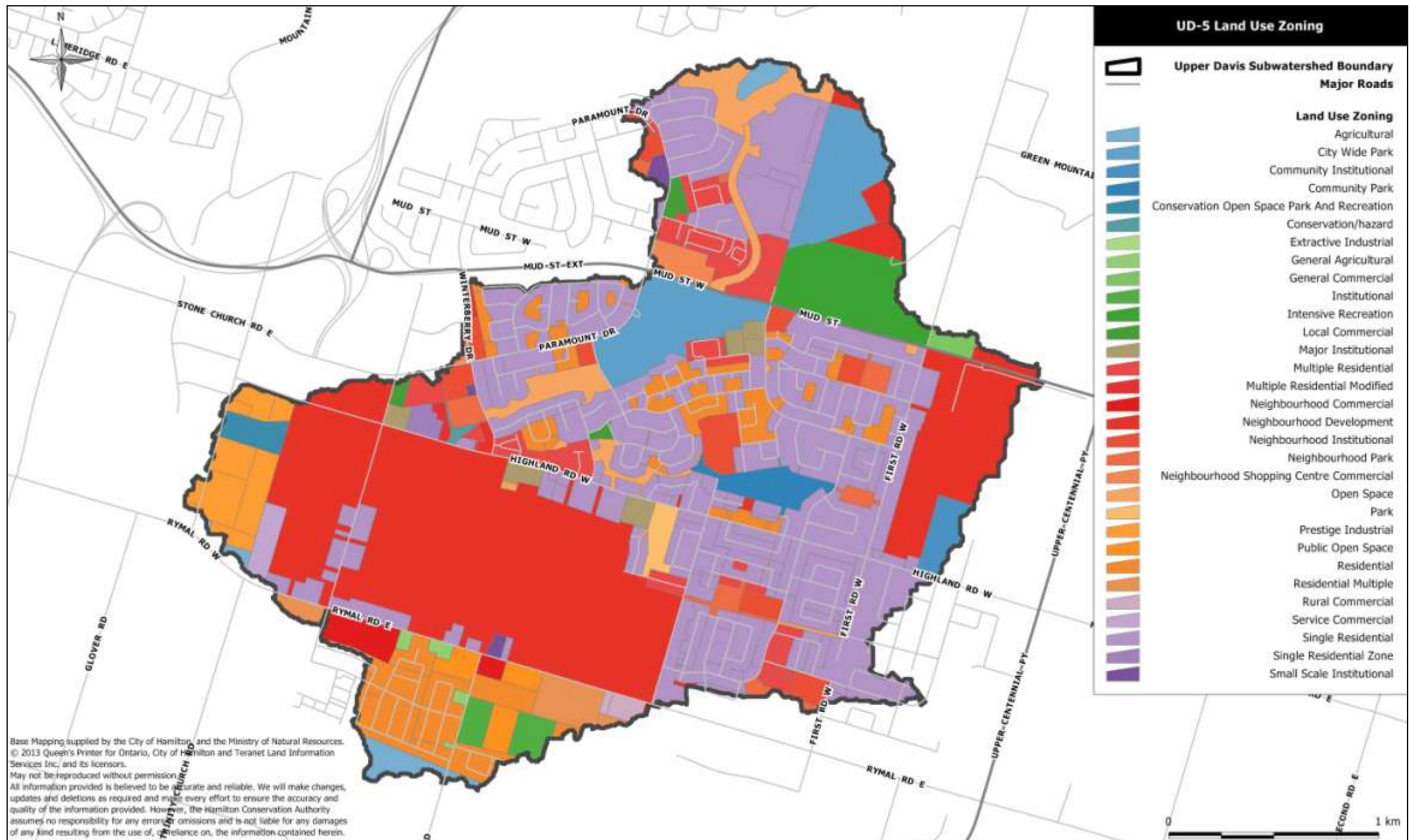
For the purposes of comparison, land use zoning designations were categorized and organized into the same land use categories as in **Map UD-4** and **Table UD-12**. **Table UD-13** outlines potential future land use composition based on current land use zoning designations. **Table UD-14** outlines the scheme used to categorize current zoning designations into current land use categories.

Significant land use changes are planned within this subwatershed. A portion of the Red Hill Business Park is within the western area of this subwatershed and is planned for development. Additional residential and other supporting land uses are also planned. **Table UD-15** outlines the percentage of the subwatershed area identified for greenfield development. **Table UD-16** outlines the percentage of subwatershed area of different types of natural features within identified greenfield development areas. **Table UD-17** outlines the percentage of subwatershed area of different types of natural features within the Red Hill Business Park area. Areas of potential development are illustrated in the Environmental Considerations mapping in the Catchment Summaries section in the remainder of this document.



Map UD - 4: Land Use





Map UD - 5: Land Use Zoning

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

**Table UD - 12: Land Use Statistics**

Area (km <sup>2</sup> )	Commercial (%)	Industrial (%)	Institutional (%)	Mixed Use (%)	Office (%)	Open Space & Misc. (%)	Residential (%)	Utilities / Transportation (%)	Warehousing / Wholesale / Store (%)	No Data (%)	Impervious Surfacing (%)
7.59	0.66	0.09	5.01	0.01	0.00	41.37	29.64	1.05	0.0	6.98	44.14

**Table UD - 13: Zoning Designation Categorized into Land Use Types – Statistics**

Area (km <sup>2</sup> )	Commercial (%)	Industrial (%)	Institutional (%)	Mixed Use (%)	Office (%)	Open Space & Misc. (%)	Residential (%)	Utilities / Transportation (%)	Warehousing / Wholesale / Store (%)	No Data (%)	Impervious Surfacing (%)
7.59	3.01	2.48	5.16	26.42	n/a	17.26	45.69	n/a	n/a	n/a	n/a

**Table UD - 14: Zoning Designation Land Use Categorization Scheme**

Land Use Zoning Designation	Land Use Category
Agricultural	Open Space & Misc.
City Wide Park	Open Space & Misc.
Community Institutional	Institutional
Community Park	Open Space & Misc.
Conservation Open Space Park And Recreation	Open Space & Misc.
Conservation/hazard	Open Space & Misc.
Extractive Industrial	Industrial
General Agricultural	Open Space & Misc.
General Commercial	Commercial
Institutional	Institutional
Intensive Recreation	Open Space & Misc.
Local Commercial	Commercial
Major Institutional	Institutional
Multiple Residential	Residential
Multiple Residential Modified	Residential
Neighbourhood Commercial	Commercial
Neighbourhood Development	Mixed Use
Neighbourhood Institutional	Institutional
Neighbourhood Park	Open Space & Misc.
Neighbourhood Shopping Centre Commercial	Commercial
Open Space	Open Space & Misc.
Park	Open Space & Misc.
Prestige Industrial	Industrial

Land Use Zoning Designation	Land Use Category
Public Open Space	Open Space & Misc.
Residential	Residential
Residential Multiple	Residential
Rural Commercial	Commercial
Service Commercial	Commercial
Single Residential	Residential
Single Residential Zone	Residential
Small Scale Institutional	Institutional

**Table UD - 15: Percentage of Subwatershed Area Identified for Greenfield Development**

Area Planned for Greenfield Development	km2	% area
Area Planned for Greenfield Development	1.20	15.81

**Table UD - 16: Natural Features within Identified Greenfield Development Areas**

Natural Feature	km2	% area	km
Watercourse			5.40
Wetland	0.00	0.00	
Meadow	0.34	4.48	
Successional	0.05	0.66	
Forest	0.03	0.40	
Total	0.42	5.53	

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**Table UD - 17 Natural Features within the Red Hill Industrial Park Area**

Natural Feature	km2	% area	km
Watercourse			0.87
Wetland	0.00	0.00	
Meadow	0.00	0.01	
Successional	0.01	0.08	
Forest	0.00	0.01	
Total	0.01	0.09	

There are some publicly owned properties in this subwatershed which contain natural features that can be preserved or enhanced to contribute to the natural heritage system in the larger watershed and that can provide education and recreation opportunities for local residents.

**Table UD-18** outlines the number of properties within the subwatershed that are owned or managed by HCA that contain natural features. **Table UD-19** outlines the number of properties within the subwatershed that are owned or managed by the City of Hamilton that contain natural features. **Table UD-12** outlines the percentage of the subwatershed area that is conservation or parkland as well as the length of trail system within the subwatershed. These properties and trail systems are identified on the built infrastructure and natural environment maps for each catchment in the catchment summaries section in the remainder of this document.

**Table UD - 18: Hamilton Conservation Authority Owned Properties with Natural Features**

Feature	Number	% of Properties
Total Number of Properties	10	n/a
Properties with Watercourse	6	60.00
Properties with Forest	6	60.00
Properties with Wetland	0	0.00
Properties with Meadow	7	70.00
Properties with Successional	6	60.00

**Table UD - 19: City Owned Properties with Natural Features**

Feature	Number of Properties	% of Properties
Total Number of Properties	45	n/a
Properties with Watercourse	14	31.11
Properties with Forest	10	22.22
Properties with Wetland	0	0.00
Properties with Meadow	7	15.56
Properties with Successional	4	8.62

**Table UD - 20: Recreational Infrastructure**

Feature	km2	% of subwatershed area	km
Existing Trails			20.80
Proposed Trails			4.30
HCA Lands	1.32	17.39	
Other 'Parks and Conservation'	0.82	10.80	
Public Lands	2.19	28.85	

## UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

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The City of Hamilton Recreation and Trails Master Plan Individual Ward Projects for Ward 9 states:

The Growth Related Integrated Development Strategy: Growth Report (May 2006) contains a Neighbourhood Concept Plan which is similar to that which was used to plan the growth of residential neighbourhoods in Wards, 6, 7 and 8 south of Mohawk Road. While it is different in that provision is made for through vehicular traffic, there is not provision for off street recreational trails and on street cycling routes will compete with vehicular traffic and experience air quality issues. As new Greenfield expansion is planned for lands within this Ward, the Neighbourhood Concept Plan needs to be re-considered to provide better trail design opportunities and connections (City of Hamilton, 2007).

Generally, neighbourhoods planned and developed in the Saltfleet Community closer to the Niagara Escarpment have maintained open space corridors along the Red Hill Creek tributaries and these can be used for recreational trails through these neighbourhoods. In undeveloped neighbourhoods, where possible, natural surface drainage should be maintained and recreational trails should be provided along these corridors. In addition, there may be opportunity to develop trails along lands owned by the City under which these streams have been piped where these are outside street allowances (City of Hamilton, 2007).

The East Mountain Trail Loop (EMTL) is one project that fulfills some of the goals of the Recreation and Trails Master Plan. It is a paved/multi-purpose 10 km loop trail. 7 km is owned and/or managed by the City of Hamilton and 3 km is owned and/or managed by HCA. When completed, the EMTL will connect the Red Hill Valley Trail, Escarpment Rail Trail, Bruce Trail, and Chippewa/Trans Canada Trail to Caledonia. It will also connect Albion Falls, Felker's Falls Conservation Area (CA), Valley Park, Paramount Park, Stoneywood Park, Oak Knoll Park, King's Forest Park, Mount Albion CA, and Eramosa Karst CA. It is also accessible by public transit. The Peter Street Trail was the first accessible trail in Hamilton. The loop also consists of a pedestrian bridge crossing the Lincoln Alexander Parkway. This pedestrian bridge links to the pedestrian bridge crossing the QEW in the lower reaches of the Red Hill watershed, making it possible to use the trail network to walk from Lake Ontario to Caledonia.

# UPPER DAVIS CREEK SUBWATERSHED CHARACTERIZATION

## STEWARDSHIP

There are 148 properties within this subwatershed contain forest, wetland, meadow, successional or aquatic habitat (**Table UD-21**). There is potential to contact landowners with natural features to create awareness regarding best practices for environmental stewardship of natural areas. Through this contact there is also potential to engage 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. Efforts should be made to solicit participation from residents in this capacity as Urban Watershed Stewards.

The Hamilton Conservation Authority is a significant land holder of properties with natural features in this subwatershed, primarily in the Upper catchment. Landowner contact should be focused on private properties with natural features throughout the subwatershed. Due to the large number of residents in this subwatershed, it is recommended that neighbourhood-specific group events, workshops and demonstration sites focused on local environmental opportunities, be used to engage numerous residents at a time.

Stewardship programming should also focus on contacting local residents who do not own or manage properties with natural features, to provide education about urban stewardship opportunities. Due to the large number of residents in this subwatershed, it is recommended that neighbourhood-specific group events, workshops and demonstration sites focused on local environmental opportunities, be used to engage numerous residents at a time.

**Table UD - 21: Stewardship Potential**

Approximate Population	Population Density (persons / km <sup>2</sup> )	Total # of Properties with Forest, Wetland, Meadow or Watercourse
11,091	1,530	148

**Table UD - 22: Environment Canada's How Much Habitat is Enough Guidelines**

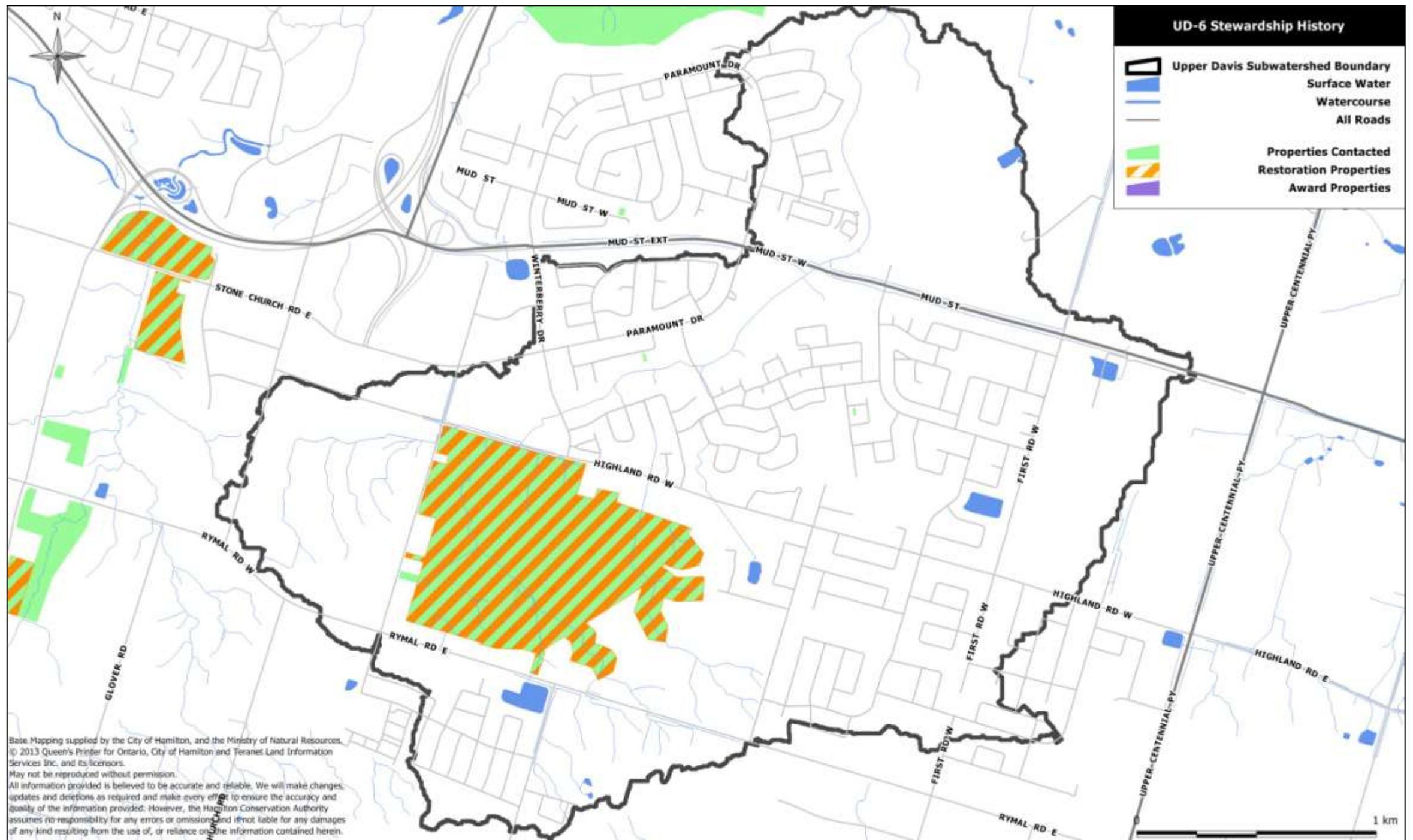
PARAMETER	% Wetlands	% Stream Naturally Vegetated	Total Suspended Sediments	% Impervious Surfacing	Fish communities	% Forest Cover	Size of largest Forest patch	% Forest Cover 100m & 200m from Forest edge
<b>GUIDELINE</b>	6	75% with 30m buffer on either side	Below 25 mg/L	< 10	Based on historical data / watershed characteristics	30	2km <sup>2</sup> & min 500m wide	10% < 100m from forest edge
<b>SUBWATERSHED STATUS</b>	0	17.87	n/a	44.14	warmwater and coldwater	6.19	0.18 km <sup>2</sup>	100m – 1% 200m – 0%

Environment Canada has provided guidelines for forest, wetland and riparian habitat for subwatersheds and in turn a preliminary analysis has been completed using the guidelines set out by this agency. **Table UD-22** displays the status of the Upper Davis Creek subwatershed when compared to these Federal guidelines.

This subwatershed does not meet Environment Canada's How Much Habitat is Enough Guidelines for forest or wetland cover. Efforts should be made to work with landowners and public agencies to preserve existing and create additional forest and wetland cover, with an emphasis being placed on area shape and size. These efforts will work toward meeting targets related to percentages of natural cover to support wildlife populations.

This subwatershed also does not meet the How Much Habitat is Enough guidelines for percentage of stream naturally vegetated. An additional 24.63 kilometers along either side of the stream would have to be buffered with 30m wide buffers, in order to meet this target. Efforts should be made to establish and enhance riparian buffers along the watercourse to meet this habitat guideline and prevent sedimentation and runoff contamination within the system.

The percentage of impervious surfacing within this subwatershed exceeds the standards recommended by Environment Canada for healthy stream systems. Efforts should be made to implement source control lot level stormwater management practices such as installing pervious pavement, rain gardens, rain barrels, etc. Efforts should also be made to de-pave unused impervious surfaces where possible.



Map UD - 6: Stewardship History

## STRESSES AND STEWARDSHIP ACTIONS

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### STRESSES AND STEWARDSHIP ACTIONS

There are thirty four types of *stresses* identified as currently impacting, or having the potential to negatively impact, the Red Hill Creek Watershed. Stresses and Stewardship Actions identified for the Spencer Creek Stewardship Action Plans that were likely relevant to the Red Hill Creek Watershed were included in these draft plans for public and stakeholder comment on their relevance to the Red Hill Creek watershed. Stresses that are not applicable to Upper Davis Creek have been included in this Action Plan to illustrate the cumulative stresses on the Red Hill Creek Watershed.

An inventory count of the number of specific occurrences of each type of stress observed in each catchment basin of this subwatershed is listed in **Table UD- 23**. The most prevalent stresses, or potential stresses, identified in the Upper Davis Creek subwatershed are stormsewer outfalls, urban creeks and development. **Table UD-24** outlines *Stewardship Actions* that have been developed to mitigate the impacts of the stresses listed in **Table UD-23**. The Lead Agency as well as Partner Agencies were identified through a desktop exercise and these agencies have not formally assumed any of these responsibilities.

Specific locations of stresses are mapped and inventoried in the subsequent catchment datasheets within the Catchment Summaries section in the remainder of this document. Within the Upper Davis Creek subwatershed, 27 specific locations where stresses are occurring or have the potential to occur, have been identified. However, this inventory is not exhaustive and therefore there may be stresses occurring within this subwatershed that are not noted within this plan. Implementation of Stewardship Actions should be undertaken on a subwatershed scale to ensure that all occurrences of stresses are mitigated.

The specific occurrences of stresses were identified through public and partner consultation, as well as using geographic information systems analyses, using the best available data; however all should be verified for accuracy before planning for the implementation of related stewardship actions.

It should be noted, there are insufficient riparian buffer stresses identified throughout the subwatershed. Insufficient Riparian Buffers are illustrated on the Environmental Considerations mapping for each catchment in the Catchment Summaries section.

The establishment of a riparian buffer along these watercourses should be a primary focus. The absence or insufficient width of riparian buffers directly relates 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 delivers technical and financial assistance programs for the establishment of riparian buffers along watercourses.

The nature of this subwatershed is such that certain areas are largely built infrastructure with key natural areas adjacent or within. It is possible for local residents and businesses to inadvertently disassociate their daily activities from impacts that they may have on the natural environment. Fortunately, the natural areas in and adjacent to this subwatershed offer residents local opportunities to experience the physical and psychological benefits of the natural environment. Efforts should be made to encourage local residents and businesses to frequent and steward local natural areas.

While encouraging the use of local natural areas, it is important to ensure that these areas are not being used beyond their capacity and that the areas are not being used for unintended or disruptive purposes. To prevent encroachment, illegal dumping, camp fires, litter, etc., signage and news items on the City and HCA websites should outline rules and etiquette to observe when using these public lands. Contraventions of City and HCA policies related to property use should be reported to the both agencies for enforcement and management.

Upper Davis Creek subwatershed is an actively urbanizing subwatershed. Stresses associated with urbanization, such as detachment from nature, habitat fragmentation/loss, increased impervious surfaces, invasive species, land maintenance practices, stormwater, runoff contamination from transportation corridors and water use are generally present within the urbanized areas of the subwatershed. Sustainable development should be the primary focus for this subwatershed. Low Impact Development practices should be employed to minimize the impacts of development on the natural environment and infrastructure.

Aquatic and terrestrial natural heritage systems are vulnerable in both the Upper and Lower catchments of this subwatershed. Land clearing associated with proposed development in this subwatershed threatens the continuity and function of these natural systems. Efforts should be made to maintain existing habitat and increase habitat where possible. Meadow and successional habitat is particularly vulnerable to land use changes as there is little legislative protection for this type of habitat. Efforts to preserve and enhance meadow and successional habitat should be a priority.

## STRESSES AND STEWARDSHIP ACTIONS

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The Davis Creek Subwatershed Study provided the following with respect to existing conditions and proposed land use changes in this subwatershed:

The majority of the main watercourse channel in the Upper Davis Creek subwatershed has been altered for development, i.e. the reach of watercourse through Valley Park. The Upper Davis Creek system predominately comprises Terrablock™ or concrete lined channels with minimal current erosion potential. The armored nature of the channel impairs geomorphic processes and conveys flows at an increased rate, with less sediment. Naturalization of the armored channel is recommended to improve fish habitat, sediment transport and reduce flow conveyance to more natural rates (Philips, 2005).

Through the proper consideration and evaluation of the physical processes operative within a stream corridor, management decisions can be made to ensure most physical functions of the watercourse are maintained in subsequent plans for development (Philips, 2005).

Existing terrestrial resources in the study area are in an advanced state of ecological transition, responding to historical as well as recent land use changes. Much of the subwatershed has been converted to agriculture or has been urbanized. This has resulted in the loss of considerable natural habitat over the years. Despite the land use conversions, the subwatershed still supports significant blocks of habitat along the Niagara Escarpment, Lower Davis Creek valley and Eramosa Karst. These areas support habitat for regionally significant flora and fauna. Linkages between these areas are considered relatively impaired due to their small size and poor connectivity to other habitat blocks. As a consequence, terrestrial resources in the subwatershed are subject to impacts from habitat fragmentation and degradation. These factors also represent a constraint to achieving a highly functional natural heritage system (Philips, 2005).

The Upper Davis Creek valley between Mud Street West and Felker's Falls represents a key opportunity for improving connectivity between the Escarpment and the Eramosa Karst natural area". The study indicates that "recent urbanization of portions of these lands has partially eliminated opportunities to enhance this corridor but that additional opportunities to enhance this corridor should be explored along the east side of the valley north of Mud Street West (Philips, 2005).

Future land uses proposed for the subwatershed include urbanization of lands that are presently agricultural or support natural and semi-natural habitats such as meadows, thickets and wetlands. While the proposed land use plan integrates key components of the Natural Heritage System such as Core Natural Areas and Linkages into the future Open Space system (ESA, ANSI's), there are additional lands where future land use will impact on the overall extent of natural habitat in the subwatershed. Impacts associated with the currently proposed land use plan include habitat loss through conversion of idle successional lands, habitat fragmentation through a reduction in width of physical linkages, and a net increase in habitat degradation due to urbanization in or adjacent to natural habitats (Philips, 2005).

The proposed land use plan, as reflected in the governing official plans will result in direct impacts to existing terrestrial resources as well as elements of the Natural Heritage System being proposed as part of the Subwatershed Study. The impact of the proposed land uses on the proposed Natural Heritage System are related primarily to competing land use. This is evident when proposed land use is overlain on the Natural Heritage System as was done in the Davis Creek Subwatershed Study (Philips, 2005).

The conservation, management and enhancement of terrestrial resources in the Davis Creek subwatershed can be achieved through the implementation of a Natural Heritage System comprised of core natural areas, linkages and enhancement areas (Philips, 2005).

Efforts should also be made to continue to increase the urban tree canopy to provide linkages between adjacent natural areas and to contribute to the overall local natural heritage system. The City of Hamilton Street Tree program should continue with a focus on native tree species.

Increasing natural cover in the subwatershed will aid in working toward habitat targets as determined by Environment Canada's How Much Habitat is Enough Guidelines and the City of Hamilton Urban Official Plan and Vision 2020 Natural Heritage Goals. What habitat targets are possible to achieve in this subwatershed, based on current and proposed land use, should be considered when evaluating conditions against recommended habitat targets.



## STRESSES AND STEWARDSHIP ACTIONS

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Improving water quality in Upper Davis Creek, toward reaching Provincial Water Quality Objectives and improving fishery and benthic communities within Upper Davis Creek, as evaluated against industry standard Indices of Biotic Integrity, should also be priorities for this subwatershed.

There is a significant amount of impervious surfacing in this subwatershed. Stormwater and runoff contamination from transportation corridor stresses are directly related to impervious surfacing. Adequate stormwater management is important to the health of the local fishery as it can mitigate the potential for erosion and contamination in the creek system. The design and maintenance of stormwater management systems should be a focus for this subwatershed to maintain and improve water quality and quantity, as well as aquatic habitat in this area.

Opportunities to implement a treatment train approach to managing stormwater including source, conveyance and end of pipe systems in new and existing developments should be undertaken throughout this subwatershed to manage flooding, erosion, degraded water quality, and increases in flow volumes to ensure that future maintenance costs are reduced and results in a healthy stream system that is stable over the long-term. Efforts to de-pave unused impervious surfaces should also be undertaken where possible.

The Davis Creek Subwatershed Study provided the following with respect to managing water quality and quantity in this subwatershed:

Volume of stormwater quantity management storage necessary to mitigate impacts on peak flow rates (flooding) resulting from proposed development will need to be addressed. The use of source and conveyance controls to address stormwater management requirements would rely on providing measures within the context of site development to promote infiltration and pollutant removal on a site by site basis. These measures rely on eliminating the direct connection between impervious surfaces such as roofs, roads, parking areas, and the storm drainage system, as well as the promotion of infiltration on each development site (Philips, 2005).

Stormwater quality control can be achieved through retrofit opportunities. Stormwater quality control is provided through the modification of existing stormwater management facilities. Although this method is primarily intended for existing stormwater management facilities, it is suggested that it can also be considered during the planning stages for quantity facilities, if it is expected that facility outflows would adversely affect downstream watercourses and habitat through water quality degradation (Philips, 2005).

Existing storm outfalls provide opportunities to provide on-line treatment of various upstream land uses within the context of existing available public lands. Water quality facilities in the form of wetlands, wet ponds and hybrids would provide extended detention for the 'first flush' of runoff (Philips, 2005).

Sampling within the Davis Creek has shown that fecal coliforms counts within both the headwaters and remainder of the subwatershed are significantly above the PWQO. Existing fecal coliform loadings are surmised as being the result of agricultural runoff in the Davis Creek headwater area and potential wastewater/stormwater servicing cross-connections within existing development. Development incorporating stormwater management typically increases contaminant loading to the receiving system, which includes fecal coliforms. Stormwater management typically removes 70% to 80% of contaminants from upstream development (suspended solid fraction). Without mitigation of the existing fecal coliform loadings, future development within the Davis Creek subwatershed would only further contribute to the existing high loadings, as 20% to 30% of the 'new' contaminants would still remain unremoved (Philips, 2005).

Outreach programming to educate the public on the design and function of their local sewer system should continue to be implemented. Outreach should include where local stormwater flows and how lot level practices such as pouring hazardous waste or sweeping material into the stormsewer can affect water quality in local streams.

Efforts should be made to locate and remediate cross connections between local household plumbing and the stormsewer system. Efforts should also be made to educate contractors and homeowners undertaking renovations on the difference between the storm sewer and the sanitary sewer to prevent future cross connections.

Our watersheds will be impacted by climate change. Urbanization further alters a watershed's ability to sustain the impacts of climate change. Increasing and enhancing biodiversity within natural cover (forests, wetlands and meadow/prairies) as well as maintaining watercourses in a natural state with adequate floodplain storage and meander belt allowances will build resiliency within the natural system to withstand the impacts of a changing climate. Existing and future infrastructure will need to be adaptable to potentially unforeseeable conditions. It will be important to ensure that adequate and innovative stormwater management infrastructure is implemented. Efforts to mitigate the impacts of climate change should continue throughout Hamilton's watersheds, including efforts to reduce carbon emissions through household and industry consumption reduction and alternative transportation initiatives.

## STRESSES AND STEWARDSHIP ACTIONS

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Upper Davis Creek subwatershed contains one closed landfill site and is immediately adjacent to an active landfill site. Through legislation, the Ontario Ministry of the Environment (MOE) requires that closed landfills have ongoing monitoring and maintenance as part of their closure plans. The MOE specifies that, for example, groundwater monitoring, preventative maintenance and final cover be maintained at closed landfills. Annual reports are submitted to the MOE on the status of the landfills and to demonstrate that MOE requirements have been fulfilled. Should legislated requirements not be met, the MOE may lay charges against the property owner. By monitoring and maintaining closed landfills, it is possible to detect and address any issues sooner, reduce potential remediation work, offset any liability since due diligence can be demonstrated, and mitigate any environmental impacts (City of Hamilton, 2013). Due to the high number of individual residences, an opportunity exists to undertake many small restoration projects that will have a cumulative benefit to the natural environment within the

subwatershed. Efforts should be made to promote alternatives to traditional land maintenance, including reducing mowing, planting pollinator gardens, eliminating fertilizer use and composting pet waste.

In densely urbanized areas there is also the potential for human wildlife conflicts. It is estimated that each year in the U.S., domestic outdoor cats are responsible for 258 million to 1.5 billion of bird deaths and 571 million to 2.5 billion of mammal deaths. Efforts should be made to educate pet owners to take measures to limit or prevent their pet's access to the outdoors.

## STRESSES AND STEWARDSHIP ACTIONS

### CATCHMENT SUMMARIES

This section of the plan identifies the occurrences of stresses within each catchment of the Upper Davis 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. Where available, ecological monitoring data for each catchment is also outlined following each catchment map. In total, 27 stresses were identified for the Upper Davis Creek Subwatershed and inventory counts are presented in **Table UD-22**.

**Table UD - 23: Stresses Inventory by Catchment**

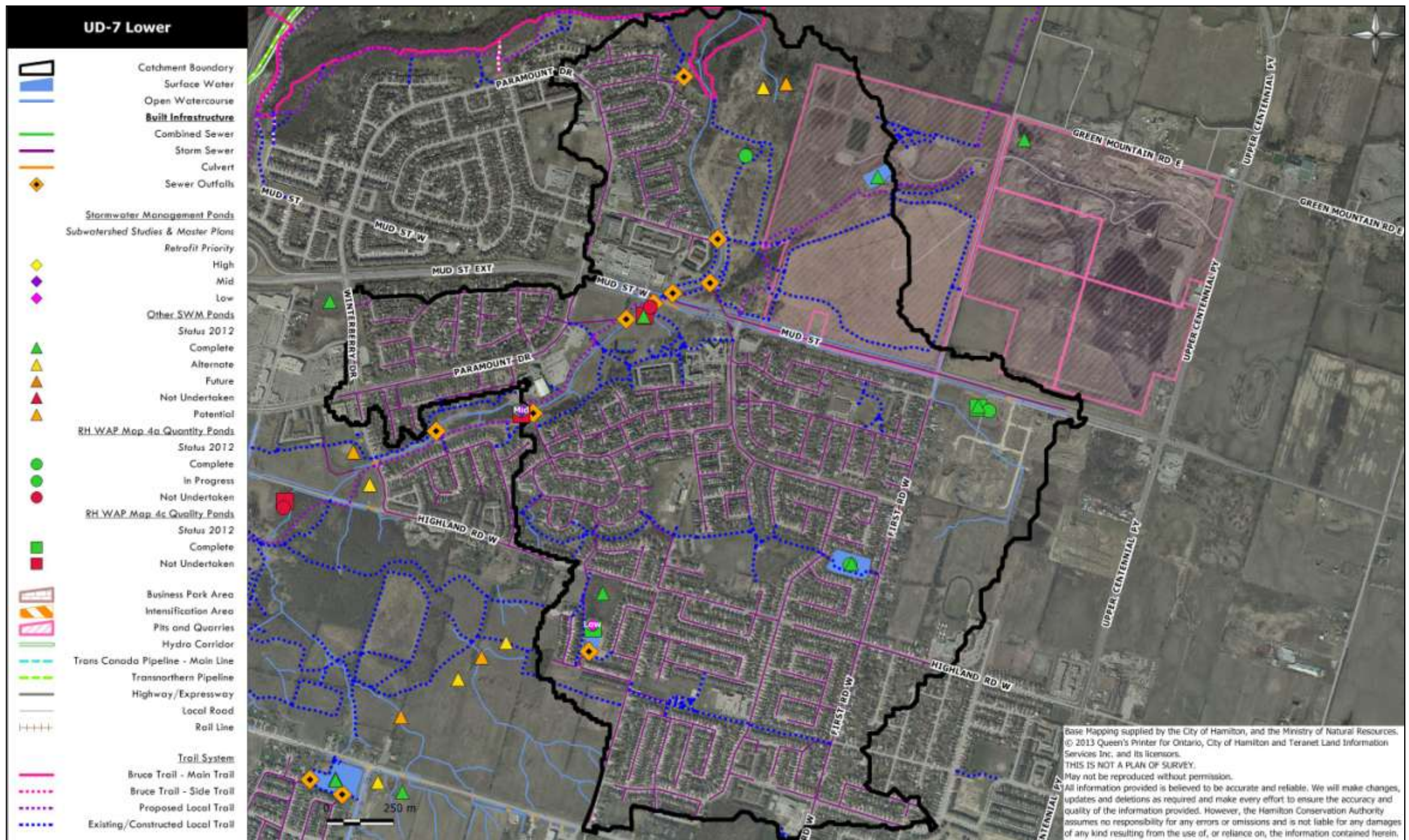
STRESS	MAP CODE	NO. IN SUBWATERSHED	CATCHMENT	
			LOWER	UPPER
Abandoned Groundwater Wells	GW	0		
Buried Stream	BS	0		
Channelization	CH	0		
Debris Jam	DJ	0		
Detachment from Nature	DT	0		
Development	DV	4	1	3
Encroachment	EN	1	1	
Erosion	ER	0		
Faulty Septic System	SS	0		
Habitat Fragmentation/Loss	HF	1		1
Increased Impervious Surface	IS	0		
Insufficient Riparian Buffer	RB	See Catchment Map	See Catchment Map	See Catchment Map
Intensive uses	IU	1	1	
Invasive/Introduced Species	IV	0		
Land Maintenance Practices	LM	1	1	
Landfill Leachate	LL	1	1	
Litter	LI	0		
Migration Barrier	MB	0		
Nutrient Loading	NL	0		
Online Pond	OP	2		2
Perched Culvert	PC	0		
Pesticide/Herbicide Use	PS	0		
Plowed Watercourse	PW	0		
Runoff Contamination via Transportation Corridors	TC	0		
Sediment Loading	SL	0		
Site Clearing Prior to Development	SC	0		
Stormsewer Outfall	SO	11	8	3
Stormwater	SW	0		
Transportation Corridor Expansion	TE	0		
Urban Creek System	UC	5	2	3
Utility Pipeline	UP	0		
Water Quality	WQ	0		
Water Use	WU	0		
Wildlife Collision	WC	0		



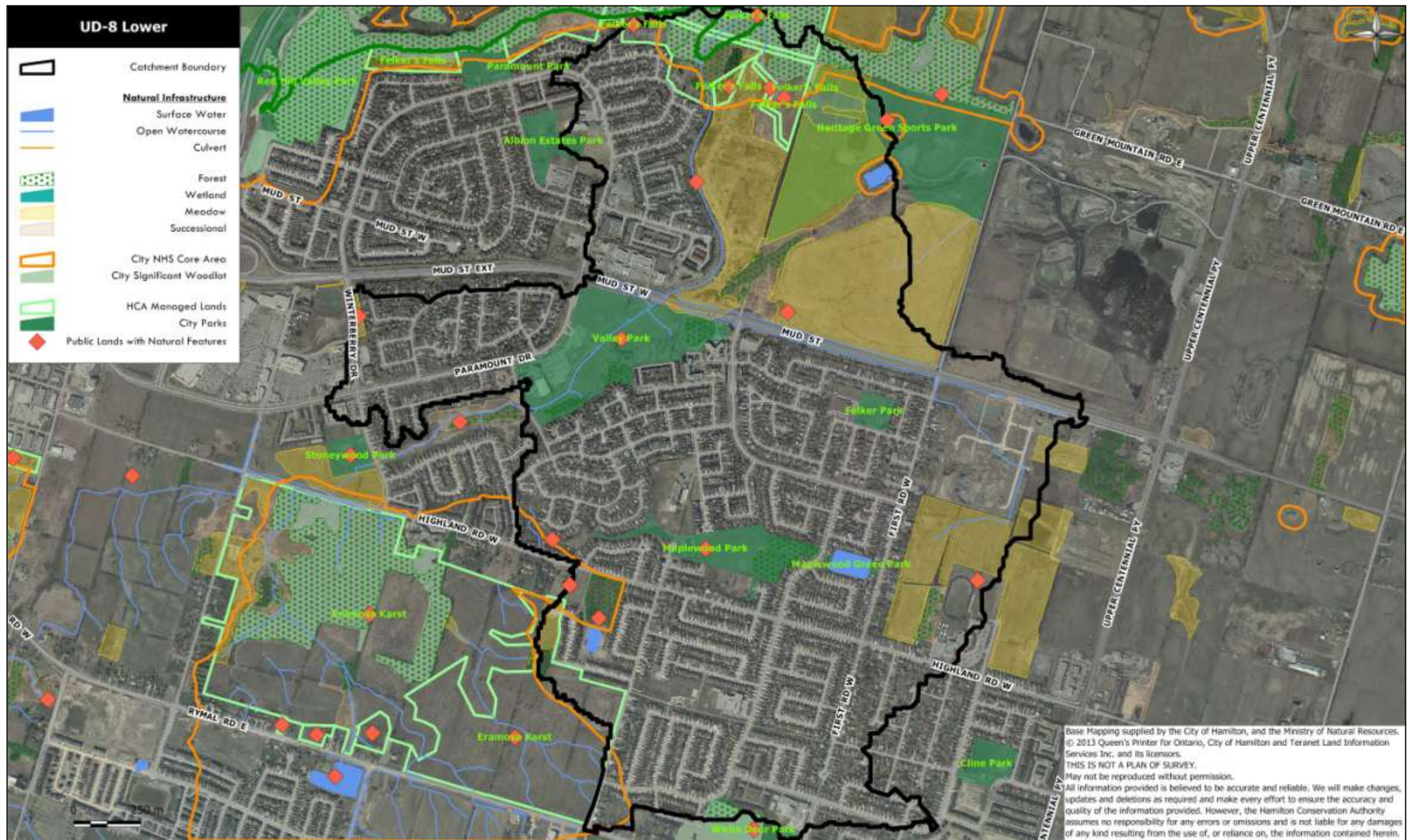


*LOWER CATCHMENT*

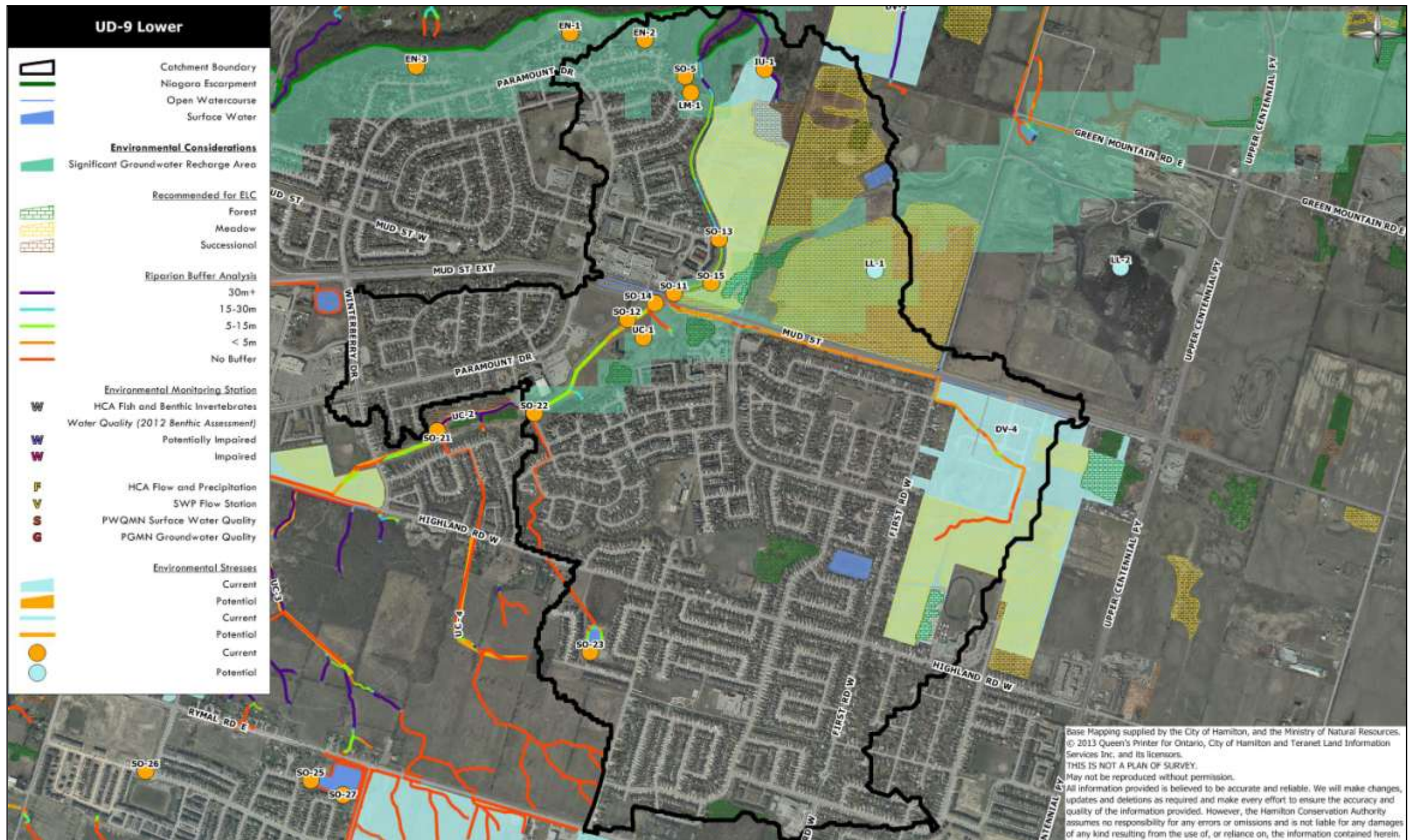
DATA SHEETS



Map UD - 7: Lower Catchment Built Infrastructure



Map UD - 8: Lower Catchment Natural Environment



Map UD - 9: Lower Catchment Environmental Considerations



## LOWER CATCHMENT DATA SHEET

**Table UD - 24: Site-specific Stresses Identified in the Lower Catchment**

MAP CODE	STRESS NAME	DESCRIPTION	STEWARDSHIP ACTIONS			STRESS TYPE	PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
			AWARENESS OPPORTUNITY	SPECIAL PROJECT OPPORTUNITY	RESTORATION OPPORTUNITY				
DV-5	Development	Area of potential greenfield development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Potential		<input checked="" type="checkbox"/>	
EN-2	Encroachment	Some landowners along Audubon St. N are mowing HCA lands	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
IU-1	Intensive Uses	Damaging uses of natural areas – at Felker’s Falls CA - Dumping garbage, campfires, tree cutting - more signage, increase patrols , fines	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
LL-1	Landfill Leachate	Closed Landfill		<input checked="" type="checkbox"/>		Potential		<input checked="" type="checkbox"/>	
LM-1	Land Maintenance Practices	Mown area for potential naturalization demonstration site		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-11	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current		<input checked="" type="checkbox"/>	
SO-12	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-13	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-14	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current		<input checked="" type="checkbox"/>	
SO-15	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-22	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-23	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-5	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
UC-1	Urban Creek Systems	Enhance urban creeks, restoration of creek, buffers, native vegetation, invasives removal - be creative to find ways to improve.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
UC-2	Urban Creek Systems	Davis Creek at Red Hill fills up with water therefore there is a lot of accumulated litter, high flows from upper watersheds, there is a creek rehabilitation & natural channel design at this location.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

## LOWER CATCHMENT DATA SHEET

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### Most Recent Environmental Monitoring Data Available for the Lower Catchment

#### FISHERIES ASSESSMENT

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

#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a	n/a	n/a

#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS
n/a	n/a	n/a	n/a	n/a

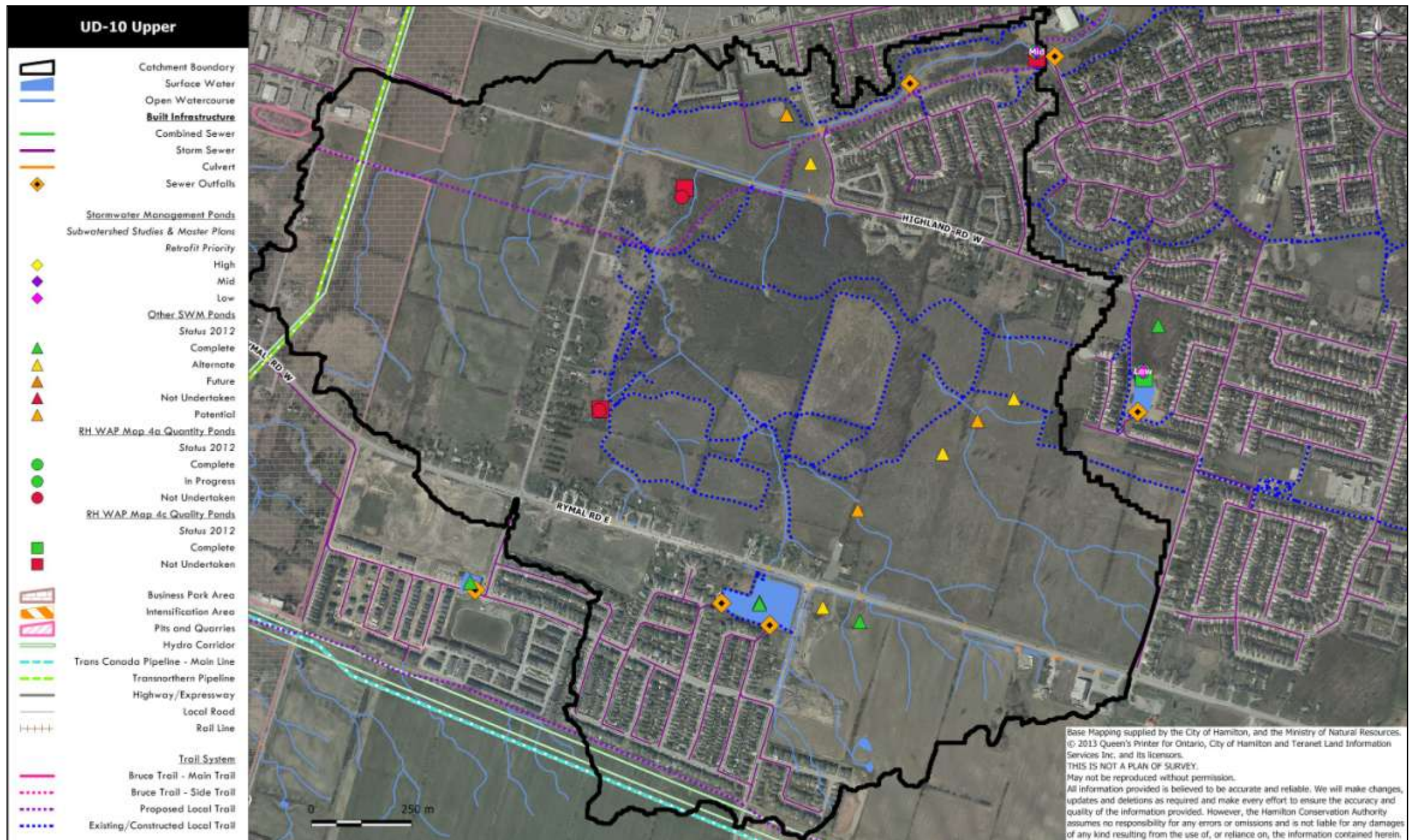
#### WATER FLOW ASSESSMENT

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

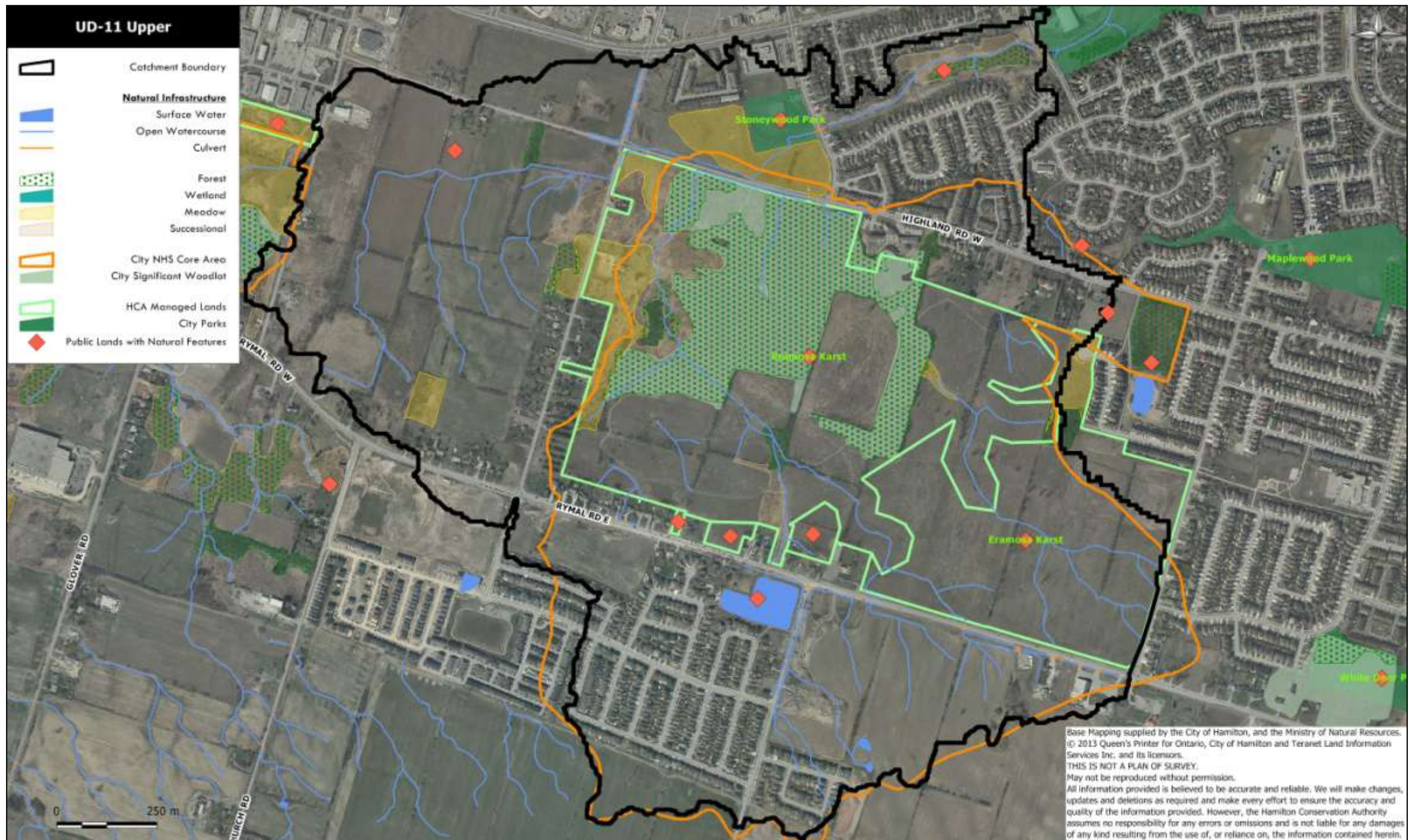


*UPPER CATCHMENT*

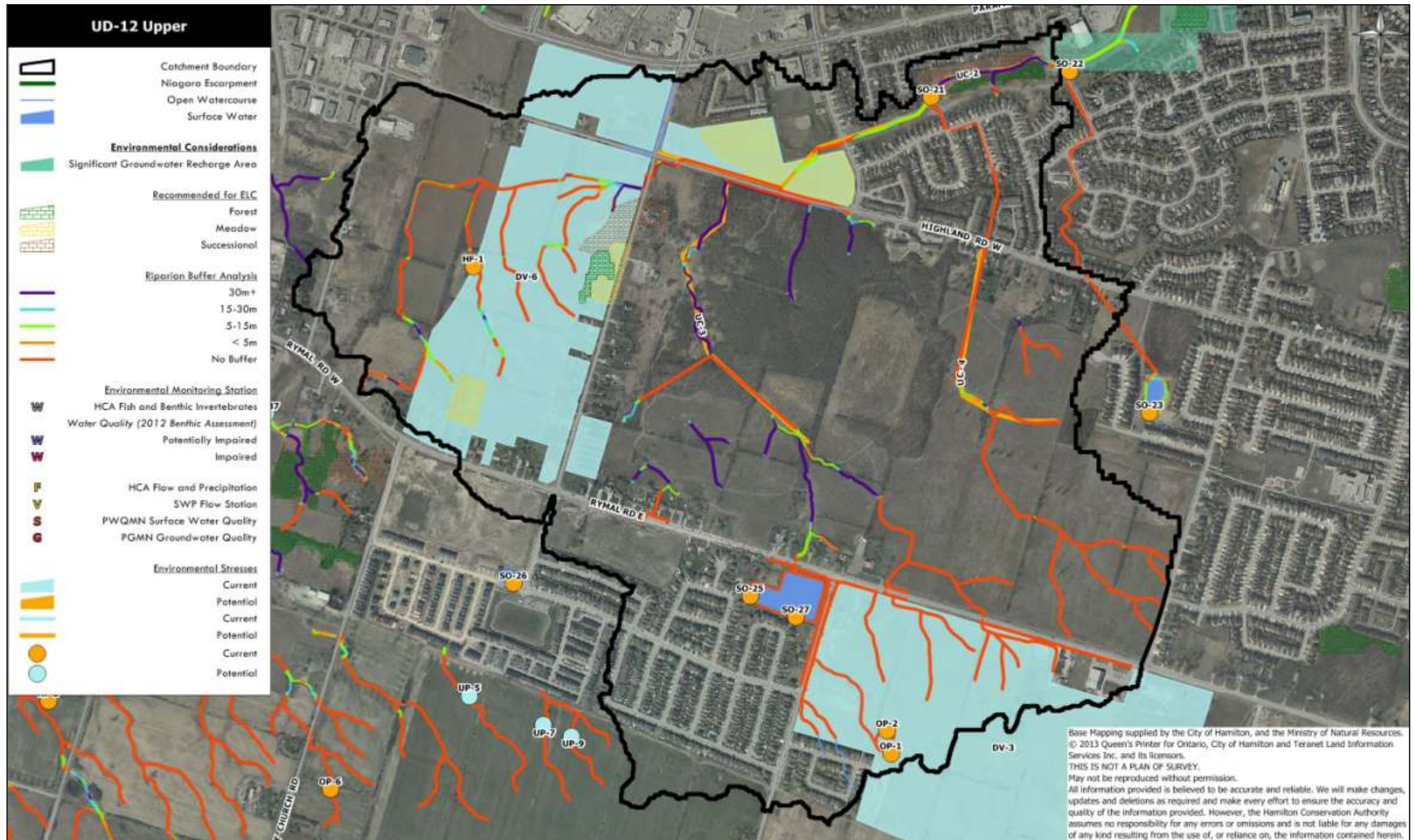
DATA SHEETS



Map UD - 10: Upper Catchment Built Infrastructure



Map UD - 11: Upper Catchment Natural Environment



Map UD - 12: Upper Catchment Environmental Considerations

**UPPER CATCHMENT DATA SHEET**

**Table UD - 25: Site-specific Stresses Identified in the Upper Catchment**

MAP CODE	STRESS NAME	DESCRIPTION	STEWARDSHIP ACTIONS			STRESS TYPE	PUBLIC LAND	PRIVATE LAND	DFO COMP PROJECT POTENTIAL
			AWARENESS OPPORTUNITY	SPECIAL PROJECT OPPORTUNITY	RESTORATION OPPORTUNITY				
DV-3	Development	Area of potential greenfield development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Potential		<input checked="" type="checkbox"/>	
DV-6	Development	Area of potential greenfield development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Potential		<input checked="" type="checkbox"/>	
DV-7	Development	Red Hill Business Park greenfield development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Potential		<input checked="" type="checkbox"/>	
HF-1	Habitat Fragmentation/Loss	Possible habitat linkage opportunity between Eramosa Karst CA and Mount Albion CA.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
OP-1	Online Pond	Waterbody Feature Type Online Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	Current		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
OP-2	Online Pond	Waterbody Feature Type Online Pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	Current		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SO-21	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-25	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
SO-27	Stormsewer Outfall	Urban runoff and potential cross connected sanitary sewer contamination	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		
UC-2	Urban Creek Systems	Davis Creek at Red Hill fills up with water therefore there is a lot of accumulated litter, high flows from upper watersheds, there is a creek rehabilitation & natural channel design at this location.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
UC-3	Urban Creek Systems - Erosion	27 - SWM Master Erosion Site ES-14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
UC-4	Urban Creek Systems - Erosion	28 - SWM Master Erosion Site ES-14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

## UPPER CATCHMENT DATA SHEET

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### Most Recent Environmental Monitoring Data Available for the Upper Catchment

#### FISHERIES ASSESSMENT

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

#### BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a	n/a	n/a

#### WATER QUALITY ASSESSMENT

LOCATION	DATE	PARAMETER	SAMPLE RESULTS	UNITS
n/a	n/a	n/a	n/a	n/a

#### WATER FLOW ASSESSMENT

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



## STRESSES AND STEWARDSHIP ACTIONS

**Table UD - 26: Stresses and Stewardship Actions**

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
<b>Abandoned Groundwater Wells</b> <b>Map Code: GW</b>  <b>Definition:</b> <b>Groundwater wells that are no longer in use, often are in a state of disrepair and can be direct conduits for contaminants into groundwater aquifers.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact promote the importance of decommissioning abandoned groundwater wells to protect drinking water and prevent human and wildlife injury.			CITY SPP	HHWSP / MOE	Agriculture and Agri-Food Canada - Water Wells, Best Management Practices Pg 52
			Work with landowners to decommission abandoned groundwater wells.	CITY SPP	HHWSP / MOE	Ontario Water Resources Act Regulation 903: Water Wells OMAFRA Best Management Practices Series – Water Wells
<b>Buried Streams</b> <b>Map Code: BS</b>  <b>Definition: The structural alteration of a stream channel, involves piping the creek system underground, eliminating aquatic habitat.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy creeks and the benefits of maintaining our creeks and streams in their natural state.			CITY / HCA WP&E	DFO / FSRT / RAP / WPN	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4, F-11, F-12, PAA-2 and ULM-2
		Undertake a feasibility and prioritization study for “daylighting” buried streams in each subwatershed.		CITY HW	DFO / HCA / MNR / MTO / RAP	HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55
			Work with the development industry to undertake daylighting projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.	CITY / HCA WP&E	DFO	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 Growth Related Integrated Development Strategy (GRIDS) Urban Hamilton Official Plan State of the Watershed Report 1997 Red Hill Creek Watershed Action Plan First Generation

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
						Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
<b>Channelization</b> <b>Map Code: CH</b>  <b>Definition: The structural alteration of a stream channel, usually involves straightening of meanders and increasing gradient which increases velocity and erosion potential.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy creeks and the benefits of maintaining our creeks and streams in their natural state.			CITY / HCA Comm. / HCA WP&E	DFO / FSRT / RAP / WPN	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4, F-11, F-12, PAA-2 and ULM-2
		Undertake a feasibility and prioritization study for restoring channelized creeks to those with a natural design.		CITY HW / HCA WP&E	DFO / MNR / RAP	HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55
			Work with landowners downstream of channelized sites to rehabilitate the riparian zone to reduce flow velocities, erosion and sedimentation.	HCA WP&E	CITY / DFO / FSRT	Fisheries Act, Section 37
			Work with landowners to undertake natural channel design projects using bioengineering and natural channel design principles, as recommended by the feasibility and prioritization study.	HCA WP&E	CITY / DFO / FSRT	City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142-158  Growth Related Integrated Development Strategy (GRIDS)  State of the Watershed Report 1997  Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
						<p>Action Plan Compendium of Actions (1998)</p> <p>Davis Creek Subwatershed Study</p> <p>June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan</p> <p>Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA</p>
<p><b>Debris Jams</b> Map Code: DJ</p> <p><b>Definition: The accumulation of debris within a watercourse that prevents the flow of water.</b></p>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to create awareness regarding proper debris jam removal so as to not disrupt aquatic habitat.			HCA WP&E	DFO / MNR	<p>Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-4, F-11 and PAA-2</p> <p>Hamilton Harbour Fisheries Management Plan</p> <p>In-stream Barrier Assessment for the Hamilton Harbour AOC.</p>
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to create awareness regarding the importance of debris jam management in flood prevention.			HCA WP&E	CITY / MNR	
		Complete an assessment of creek/in-stream flow barriers that are prone to debris and cause barriers to fish migration, including the prioritization of barriers to be removed.		HCA WP&E	CITY / MNR	
		Incorporate debris jam removal into the City of Hamilton Adopt a Park and Neighbourhood Clean Team Programs.		CITY Op.	BARC / DFO / HCA / MNR	
			Work with landowners to remove debris jams, incorporating proper sediment and erosion control practices throughout the process.	HCA WP&E	BARC / CITY / DFO / FSRT	
<p><b>Detachment from Nature</b> Map Code: DT</p> <p><b>Definition: The condition of people disassociating their existence from</b></p>	Continue to implement the Watershed Steward Award Program; include a 'Neighbourhood-level' component to the program.			HCA WP&E		<p>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</p>
	Develop an information package for real estate agents with information for potential homebuyers for living adjacent to natural areas. Offer the information as a training course for the Realtor's Association of Hamilton-Burlington.			HCA WP&E	CITY / RAHB	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
nature.	Develop education and outreach materials linking resident's everyday activities to their impacts on local natural areas to help local residents understand the connection between activities and their impacts i.e. lawn mowing, dumping of yard waste, draining pools, etc.			BARC / CITY Op. / GV / HCA WP&E		Royal Botanical Gardens Back to Nature: Towards a Ontario Strategy for Bringing Children and Nature Together - Event and Workshop Report
	Encourage the formation and activities of "Friends of" groups aimed at protecting and rehabilitating natural features. Invite established ENGO's to liaise with these groups. Centre ENGO liaison events around social events for these groups (i.e. neighbourhood barbeques).			CITY Op. (Outreach) / HCA Lands / HCA WP&E	BARC / BTC / GV	Evergreen Schoolground Greening Resources: Getting Started City of Hamilton Vision 2020 Urban Hamilton Official Plan
	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 Op. (Outreach) / EH / HCA WP&E	GV	State of the Watershed Report 1997 Red Hill Creek Watershed Action Plan First Generation Plan 1998
	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	CITY / HCA / HWCDSB / HWDSB	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
	Erect creek crossing (Watershed Planning Network) & ecological corridor signage along roadways.			CITY Plan.	BARC / GV / HCA / RAP / WPN	
	Help local residents to value natural features by developing a recurring column in a local newspaper which highlights significant natural features in the community, their importance and what local residents can do to assist with their care and management.			HCA Comm. / HNC	BTC / CITY / GV / HCA / RAP	
	Implement education outreach programs for school-aged children and children's groups, including: Yellow Fish Road, Stream of Dreams, Mini Marsh, Envirothon, Children's Water Festival, Eco-House Tours, HNC Junior Naturalists, HCA Junior Conservationists, etc. Include curriculum links in program development.			BARC / CITY HW / GV / HCA Lands	HWCDSB / HWDSB	
	Initiate community-based greening projects/events with watershed partners to deliver messaging to targeted audiences.			GV	BARC / CITY / EDHB / EH / FSRT / HCA	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Offer guided hikes with resource interpreters to educate local residents and employees of local businesses on the environmental significance of natural areas in their communities. Include messaging for stewardship of the natural areas. Develop different hikes for children and adults.			HCA Comm. / HNC	HCA	
	Promote existing organizations that currently offer guided hikes through natural areas in the watershed i.e. Hamilton Naturalists Club Wednesday Evening Walks Series.			BTC / HNC	HCA	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote watersheds, watershed characteristics and the ecological significance of natural features.			HCA Comm. / HCA WP&E	BARC / CITY / GV / RAP / WPN	
		Assess barriers to participation in environmental programs to improve program design.		BARC / CITY Op. / GV / HCA Comm.	EH / MAC	
		Assess landowner willingness to participate in and/or support water quality improvement and habitat restoration projects.		HCA Comm.	CITY / HWSC / MAC	
		Encourage municipalities and trail managers to coordinate trail plans that improve access between urban centres and provide links to parks and rural areas.		BTC / CITY Plan. / HCA Lands		
		Undertake a pilot program for local residents to undertake/assist with plant propagation in urban areas to be used in planting projects in neighbourhood natural areas.		HCA WP&E	CITY / HCA	
			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. / GV / HCA WP&E	BTC	
			Work with schools and school boards to implement the School Grounds Naturally Program; undertaking schoolyard naturalization projects.	HCA WP&E	BARC / CITY / GV / HWCDSB / HWDSB	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS	
<b>Development Map Code: DV</b>  <b>Definition: The process of developing populated settlements including housing and supporting infrastructure.</b>	Host annual training sessions for City staff & the 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.).			CITY HW / HCA WP&E	BARC / DFO / GV / HHHBA / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-12, ULM-2, ULM-3, ULM-8, ULM-13 and ULM-14  Credit Valley Conservation and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Manual	
	Promote the City of Hamilton Low Impact Development Policy for Industrial Lands when completed.			CITY Plan.	BARC / GV / HCA / HHHBA / RAP	HCA Planning and Regulation Policies and Guidelines  City of Hamilton Vision 2020	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote the requirements, benefits of and need for intensification and in-fill and brownfield development.			CITY Plan. / HCA WP&E	EH / GV / HHHBA / RAP	Growth Related Integrated Development Strategy (GRIDS)  State of the Watershed Report 1997	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to provide education about the importance and proper installation of sediment and erosion control through all stages of development, from developer to homeowner.			CITY Plan. / HCA WP&E	EH / GV / HHHBA / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998	
	Work with the development industry to develop stewardship guides for new homeowners in all new housing developments adjacent to natural areas and watercourses.			CITY Plan. / HCA WP&E	EH / GV / HHHBA / RAP	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study	
		Review the fish habitat buffer requirements for watercourses in the HCA Planning and Regulations Policy and Guidelines document to a 30m setback, per the third edition of Environment Canada's How Much Habitat Is Enough Guidelines.			HCA WP&E	CITY / HHHBA / RAP	June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan
		Continue to incorporate downstream assessments of creek conditions, with recommendations for improvement in overall subwatershed studies, conducted as part of new Greenfield development planning.			CITY HW	DFO / HCA	Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
		Determine the feasibility of adapting the Alternative Land Use Services (ALUS) program for an urban context where landowners receive payments to deliver environmental services; i.e. wildlife and pollinator habitat, improved water quality, clean air and carbon sequestration.				CITY / HCA / MNR	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Develop education and outreach programming around valuing sustainable development.		CITY HW / HCA WP&E	EH / GV / HHHBA	
		Develop policies and guidelines to ensure principles of sustainable development are required in all levels of development, from official plan through to the site plan level.		CITY Plan.	HCA / HHHBA / RAP	
		Encourage the provincial government to amend the building code to include and favour Low Impact Development technologies; e.g. green and white roofs, multilevel parking, interlocking pavement, etc.		CITY Plan. / HCA WP&E	GV / HHHBA	
		Encourage the provincial government to support property tax-based loans i.e. local improvement charges, to assist in funding development and retrofits which incorporate low impact development technologies.		CITY Plan.	HCA / HHHBA	
		Ensure natural feature preservation is incorporated into secondary plan and official plan development.		CITY Plan. / HCA WP&E	HHHBA	
		Implement stewardship and management recommendations resulting from the HCA development permit application review process.		HCA WP&E	CITY / HHHBA	
		Investigate measures for new infrastructure to compensate and/or offset the cost of upgrading existing infrastructure.		CITY HW	HHHBA / MMAH	
		Investigate the need for expiry dates or re-evaluation requirements for preapproved draft plans.		CITY Plan.	HCA / HHHBA / MMAH	
		Revise municipal by-laws regarding development practices and guidelines to facilitate increased use of Low Impact Development technologies.		CITY Plan. / HCA WP&E	GV / HHHBA / MMAH	
		Revise policies to require that development applications contain a certain number/degree of LID's/green infrastructure in order to obtain development and site plan approval. I.e. Minimum number per application.		CITY Plan.	HCA / HHHBA / MMAH	
		Criteria used in the development of the City of Hamilton's Natural Heritage System should be used to identify and value 'potential' natural heritage features and functions in planning for development.		CITY Plan.	GV / HCA / HHHBA / MNR	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Work with development industry to initiate a Water Management Task Force to assist in implementing stewardship actions and recommendations from the City of Hamilton Stormwater Master Plan.		CITY HW	GV / HCA / HHHBA / RAP	
		Work with the development industry to create a Low Impact Development demonstration site/house in a new subdivision.		CITY Plan. / HCA WP&E	GV / HHHBA / RAP / MMAH	
		Work with the development industry to determine cost savings and other benefits associated with Low Impact Development, separate from benefits of/to natural areas.		CITY Plan.	GV / HCA / HHHBA / RAP / MAC / MMAH	
			Continue to implement the principles from the Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines in development application review.	HCA WP&E	CITY / DFO / HHHBA / MNR	
			Continue to incorporate lot level control Low Impact Development techniques i.e. bioswales, pervious pavement, etc. at the site plan level and as part of subdivision design.	CITY HW / HCA WP&E	GV / HHHBA / MMAH / RAP	
			Continue to require tree protection plans and one to one compensation for the protection or replacement of single/small numbers of trees, based on the City of Hamilton Tree Protection Guidelines.	CITY Plan. / HCA WP&E	HHHBA / MNR	
			Work to implement the Low Impact Development policy for Industrial Lands currently under development by the City of Hamilton.	CITY Plan.	HCA / HHHBA / MMAH / RAP	
			Work to undertake in-stream rehabilitation projects; including those identified in the Stewardship Action Plans as suitable for the DFO Habitat Compensation Program.	HCA WP&E	CITY / DFO / HHHBA / MNR	
<b>Encroachment Map Code: EN</b>	Conduct a direct mailing of an encroachment education brochure to landowners adjacent to Conservation Authority and City owned natural areas.			CITY Op. / HCA Comm. / HCA Lands	BTC / HNC	HCA Planning and Regulation Policies and Guidelines Pages 36-41, 55, 60
<b>Definition: The act of undertaking practices on another person's property, i.e. erecting structures, planting gardens, disposal of waste.</b>	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.			CITY Op. / HCA Comm. / HCA Lands	BARC / BTC / GV / HNC	City of Hamilton Draft Private Tree and Woodland Conservation By-law  City of Hamilton By-law No. 03-117 Illegal Dumping



## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Install property demarcation posts (with agency logos) at regular intervals along property boundaries to prevent encroachment into natural areas.			CITY Op. / HCA Comm. / HCA Lands	BTC / HNC	
	Provide local residents with information on appropriate species to plant and what types of plants will naturally re-establish to support encroachment remediation projects.			CITY Op. & W. Man (Outreach) / HCA WP&E	BTC / HNC	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to create awareness regarding how encroachment (i.e. dumping yard waste, establishing gardens in natural areas, 'tidying' the forest floor, etc.) negatively impacts habitat.			CITY Op. / HCA Comm. / HCA Lands / HCA WP&E	BARC / BTC / GV / HNC	
	Work with local nurseries & landscaping co.'s to educate / encourage landowners to use native plants.			HCA WP&E	BTC / CITY / GV / HNC	
		Undertake a pilot initiative of a three warnings rule for enforcement where, if after three warnings, encroachment has not been remediated then a fine is issued.		CITY Op. / HCA Lands	BTC / GV / HNC	
		Undertake an orthophotography interpretation analysis to determine how many properties are encroaching into natural areas and how much natural feature is lost to encroachment.		CITY Op. / HCA Lands	MNR / MAC	
			Utilize enforcement of the City of Hamilton Litter, Yard Waste and Property Maintenance by-law No. 10-118 to prevent and remediate encroachment into natural areas.	CITY Op. / HCA Lands /	BTC / GV	
			Work with citizen groups to prioritize and remove encroaching material on public and private lands, including "Friends of" work days, Adopt a Creek, Fishing Clubs, Stewardship Rangers, etc.	CITY Op. / HCA Lands / HCA WP&E	BARC / GV / HNC	
<b>Erosion</b> <b>Map Code: ER</b>  <b>Definition: The process of soil being scoured or washed away by flowing</b>	Conduct a direct mailing to landowners where erosion has been identified through the City of Hamilton GRIDS Plan and City-wide erosion assessment to engage landowners in restoration work.			CITY HW	DFO / HCA	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4, ULM-2 and ULM-3  HCA Planning and Regulation
	Create demonstration sites on public lands that highlight streambank stabilization and natural channel design projects.			CITY / HCA Lands	BARC / DFO / GV	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
water.	Host training sessions for City staff and development industry to create awareness regarding BMPs & importance of properly maintained erosion / sediment control measures & enforcement.			HCA WP&E	CITY / DFO / MMAH / RAP	Policies and Guidelines Pages 68-69  Fisheries Act, Section 35
	Utilize enforcement scheme to enforce appropriate erosion control measures on development sites, including: seeding, avoiding steep slopes, etc.			HCA WP&E	CITY / DFO / GV / RAP	City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 142, 159-160
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy creeks and the importance of riparian buffers.			HCA WP&E	BARC / CITY / DFO / GV / HHHBA / RAP	Erosion and Sediment Control Guidelines for Urban Construction
		Undertake a field study of stream morphology, determining erosion hotspots & associated causes.		HCA WP&E	CITY / DFO / RAP	OMAFRA Best Management Practices Series – No-Till Making It Work
			Enhance urban creeks through the restoration of creek buffers, establishing native vegetation, naturalizing eroded areas, installing habitat features, removing invasive species, etc. i.e. Upper Davis Creek through Valley Park.	CITY Op. / HCA WP&E	BARC / GV	Growth Related Integrated Development Strategy (GRIDS)
			Work to undertake erosion rehabilitation projects as identified in the City-wide Erosion Study; combine hard and soft bank protection for erosion sites. Ex. Lower Davis project.	CITY HW	DFO / HCA	State of the Watershed Report 1997
			Work with City staff to install permeable conveyance systems (infiltration trenches) where suitable along roadsides as an alternative to the conventional ditch system.	CITY Op. & W. Man (Roads) / HCA WP&E	DFO / MTO / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998
			Work with private landowners to undertake bank stabilization and erosion rehabilitation projects using bioengineering design principles; combine hard and soft bank protection for erosion sites. Ex. Lower Davis project.	HCA WP&E	BARC / DFO / FSRT / OSCIA	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS	
<b>Habitat Fragmentation</b> <b>Map Code: HF</b>  <b>Definition:</b> <b>Disruption of large continuous tracts of habitat.</b>	Create demonstration sites on public lands that highlight various types of terrestrial and aquatic habitat restoration projects.			HCA Comm. / HCA Lands / HCA WP&E	CITY / DFO / DU / FSRT / HNC / MNR	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-2, FW-4, FW-12, PAA-1 and ULM-2	
	Encourage landowners to complete management plans for the natural features of their properties and to sustainably manage those features through the implementation of BMP's.			HCA WP&E	CITY / HNC / MNR	HCA Planning and Regulation Policies and Guidelines Pages 53-59	
	Encourage urban ecosystem restoration practices on public and private properties, including promoting the importance of creating and preserving meadow and prairie habitats.			CITY Op. / HCA Lands / HCA WP&E	HNC / MNR	City of Hamilton Draft Private Tree and Woodland Conservation By-law	
	Promote the City of Hamilton Street Tree Planting Program and its importance in contributing to the natural heritage system.			CITY Op.	HCA / HNC / MNR	Cootes to Escarpment Park System – A Conservation and Land Management Strategy	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to create awareness regarding the Niagara Escarpment Plan and Greenbelt Plans and the importance of preserving these areas with an emphasis on the importance of healthy ecosystems, habitat and habitat connectivity.			CITY Plan. / HCA WP&E	CC / DU / HNC / MMAH / MNR / NEC / OMAFRA	Nature Counts – City of Hamilton Natural Areas inventory 2003  City of Hamilton Natural Areas Acquisition Fund  Dundas Valley 50 Year Vision	
		Communicate and coordinate with adjacent Conservation Authorities regarding goals and objectives for natural heritage.			HCA WP&E	CITY / MNR	Hamilton Harbour Fisheries Management Plan
		Continue to complete ecological surveys (using acceptable protocols) to ensure species at risk habitat or rare ecological areas are not disrupted.			CITY Plan. / HCA WP&E	HNC / MNR	OMAFRA Best Management Practices Series – Farm Forestry and Habitat Management
		Continue to implement the City of Hamilton Naturalization Pilot project in local parks.			CITY Op.	HCA / HNC	OMAFRA Best Management Practices Series – Fish and Wildlife Habitat Management
		Determine the potential for ecosystem restoration on cemetery grounds/memorial gardens i.e. prairie/meadow habitat			CITY Op.	EH / HCA / HNC	City of Hamilton Vision 2020
		Develop How Much Habitat is Enough habitat targets for each subwatershed.			HCA WP&E	CITY / CC / DFO / HNC / MNR	Growth Related Integrated Development Strategy (GRIDS)
	Investigate the suitability of stormwater management ponds for wildlife habitat, i.e. basking logs, nesting sites, etc.			HCA WP&E	CITY / DFO / EH / MNR	Urban Hamilton Official Plan	
	Map fisheries information throughout each subwatershed to identify areas at risk and prioritize areas for remediation.			HCA WP&E	CITY / DFO / EH / MNR	State of the Watershed	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Protect and enhance natural corridors through parks and public lands by ensuring that naturalization and habitat creation are incorporated into master planning.		CITY Plan. / HCA Lands / HCA WP&E	BTC / HNC / MNR	Report 1997 Red Hill Creek Watershed Action Plan First Generation Plan 1998
		Strengthen the City of Hamilton Forest Conservation By-law to be more similar to a private tree by-law (that applies to single/small numbers of trees as well as woodlots) – Ex. Private tree by-laws for Ancaster and portions of Dundas and Stoney Creek.		CITY Plan.	HCA / MMAH / MNR	Red Hill Creek Watershed Action Plan Compendium of Actions (1998) Red Hill Valley Project Ecosystem Restoration Program
		Continue to work with the aggregate industry when planning new/expanded pit and quarry operations to minimize impacts on the adjacent natural features.		HCA WP&E	CITY / MNR	Davis Creek Subwatershed Study
			Implement the recommendations outlined in the City of Hamilton Urban Official Plan and Nature Counts 2 Project Hamilton Natural Areas Inventory relating to preserving and enhancing natural heritage systems.	CITY Op. / HCA Lands / HCA WP&E	BTC / HNC / MNR	June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan
			Manage public lands, identified in the Stewardship Action Plans as 'public lands having natural features', for wildlife habitat, including planting native species and managing for invasive species.	CITY Op. / HCA Lands	BTC / HNC / MNR	Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
			Work to acquire lands that enhance and further the continuity of the natural heritage system through the City of Hamilton Natural Areas Acquisition Fund, Hamilton Conservation Authority Land Acquisition Strategy and Head of the Lake Land Trust (Hamilton Naturalists Club).	CITY Plan. / HCA Lands / HNC	BTC / MNR / MMAH	
			Work to maintain existing and improve habitat cover toward meeting the subwatershed and watershed habitat targets as outlined in the How Much Habitat is Enough guidelines as well as the City of Hamilton Official Plan targets for forest cover. The targets identified in the City's Official Plan are based on Environment Canada's 2004 Framework for Guiding Habitat Restoration in Great Lakes Areas of Concern.	CITY Plan. / HCA WP&E	HNC / MNR	
			Work to maintain prairie and meadow habitat for ground nesting and pollinator species.	CITY Plan. / HCA WP&E	HNC / MNR	
			Work with landowners to build and install bird, bat and waterfowl nest boxes, where suitable.	HCA WP&E	CITY / HNC / MNR	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
			Work with landowners to undertake habitat creation and enhancement projects which enhance core habitat by infilling areas within or linking existing forested areas, where forested habitat is suitable.	HCA WP&E	FSRT / MNR	
			Work with the aggregate industry to restore decommissioned pits and quarries into natural habitat through the Management of Abandoned Aggregate Properties Program.	CITY Plan. / HCA WP&E	MNR	
			Work with the school boards to implement the School Grounds Naturally program to create habitat restoration (meadow, prairie forest, etc.) demonstration sites on school grounds.	HCA WP&E	CITY / HNC / HWCDSB / HWDSB	
			Work with utility companies to implement integrated vegetation management practices along utility corridors.	CITY Plan. / HCA WP&E	HNC / MNR	
<b>Increased Impervious Surfacing</b> <b>Map Code: IS</b>  <b>Definition: The decreased potential for rainwater infiltration into the soil as a result of increased paved/impermeable surfacing.</b>	Create demonstration sites that highlight development related BMP's and Low Impact Development technologies; e.g. permeable pavement, green roofs, rain gardens, on-site wastewater treatment, etc.			CITY Plan. / HCA WP&E	GV / HHHBA	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-4 and ULM-2
	Host training sessions for HCA and City staff, members of the development industry and consultants to promote the incorporation of development related BMP's into planning applications; e.g. permeable pavement, green roofs, rain gardens, on-site wastewater treatment, etc.			CITY Plan. / HCA WP&E	GV / HHHBA / RAP / MMAH	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
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote the Green Venture de-paving project at St. Augustine School as a demonstration site for impervious surfacing remediation.			GV	BARC / CITY / HCA / RAP / HWCDSB	Dundas Valley 50 Year Vision  Cootes to Escarpment Park System – A Conservation and Land Management Strategy
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote the implementation of development related BMP's and Low Impact Development technologies when undertaking home renovations.			GV	CITY / HCA / HHHBA / RAP	Towards Full Cost Recovery: Best Practices in Cost Recovery for Municipal Water and Wastewater Services  Growth Related Integrated
		Investigate the potential to implement a stormwater credit and rebate program (i.e. City of Kitchener Stormwater Credit Program) for impervious surfaces to offset the cost of stormwater infrastructure and to compensate rehabilitation efforts associated with stormwater infrastructure.			CITY Plan.	HCA / HHHBA / RAP

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Undertake a GIS analysis to determine the percentage of impervious surface per land use type in each subwatershed to better understand sources of impervious surfaces to facilitate better distribution of land use types when planning for future land use.		CITY Plan.	HCA / RAP	Development Strategy (GRIDS) Urban Hamilton Official Plan
			Reduce stormwater runoff and enhance groundwater recharge by requiring as condition for development application approval, the inclusion of measures that will capture and enhance the infiltration of stormwater runoff; Maximize infiltration by ensuring that pervious areas remaining are supported by suitable geologic conditions, as determined through subwatershed studies.	CITY Dev. Eng. / HCA WP&E	HHHBA	State of the Watershed Report 1997 Red Hill Creek Watershed Action Plan First Generation Plan 1998 Red Hill Creek Watershed Action Plan Compendium of Actions (1998) Davis Creek Subwatershed Study June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
<b>Insufficient Riparian Buffer</b> <b>Map Code: RB</b>  <b>Definition:</b> <b>Disruption of large continuous tracts of habitat along watercourses.</b>	Conduct direct mailings to property owners identified through the 2009 GIS analysis, as having insufficient riparian buffers, promoting funding and technical assistance available for establishing riparian buffers.			HCA WP&E	CITY / OSCIA	
	Create riparian buffer demonstration sites in high traffic locations. i.e. golf courses, municipal parks, schools, etc.			CITY Op. / HCA Lands	BARC / GV / HWCDSB / HWDSC	
	Notify local residents of intent to naturalize/establish riparian buffers along watercourses on public lands (i.e. parks) prior to naturalization commencing, explaining the purpose of riparian buffers.			CITY Op. / HCA Comm. / HCA Lands	BARC / EH / GV	
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			HCA WP&E	CITY / OMAFRA / OSCIA	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy streams and the establishment of larger riparian buffers.			HCA WP&E	CITY / OMAFRA / OSCIA	
			Work with landowners to naturalize and plant riparian buffers along reaches of watercourses identified in the 2009 riparian analysis as not having a buffer that meets the How Much Habitat is Enough guideline of 30m riparian buffer width.	HCA WP&E	BARC / CITY / FSRT / GV / OSCIA	
<b>Intensive Uses</b> <b>Map Code: IU</b>  <b>Definition: Activities occurring in natural areas which degrade the natural features of the area.</b>	Add "tread lightly" messaging to partner recreation oriented websites.			CITY Op. / HCA Op.	BTC / HNC	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations FW-8, PAA-1, PAA-2 and PAA-3
	Encourage the formation and activities of "Friends of" groups aimed at protecting and rehabilitating natural features.			CITY Op. / HCA Op. / HCA WP&E	BARC / BTC / EH / FOTEK / FSRT / GV	The Conservation Lands of Ontario – Three Year Business Plan
	Erect interpretive signage explaining the environmental significance of natural areas and promoting user "etiquette" for the area.			CITY L.A.S. / HCA Lands	BTC / HNC	A Joint Outdoor Tourism Marketing Strategy
	Help local residents to value green space by developing a recurring column in a local newspaper which highlights significant natural features in the community, their importance and what local residents can do to assist with their care and maintenance.			HCA Comm. / HNC	CITY / EH	Niagara Escarpment Access Enhancement Plan
	Install deterrent mechanisms along trails and in off trail areas known to be degraded by trespassing, such as no trespassing signage.			CITY Op. / HCA Lands	BTC / HNC	Dundas Valley 50 Year Vision Strategy
	Offer guided hikes with resource interpreters to educate the local residents on the environmental significance of natural areas in their communities. Include messaging for stewardship of the natural areas. Develop different hikes designed for children and adults.			HCA Comm.	FOTEK / IBTC / HNC	Cootes to Escarpment Conservation & Land Management Strategy
	Promote the City of Hamilton Adopt-a-Park and Neighbourhood Clean Team Programs.			CITY Op.	BARC / HCA	Urban Hamilton Official Plan
	Work with special interest groups to steward natural areas, tailoring activities to each group's interests i.e. Mountain Biking groups to design and maintain sustainable trails. Maintain regular/semi-regular contact with each group.			CITY Op. / HCA Lands / HCA Op.	FOTEK / IBTC	Red Hill Creek Watershed Action Plan First Generation Plan 1998
	Develop marketing strategies for sensitive lands that focus on sustainable use.			CITY L.A.S. / HCA Op.	BTC / HNC	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study  June 2010 Final Hannon

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Monitor Category A and B waterfalls on public lands for signs of intensive use.		CITY L.A.S. / HCA Lands	BTC	Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan
		Refer to the Niagara Escarpment Access Enhancement Plan and Niagara Escarpment Parks and Open Space System Planning Manual to design infrastructure for high traffic areas to guide users along approved trails.		CITY L.A.S. / HCA Lands	BTC	Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
		When undertaking master planning exercises, refer to the Ontario Trails Guidelines and Best Practices for the Design, Construction and Maintenance of Sustainable Trails.		CITY L.A.S. / HCA Lands	BTC	
			Host annual clean up days for natural areas identified as having excessive amounts of litter.	CITY Op. / HCA Op.	BARC / IBTC / GV	
			Rotationally restrict access to degraded areas to allow for the regeneration of vegetation.	CITY Op. / HCA Op.	IBTC	
			Utilize enforcement scheme, including increased patrols, signage and fines, to deter dumping garbage, campfires, tree cutting, etc. in natural areas on public lands.	CITY Op. / HCA Op.	BTC / IBTC / FOTEK	
			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. / HCA Op.	BTC / IBTC	
<b>Invasive/Introduced Species</b> <b>Map Code: IV</b>  <b>Definition: The establishment / proliferation of exotic species that have no natural control measures which compete with native species for resources and degrade the ecosystem.</b>	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.			CITY Plan. / HCA WP&E	HNC / MNR / OIPC	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation FW-5
	Host training sessions on the identification and management of invasive species as well as landscaping with native species for the landscaping industry through Landscape Ontario; include information about the spread of invasive species by contractor vehicles.			CITY Plan. / HCA WP&E	HNC / MNR / OIPC	Action Plan for Addressing Terrestrial Invasive Species within the Great Lakes Basin  HCA Planning and Regulation Policies and Guidelines Pages 53-56, 70-71
	Host workshops for landowners adjacent to natural areas to provide training on how to identify and manage invasive species, as well as alternatives to invasive species for planting.			CITY Op. / HCA WP&E	HNC / MNR / OIPC	Invasive Alien Plant Species Found in the Carolinian Zone – Inventory and Management Options for rare Charitable



## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media, community events, demonstration signage & direct landowner contact to create awareness regarding the importance of controlling invasive species and planting native species.			CITY Op. / HCA Comm.	HNC / MNR / OIPC	Research Reserve Mistaken Identity – Invasive Plants and their native look-alikes. City of Hamilton Natural Heritage Strategy
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media, community events, demonstration signage & direct landowner contact to provide education about invasive insects i.e. Emerald Ash Borer. Include information on how to identify the insects and indicators of specific species presence. Also include contact information for agencies for reporting observations.			CITY Op. / HCA WP&E	HNC / MNR	Dundas Valley 50 Year Vision Cootes to Escarpment Park System – A Conservation and Land Management Strategy City of Hamilton Vision 2020
	Work with nurseries to deliver the Grow Me Instead program, highlighting native species alternatives for commonly used non-native ornamental species.			CITY Op. / HCA WP&E	HNC / MNR / OIPC	Urban Hamilton Official Plan State of the Watershed Report 1997
		Continue to review development application landscape plans against the most up to date landscape plan guidelines to ensure that no invasive plants are included on properties near or adjacent to natural areas.		CITY Plan. / HCA WP&E	HHHBA / MNR / OIPC	Red Hill Creek Watershed Action Plan First Generation Plan 1998
		Contribute local data to the Early Detection and Distribution Mapping System for Invasive Species in Ontario as adapted by the Ontario Ministry of Natural Resources, Canada-Ontario Invasive Species Centre and OFAH/MNR Invading Species Awareness Program.		CITY Plan. / HCA WP&E	MNR / OIPC	Red Hill Creek Watershed Action Plan Compendium of Actions (1998) Red Hill Valley Project Ecosystem Restoration Program
		Develop a volunteer program to map invasive species on public lands; include the use of smart phones for georeferencing and/or photographing the invasive species.		CITY Plan. / HCA WP&E	MNR / OIPC	Davis Creek Subwatershed Study
		Develop an 'Adopt a' program for managing invasive species hot spots or add invasive species management to the City of Hamilton Adopt-a-Park Program.		CITY Op. / HCA WP&E	MNR / OIPC	June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan
		Develop an Invasive Species Management Program which includes monitoring sites and management for specific species; include a prioritization scheme for the management of invasive species on public lands.		CITY Op. / HCA WP&E	HNC / MNR / OIPC	Mewburn and Sheldon Neighbourhoods Master

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Implement the recommendations in the City of Hamilton Urban Official Plan and Nature Counts 2 Project Hamilton Natural Areas Inventory relating to preserving and enhancing biodiversity.		CITY Op. / HCA WP&E	MNR / OIPC	Servicing Plan Class EA
		Review the City of Hamilton Street Tree Planting Program Available Species List to ensure that suitable species are incorporated into the natural heritage system; recommend native, non-invasive alternatives.		CITY Op.	HCA MNR / OIPC	
		Revise the City of Hamilton Litter, Yard Waste and Property Maintenance by-law No. 10-118 to include language regarding the prevention of the introduction of invasive species onto private properties.		CITY Op.	HCA / HNC	
			Manage public lands for wildlife habitat, including management of invasive species to preserve and enhance biodiversity.	CITY Op. / HCA WP&E	BTC / FOTEK / IBTC / HNC / MNR / OIPC	
			Work with community volunteers to undertake stewardship events to manage invasive species on private and public lands.	CITY Op. / HCA WP&E	BTC / FOTEK / IBTC / HNC / MNR / OIPC	
			Work with landowners to control invasive species and to plant native species on private lands.	HCA WP&E	CITY / GV	
<b>Land Maintenance Practices</b> <b>Map Code: LM</b>  <b>Definition: Land maintenance practices which unnecessarily degrade wildlife habitat.</b>		Continue to work with utility companies to develop low impact land maintenance practices policies to be implemented throughout utility corridors.		CITY Plan. / HCA WP&E	MNR	
		Determine suitability for incorporating the installation of alternative roadside vegetation, such as MTO roadside prairie and wildlife shrub corridors, into existing maintenance plans.		CITY Op.	HCA / MTO	
		Implement the Hydro One Integrated Land Management protocol on utility corridors that pass through HCA lands and lands regulated by HCA.		HCA Lands / HCA Op. / HCA WP&E	CITY / MNR	
		Work with the City to develop guidelines for using native plant species for revegetation projects along roadsides.		CITY Op.	HCA / MNR / MTO	
			Work to naturalize infrequently used areas of municipal parks (Adopt a Park) and Conservation Areas.	CITY Op. / HCA Lands / HCA Op.	BARC / HNC	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
			Work with the City to ensure roadside maintenance is not done in excess of access standards.	CITY Op.	HCA / MTO	
<b>Landfill Leachate</b> <b>Map Code: LL</b>  <b>Definition: Rainwater filtering down through the landfill materials with the potential to contaminate groundwater aquifers.</b>		Monitor existing surface and groundwater sampling programs to ensure that surface and groundwater contamination is not occurring as a result of landfill leachate.		CITY HW / HCA WP&E	EH / MOE / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-12  HCA Planning and Regulation Policies and Guidelines Page 60  State of the Watershed Report 1997  Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
<b>Litter</b> <b>Map Code: LI</b>  <b>Definition: The act of illegally disposing of waste into public/natural areas.</b>	Implement the 'Pack it in – Pack it out" waste disposal policy at strategic City parks and Conservation Authority lands.			CITY Op. / HCA Op.	MMAH	City of Hamilton By-law No. 10-118 Litter, Yard Waste and Property Maintenance  City of Hamilton Vision 2020  State of the Watershed Report 1997  Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
	Promote not overfilling recycling bins (i.e. crushing cans to reduce the volume of recyclables) so as to reduce the occurrence of materials falling or being blown out of bins at the roadside.			CITY Op. (Outreach)	EDHB / GV	
	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. (Outreach)	BARC / GV /	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media, community events, demonstration signage & direct landowner contact to create awareness regarding the prevention and clean-up of litter.			CITY Op. / HCA Op.	BARC / EDHB / EH / GV	
	Work to develop an Adopt a Park / "Friends of" Program for Conservation Authority lands.			HCA Lands / HCA Op.	CITY / FOTEK	
		Undertake a pilot project to determine the effectiveness and feasibility of replacing all current recycle bins with ones with lids.			CITY Op. (Outreach)	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Undertake an inventory of illegal dumping sites throughout each subwatershed. Prioritize sites for the installation of deterrent mechanisms and the implementation of the Clean City Strategy Components.		CITY Op. / HCA Op.	MMAH	
			Work to replace all current recycle bins in public areas with ones that have lids.	CITY Op. / HCA Op.	GV / MMAH	
			Work with local residents to host litter clean up events, such as the Great Canadian Shoreline Clean-Up, on public lands; including City parks and Conservation Authority lands.	CITY Op. / HCA Op.	BARC / GV	
<b>Migration Barrier</b> <b>Map Code: MB</b>  <b>Definition: Any infrastructure that precludes the passage of wildlife into upstream habitat or the upper reaches of natural corridors.</b>	Erect wildlife crossing signage where known migration corridors cross roadways and trails.			CITY Plan. / HCA WP&E	BARC / HNC / RAP / WPN	In-stream Barrier Assessment for the Hamilton Harbour AOC.
			Work to retrofit infrastructure, as appropriate, that precludes the passage of wildlife into upstream habitat or other reaches of natural corridors. Possible retrofit options include: underpasses, fish ladders, by-pass channels, etc.	CITY Plan. / HCA WP&E	FSRT / RAP	Hamilton Harbour Fisheries Management Plan State of the Watershed Report 1997  Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
<b>Nutrient Loading</b> <b>Map Code: NL</b>  <b>Definition: Excessive</b>	Create demonstration sites on public lands that highlight nutrient management BMP projects, including fertilizer free lawns, gardens and natural areas.			CITY Op. / GV / HCA WP&E	BARC / MOE / OSICA / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-9, RM-4, RM-7, WQ-1d

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
nutrients being inputted into a watercourse.	Host a training workshop for local golf course practitioners to discuss BMP's for golf course management, including Audubon Cooperative Sanctuary Program certification standards.			HCA WP&E	CITY / GV / MOE / RAP / RCGA	and ULM-2  Nutrient Management Act 2002, O. Reg 267/03
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote alternatives to lawn fertilizer to reduce phosphorous in urban areas.			GV / HCA WP&E	BARC / EH / MOE / RAP	Fisheries Act, Section 34  HCA Planning and Regulation Policies and Guidelines Page 72
		Develop a fertilizer use by-law under the Fertilizer Act, limiting the use of fertilizer for non essential purposes.		CITY Plan.	BARC / EH / HCA / MOE / RAP	Ministry of the Environment Water Management Policies and Guidelines – Provincial Water Quality Objectives Appendix A
		Develop a plan to reduce nutrient levels to meet Provincial Water Quality Objectives as determined by the land use dependent nutrient level monitoring program.		HCA WP&E	BARC / EH / MOE / RAP	OMAFRA Best Management Practices Series – Nutrient Management Planning  OMAFRA Best Management Practices Series – Manure Management
		Develop a subwatershed-based total phosphorous target for surface water 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 protection against aesthetic deterioration, to measure progress toward reaching Harbour RAP targets for total phosphorous.		HCA WP&E	BARC / EH / MOE / RAP	State of the Watershed Report 1997
		Encourage the provincial government to develop a policy to ban the use of phosphorous in fertilizer for cosmetic use.		GV	CITY / EH / HCA / MNR / MOE / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998
		Establish a nutrient level monitoring program with strategic sampling sites that are land use dependent, to identify specific sources of nutrient loading.		HCA WP&E	BARC / EH / MOE / RAP	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
		Model phosphorus loading in the subwatersheds and compare against RAP objectives		HCA WP&E	CITY / EH / MOE / RAP	Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
			Work with landowners to reduce nutrient loading by implementing agricultural and urban BMP's related to nutrient management, including fertilizer use and pet waste management.	GV / HCA WP&E	BARC / CITY / MOE / OMAFRA / OSCIA	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
<b>On-line Ponds</b> <b>Map Code: OP</b>  <b>Definition: An in-stream structure designed to impound stream flow; leads to increased in-stream temperatures downstream and is often a barrier to fish migration.</b>	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy streams and pond retrofit options.			HCA WP&E	CITY / DFO	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW-1, FW-4 and ULM-2
			Work with landowners to restore or retrofit on-line ponds.	HCA WP&E	CITY / DFO / MNR	Fisheries Act, Section 37  HCA Planning and Regulation Policies and Guidelines Page 63  In-stream Barrier Assessment for the Hamilton Harbour AOC  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
<b>Perched Culverts</b> <b>Map Code: PC</b>  <b>Definition: In-stream culverts that when improperly designed / installed, create barriers to water flow and fish migration.</b>	Host training sessions for HCA and City staff and contractors to promote the proper design and installation of culverts.			CITY Op. / HCA WP&E	DFO / MNR	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy streams and create awareness regarding the detrimental effects of perched and closed bottom culverts.			HCA WP&E	CITY / DFO / MNR	
		Undertake an inventory of perched and closed bottom culverts throughout each subwatershed. Prioritize culverts for mitigation or replacement.			CITY Op.	DFO / HCA / MNR

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
			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 WP&E	CITY / DFO / MNR	
<b>Pesticide/Herbicide Use</b> <b>Map Code: PS</b>  <b>Definition: The application of pesticides/herbicides to control perceived pests/weeds.</b>	Create demonstration sites on public lands that highlight pesticide/herbicide free lawns, gardens, natural areas, crops, etc.			CITY Op. / GV / HCA Lands	MOE	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-4, EPI-6, TSSR-6 and ULM-2  Fisheries Act, Section 34  City of Hamilton By -Law No. 07-282  Pesticides Act Ontario Regulation 63/09  OMAFRA Best Management Practices Series – integrated Pest Management  OMAFRA Best Management Practices Series – Pesticide Storage, Handling and Application
	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.			HCA WP&E	CITY / GV / MOE / RAP / RCGA	
	Promote Municipal and Provincial Pesticide By-Laws.			CITY Op. / GV	MNR / MOE	
	Promote the Ministry of the Environment 'Add It Up Program – Going Pesticide Free' Program			GV	MNR / MOE	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to create awareness regarding the detrimental effects of pesticides and herbicides and to promote alternatives to traditional methods.			GV	CITY / HCA / MOE	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote Integrated Pest Management principles, Natural Tips for Healthy Lawns and Gardens and alternative turf management techniques.			CITY Op.	GV / HCA / MOE	
				GV / HCA WP&E	CITY / MOE	
<b>Plowed Watercourse</b> <b>Map Code: PW</b>  <b>Definition: Headwater swales or small watercourses that are worked for agricultural production.</b>	Conduct a direct mailing to landowners where plowed watercourses have been identified to promote technical and financial assistance available for BMP projects related to agricultural drainage.			HCA WP&E / OSCIA	DFO	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
	Create and link to existing OMAFRA demonstration sites that highlight BMP's that promote agricultural land drainage practices; e.g. grassed waterways, Water and Sediment Control Basins, etc.			HCA WP&E / OSCIA	DFO / OMAFRA	
	Promote the Environmental Farm Plan Program and associated Cost Sharing Programs for the implementation of BMP projects.			HCA WP&E / OMAFRA / OSCIA	DFO	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote drainage related BMP's; e.g. Water and Sediment Control Basins and grassed waterways.			HCA WP&E / OMAFRA / OSCIA	DFO	Practices Series – Soil Management  Red Hill Creek Watershed Action Plan First Generation Plan 1998
			Work with landowners to install effective agricultural land drainage; e.g. grassed waterways, Water and Sediment Control Basins, etc.	HCA WP&E / OMAFRA / OSCIA	DFO	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
<b>Runoff Contamination via Transportation Corridors</b> <b>Map Code: TC</b>  <b>Definition: Contamination resulting from stormwater runoff from major arterial roadways; often associated with the application of salts for de-icing and the residual precipitate created by automobile exhaust.</b>	Host training sessions for City Staff and Contractors using the Ministry of the Environment Snow Disposal and De-icing Operations in Ontario Guidelines.			CITY Op. (Roads)	MOE / MTO / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation ULM-5b
	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. (Roads) / HCA WP&E	DFO / MOE / MTO / RAP	Fisheries Act, Section 34  City of Hamilton 2003 Road Salt Management Plan
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote the use of sidewalk salt alternatives.			CITY Op. / GV	DFO / MOE / RAP	Municipalities of Wellington County – 2005 Salt Management Plan
		Investigate using the Region of Waterloo Smart About Salt Council as a model to develop a Smart About Salt Program in Hamilton.		CITY Op. (Outreach)	GV / MOE / MTO / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998
		Support planning for alternative and sustainable transportation strategies including Light Rail Transit.		CITY Plan.	HHHBA / MTO	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
		Undertake a study to determine the most effective method of snow and ice removal and snow storage that will reduce contamination of watercourses and groundwater.			CITY Op.	DFO / MOE / MTO / RAP



## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
			Implement improved snow removal methods as recommended by the study to determine the most effective method of snow and ice removal and snow storage that will reduce contamination of watercourses and groundwater.	CITY Op.	MTO	
			Install vegetated filter strips along medians and roadsides and riparian buffers along watercourses.	CITY Op.	HCA / MTO	
<b>Sediment Loading</b> <b>Map Code: SL</b>  <b>Definition: Organic and inorganic material that is entrained by the flow of water and is deposited in a creek system.</b>	Develop educational material for local residents to understand the purpose and need for erosion and sediment control, how it relates to the community as a whole and how they can be involved in its implementation i.e. who to contact if sediment is observed coming from a property.			CITY HW / EH	DFO / HCA / HHHBA / MOE / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations EPI-6, FW9, RM-4, ULM-2, ULM-3, ULM-5 and WQ-1d
	Promote new techniques for sediment and erosion control, i.e. compost filter socks. Include information that alternatives to silt fence can be cost effective and easy to maintain.			CITY HW / HCA WP&E	HHHBA / RAP	Fisheries Act, Sections 34 and 36
	Promote the Erosion and Sediment Control Guidelines for Urban Construction, 2006.			CITY HW / HCA WP&E	DFO / EH / HHHBA / RAP	Erosion and Sediment Control Guidelines for Urban Construction
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote healthy streams and BMP's related to preventing sedimentation.			HCA WP&E	DFO / FSRT / MNR / RAP	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
		Develop a total suspended solids target based on the PWQO turbidity recommendation of between 5-50 FTU (Formazin Turbidity Units)		CITY HW / HCA WP&E	DFO / MOE / RAP	OMAFRA Best Management Practices Series – No-Till Making it Work
			Continue to monitor and enforce the proper installation and maintenance of sediment and erosion control measures on construction sites.	HCA WP&E	CITY / DFO / HHHBA MOE	Ministry of the Environment Stormwater Management Design Guidelines
			Work to achieve and maintain the total suspended solids target developed based on the PWQO turbidity recommendation of between 5-50 FTU (Formazin Turbidity Units)	HCA WP&E	CITY / DFO / MOE / RAP	State of the Watershed Report 1997
			Work to mitigate non point sediment sources identified in the 2009 Draft Identifying Non Point Sediment Sources for Priority Remediation Report completed by the Watershed Planning Network.	HCA WP&E	CITY / DFO / MOE / RAP	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
			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 WP&E	CITY / DFO / HHHBA MNR	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
			Work with landowners to reduce sediment loading by implementing BMP projects; e.g. streambank stabilization, riparian buffers, natural channel design, etc.	HCA WP&E	BARC / CITY / DFO / FSRT	
			Work with the development industry to implement the Erosion and Sediment Control Guidelines for Urban Construction, 2006.	HCA WP&E	CITY / DFO / HHHBA / MNR	
<b>Septic Systems</b> <b>Map Code: SS</b>  <b>Definition:</b> <b>Malfunctioning and unmaintained septic systems; including plugged distribution tiles, infrequent tank pumping, etc. lead to untreated sewage contaminating ground and surface water.</b>	Install interpretive signage on public lands, where septic systems are in use, that illustrate properly functioning septic systems.			CITY SPP / CITY Op. / HCA Comm. / HCA Lands	MOE / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendation WQ-d1
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote the proper maintenance of existing septic systems.			CITY SPP / HHWSP	BARC / HHSWP / MOE	City of Hamilton's Greensville Community Subwatershed Study
		Develop a financial assistance loan-based program for upgrading or replacing faulty septic systems.		CITY Plan.	HCA / HHSWP / MOE / RAP	Ontario New Home Warranty Program – A New Homeowner's Guide to Septic Systems
						State of the Watershed Report 1997
			Work with landowners to properly maintain their septic systems or upgrade or decommission faulty or unused septic systems.	CITY SPP / HHWSP	BARC / HHSWP / MOE	Davis Creek Subwatershed Study
<b>Site Clearing Prior to Development</b> <b>Map Code: SC</b>  <b>Definition: The act of removing or excavating the vegetation and</b>	Host training sessions for City staff, development industry and consultants to promote City standards and guidelines related to site preparation prior to development.			CITY Plan. / HCA WP&E	DFO / HHHBA / MNR / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM-3, ULM-4
	Promote City of Hamilton By-Law No. 03-126 Prohibiting and Regulating the Alteration of Property Grades, the Placing or Dumping of Fill, and the Removal of Topsoil.			CITY Plan.	DFO / HCA / HHHBA / MNR / RAP	HCA Planning and Regulation Policies and Guidelines

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
topsoil from a site prior to construction works.		Review City of Hamilton By-Law No. 03-126 to determine if it addresses the requested education and outreach policy of the Source Protection Plan and guidance of the MOE.		CITY SPP	MOE / HHSWP	Pages 50-62, 68-69 City of Hamilton Draft Private Tree and Woodland Conservation By-Law
		Strengthen the City of Hamilton Forest Conservation By-law to be more similar to a private tree by-law (that applies to single/small numbers of trees as well as woodlots) – Ex. Private tree by-laws for Ancaster and portions of Dundas and Stoney Creek.		CITY Plan.	HCA / HNC / MNR	City of Hamilton By -Law No. 03-126 Site Alteration By-Law Erosion and Sediment Control Guidelines for Urban Construction
			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 Plan. / HCA WP&E	DFO / HHHBA / MNR / RAP	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 Growth Related Integrated Development Strategy (GRIDS) Red Hill Creek Watershed Action Plan First Generation Plan 1998 Red Hill Creek Watershed Action Plan Compendium of Actions (1998) Davis Creek Subwatershed Study June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
<b>Storm Sewer Outfalls</b> <b>Map Code: SO</b>  <b>Definition: The point where a sewer system discharges into a watercourse.</b>	Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scouting and girl guide groups and other children's groups, to create awareness regarding stormwater input & the impacts of CSO and stormsewer outfalls on stream systems.			BARC	CITY / EH / GV / HCA / HMCDSB / HWDSB / RAP	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  State of the Watershed Report 1997  Red Hill Creek Watershed Action Plan First Generation Plan 1998  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
	Promote EcoHouse as a demonstration site for Rain Gardens.			GV	BARC / CITY / EH / HCA / HHHBA / RAP	
	Promote the City of Hamilton Public Works Stormwater Pollution Solutions for Urban and Rural Residents Outreach Program.			CITY HW	BARC / EH / GV / HCA / HHHBA / RAP	
	Promote the downspout disconnection and rain barrel programs, including demonstration sites at EcoHouse.			GV	BARC / CITY / EH / HCA / HHHBA / RAP	
	Promote the Municipal Sewer-Use By-law No. 04-150 as amended by By-Law No. 06-228.			CITY HW	BARC / EH / GV / HCA / RAP	
		Conduct water quality testing at outfalls pre and post mitigation to support mitigation measures.		CITY HW	BARC / EH / GV / HCA / MOE / RAP	
		Conduct water quality testing at storm sewer outfalls to support the study to investigate cross connections of the sanitary sewer with the storm sewer system, Sewer Use Bylaw enforcement, & restoration efforts.		CITY HW	BARC / EH / GV / HCA / MOE / RAP	
		Investigate the potential for undertaking cross connection corrections/retrofits with scheduled road improvements.		CITY HW	HCA / RAP	
		Reduce stormwater load to meet the MOE volumetric target of a 90% overflow capture rate for combined sewer systems		CITY HW	BARC / EH / GV / HCA / MOE / 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 HW / HCA / WP&E	BARC / DFO / EH / GV / MOE / RAP	
		Undertake a risk analysis of the potential for old and/or degraded sewer lines to contaminate groundwater.		CITY HW	HCA / MOE / RAP	
		Work toward achieving the final net loading targets for CSO's outlined in the RAP.		CITY HW	BARC / EH / GV / HCA /	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
					MOE / RAP	
		Work with Green Venture to develop the RAIN Stormwater Mitigation Program.		GV	BARC / CITY / EH / HCA / HHHBA / RAP	
			Continue to implement the Catch the Rain Rain Barrel and Downspout Disconnection Program to assist with installing rain barrels and disconnecting downspouts.	CITY HW / GV	BARC / EH / HCA / RAP	
			Continue to rehabilitate eroded or undermined stormsewer outfalls to incorporate erosion control measures such as plunge pools, rip rap, tree planting, etc.	CITY HW	DFO / HCA / RAP	
			During re-development incorporate bottom or post treatment train options at existing outfalls for natural infiltration; i.e. lot level, vegetated swales, etc.	CITY HW / HCA WP&E	HHHBA / MOE / RAP	
			Work to implement the recommendations in the 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 HW / HCA WP&E	BARC / DFO / EH / GV / MOE / RAP	
			Work with landowners to establish riparian buffers and/or erosion protection downstream of storm sewer outfalls; e.g. plunge pools, rip rap, tree planting, etc.	HCA WP&E	BARC / CITY / DFO / FSRT / GV	
<b>Stormwater</b> <b>Map Code: SW</b>  <b>Definition: Water that flows overland from rainfall during or after a storm event or as a result of snowmelt</b>	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 and stormsewer outfalls on stream systems.			BARC	CITY / EH / GV / HCA / HMCDSB / HWDSB / RAP	Hamilton Harbour Remedial Action Plan Stage 2 Update: Recommendations ULM -6, ULM-9, ULM-11 and ULM-14
	Promote City of Hamilton and Green Venture Programs to prevent the overloading of stormwater infrastructure; including the Wise Water Use Program, Protective Plumbing Program, Rates and Leaks Detection Program and High Household Water Consumption Program.			CITY HW / GV	BARC / EH / HCA / RAP	HCA Planning and Regulation Policies and Guidelines Pages 74-77  Fisheries Act, Section 34
	Promote the use of constructed wetland technology and Low Impact Development technology in the design of stormwater management facilities.			CITY HW / HCA WP&E	DFO / HHHBA / MOE / RAP	City of Hamilton Stormwater Master Plan Class Environmental Assessment Report Pages 38-44, 93-97, 122-125, 158-162
	Support Sewer-Use Bylaw enforcement (By-law No. 04-150 as amended by By-Law No. 06-228).			CITY HW	BARC / DFO / EH / GV / HCA / MOE / RAP	Towards Full Cost Recovery: Best Practices in Cost

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Utilize stormwater management ponds along recreation trails as demonstration sites to educate the public about stormwater contamination of local waterbodies and negative impacts to wildlife. Include information on sources of contaminants.			CITY HW / GV	BARC / EH / HCA / RAP	Recovery for Municipal Water and Wastewater Services
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to educate the public about Hamilton's sanitary and storm sewer system; i.e. how it functions, where their water goes, etc.			CITY HW / GV	BARC / EH / HCA / RAP	Growth Related Integrated Development Strategy (GRIDS)
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to educate the public on the impacts of climate change as well as adaptation and mitigation measures to be implemented.			CITY HW / HCA WP&E	BARC / EH / GV / RAP	State of the Watershed Report 1997
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote stormwater management BMP's including: disconnected downspouts, roof gardens, rain barrels, biofilters, permeable pavement, rain gardens, etc.			CITY HW / GV	BARC / EH / HCA / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998
		Adapt the Slow it. Spread It Sink It. A Homeowner's Guide to Using Rain as a Resource for Hamilton residents.		CITY HW / HCA WP&E	BARC / EH / GV / HHHBA / MOE / RAP	Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
		Automate the decision making process for operators for combined sewer overflow events.		CITY HW	MOE / RAP	Davis Creek Subwatershed Study
		Conduct water quality testing at CSO outfalls pre and post mitigation to support mitigation measures.		CITY HW	BARC / EH / GV / HCA / MOE / RAP	June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan
		Determine the suitability of Limeridge Mall as a green building demonstration site, including lot level stormwater management features, permeable paving, green roofs, upgraded infrastructure, grey water system, etc.		CITY HW / HCA WP&E	BARC / EH / GV / HHHBA / MOE / RAP	Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
		Develop a system to ensure sufficient capital and operating funds to install and maintain stormwater management infrastructure.		CITY HW	MMAH / RAP	
		Evaluate opportunities for implementing full cost recovery and life cycle asset management for water and wastewater services.		CITY HW	MMAH / RAP	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
		Offer financial incentives and/or grant programs to replace driveways and decks with permeable pavement, interlocking brick, etc.		CITY HW	BARC / EH / GV / HHHBA / MOE / RAP	
		Outline the operational requirements for existing stormwater management infrastructure.		CITY HW	HCA / HHHBA / EH / MOE / RAP	
		Undertake a study to determine the percentage of landowners with connected downspouts.		CITY HW / GV	MAC	
		Undertake water quality monitoring in stormwater management ponds.		CITY HW	EH / HCA / MAC	
		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.		CITY Plan. / HCA WP&E	BARC / GV / HHHBA	
		Work with insurance companies to develop a cost-sharing grant program to support the implementation of lot level stormwater controls on private properties. i.e. retrofit impervious surfaces, install rain gardens, etc.		CITY Dev. Eng. / HCA WP&E	BARC / GV / HHHBA	
		Revise stormwater management policy to include Low Impact Development as a component of the treatment train approach to stormwater management.		CITY Dev. Eng. / HCA WP&E	DFO / MNR / MOE / RAP	
		Undertake an inventory of oil and grit separators installed within the each subwatershed implement an awareness program to ensure that they are maintained regularly and working as designed.		CITY HW	HCA	
			Implement recommendations from the City of Hamilton Stormwater Master Plan.	CITY HW	BARC / GV / HCA / HHHBA / RAP	
			Implement the City of Hamilton Low Impact Development Policy for Industrial Lands when completed.	CITY Dev. Eng.	BARC / GV / HCA / HHHBA / RAP	
			Retrofit existing dry stormwater management ponds to wet ponds where beneficial to water quality, aquatic habitat and erosion control.	CITY HW	HCA / RAP	
			Retrofit outlet structures to decrease the velocity of stormwater as it flows into the creek system.	CITY HW	GV / HCA	
			Work to ensure adequate stormwater management in in-fill developments.	CITY Dev. Eng.	HCA / HHHBA / RAP	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
			Work to ensure adequate stormwater management in new developments in headwaters areas, including: over controlling, planning and advanced design of LID, SWM ponds that maintain and control water within subdivision footprint, treatment devices i.e. oil and grit separators, and maintenance.	CITY Dev. Eng.	HCA / HHHBA / RAP	
			Work with landowners to install lot level stormwater controls i.e. disconnect downspouts, retrofit impervious surfaces, install rain barrels and rain gardens, etc.	CITY HW / GV	BARC / HCA	
<b>Transportation Corridor Expansion</b> <b>Map Code: TE</b>  <b>Definition: The process by which new roads are built or existing roads are widened.</b>	Host training sessions for City staff, 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.			CITY HW	HCA / HHHBA / MNR / MTO	HCA Planning and Regulation Policies and Guidelines Pages 50-62, 68-69
		When planning for major road works, design transportation corridors using new technologies for environmental solutions.		CITY HW	HCA / HHHBA / MNR / MTO	Ontario Provincial Standards for Roads and Public Works
			When repairing roads, utilize new technologies for road maintenance that are proven to have environmental benefits.	CITY Op.	HCA / HHHBA / MNR / MTO	Erosion and Sediment Control Guidelines for Urban Construction  Growth Related Integrated Development Strategy (GRIDS)  Urban Hamilton Official Plan  State of the Watershed Report 1997  Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)  Davis Creek Subwatershed Study  June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon



## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
						Neighbourhoods Master Servicing Plan Class EA
<b>Urban Creek System</b> <b>Map Code: UC</b>  <b>Definition: A creek system within an urbanized environment which may be altered or impacted by the surrounding land use.</b>	Engage local residents in Stream of Dreams and Adopt a Creek programs along reaches of creek that pass through new and existing residential developments (i.e. creek blocks).			BARC	CITY / EH / GV / HCA / RAP	State of the Watershed Report 1997
		Develop a pilot information package for one street or part of a neighbourhood related to the health of a local watercourse. Aim for one or two neighbourhood champions to promote 'big picture' ideas about preserving and maintaining the natural environment for the community.		HCA WP&E	BARC / CITY / EH / GV / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)
			Enhance urban creeks through the restoration of creek buffers, establishing native vegetation, naturalizing eroded areas, installing habitat features, removing invasive species, etc. i.e. Upper Davis Creek through Valley Park.	HCA WP&E	BARC / CITY / GV	Davis Creek Subwatershed Study
			Undertake riparian and in-stream rehabilitation works on reaches of creek in urban areas to enhance/improve hydrologic function and aquatic habitat.	CITY HW / HCA WP&E	BARC / GV	June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan  Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
<b>Utility Pipeline</b> <b>Map Code: UP</b>  <b>Definition: Oil and gas conveyance systems.</b>		Continue to work with individual utility companies to review emergency protocols for identification of issues, reporting protocols and emergency contacts.		CITY Plan. / HCA WP&E	MOE	
		Develop an HCA emergency protocol for identification of issues, reporting protocols and emergency contacts.		HCA WP&E	CITY / MOE	
<b>Water Quality</b> <b>Map Code: WQ</b>  <b>Definition: Maintenance of water resources at an appropriate quality for its identified use.</b>	Install signage indicating that water in watercourses may be contaminated; include a phone number or hotline to report concerns on the signage.			CITY Op.	EH / MOE / RAP	State of the Watershed Report 1997
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to educate the public about the impacts of pharmaceuticals on wildlife and promote free disposal programs at pharmacies and municipal transfer stations.			CITY HW	DFO / HCA / MAC / RAP	Red Hill Creek Watershed Action Plan First Generation Plan 1998  Red Hill Creek Watershed Action Plan Compendium of Actions (1998)

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote driveway sealer alternatives that do not contain coal tar.			EH	CITY / DFO / HCA / MAC / RAP	Davis Creek Subwatershed Study
		Consider adapting the Conservation Halton Fisheries Index of Biotic Integrity for HCA to measure the health of the local fishery.		HCA WP&E	DFO / MAC / MNR / RAP	June 2010 Final Hannon Creek Subwatershed – North Glanbrook Industrial Business Park Master Drainage Plan
		Determine if pharmaceuticals as a result of cross connections or dumping are currently being investigated through the Environment Canada Pharmaceuticals and Personal Care Products Surveillance Network.		CITY HW	DFO / HCA / MAC / RAP	Mewburn and Sheldon Neighbourhoods Master Servicing Plan Class EA
		Determine the impacts of pools & drainage of chlorinated and salt water on local watercourses and aquatic wildlife.		CITY HW / HCA WP&E	DFO / MAC / MOE / MNR / RAP	
		Investigate the impacts of water quality in stormwater management ponds on wildlife to determine if ponds are suitable habitat and to provide management recommendations based on findings.		CITY HW / HCA WP&E	DFO / EC / MAC / MOE / MNR / RAP	
		Link water quality monitoring to fishery health to determine the cause of, and prevent future fish kills.		CITY HW / HCA WP&E	DFO / MAC / MOE / MNR / RAP	
		Prioritize sewersheds for retrofit of cross connections.		CITY HW	DFO / HCA / MAC / MOE / RAP	
		Assess the monitoring network for various programs including: surface water and groundwater quality and quantity for PWQMN, PGMN, Ontario Low Water Response Program and local programs; weather and longer term climate data to understand deficiencies and plan for improvement.		HCA Eng. / CITY HW	MOE / MNR / MAC	
			Maintain and enhance stormwater management ponds as identified and prioritized in the City of Hamilton Inventory of stormwater management ponds.	CITY HW	DFO / HCA / MAC / MOE / RAP	
			Work to maintain existing water quality and improve water quality toward improving benthic communities, as determined using the Hilsenhoff Index of Biotic Integrity.	CITY HW / HCA WP&E	BARC / DFO / GV / MAC / MOE / MNR / RAP	
			Work to maintain existing water quality and improve water quality toward improving the health of the overall fishery, as determined using the Conservation Halton Fisheries Index of Biotic Integrity.	CITY HW / HCA WP&E	BARC / DFO / GV / MAC / MOE / MNR / RAP	

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS	
			Work to maintain or improve groundwater quality to meet the Ontario Drinking Water Quality Standards and the Provincial Water Quality Objective for total phosphorous.	CITY HW / HCA WP&E	BARC / DFO / GV / MAC / MOE / MNR / RAP		
			Work to maintain existing water quality and improve water quality toward meeting the Provincial Water Quality Objectives as determined for the Provincial Water Quality Monitoring Program.	CITY HW / HCA WP&E	BARC / DFO / GV / MAC / MOE / MNR / RAP		
<b>Water Use</b> <b>Map Code: WU</b>  <b>Definition: The extraction, use and disposal of surface and groundwater.</b>	Encourage landowners with water taking needs to establish an Irrigation Advisory Committee to schedule takings alternately.			HCA WP&E	GV / HHSWP / MOE / MNR / OMAFRA / OSCIA	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	
	Encourage landowners with water taking permits to implement water conservation measures/infrastructure.			HCA WP&E	GV / HHSWP / MOE / MNR / 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 WP&E		GV / HHSWP / MOE / MNR / OMAFRA / OSCIA
	Promote City of Hamilton and Green Venture Programs for water conservation; including the Wise Water Use Program, Protective Plumbing Program, Rates and Leaks Detection Program and High Household Water Consumption Program.				CITY HW / GV		BARC / HCA / HHSWP / MOE / MNR / RAP
	Promote the Ministry of Natural Resources Low Water Response Program.				HCA WP&E / MNR		GV / HHSWP / MOE / OMAFRA / OSCIA
	Promote the use of greywater systems i.e. for lawn care rather than treated/potable water.				CITY HW / GV		BARC / HCA / HHSWP / MOE / MNR / RAP

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote decreasing water use in combined sewer areas resulting in less wastewater to be treated at the Woodward Treatment Plant and therefore less cost for treatment and greater available capacity to reduce the potential for emergency by-passes. Also include messaging explaining reasons for rate increases despite usage decreases.			CITY HW / GV	BARC / HCA / HHSWP / MOE / MNR / RAP	
	Utilize workshops, information sessions, literature, websites, public service announcements, interpretive signage, social media & direct landowner contact to promote water conservation programs and techniques.			CITY HW / GV	BARC / HCA / HHSWP / MOE / MNR / RAP	
		Develop a low flow toilet rebate program. Include a return system for existing toilets to be recycled (crushed to make "poticrete" an aggregate mix containing 20 percent toilets that can be used in sidewalk construction).		CITY HW / GV	BARC / HCA / HHSWP / MOE / MNR / RAP	
		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 WP&E	DFO / HHSWP / MNR / MOE / OMARFRA / OSCIA	
		Investigate the use of block rates for water services.		CITY HW	HCA / HHSWP / MMAH / RAP	
		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 WP&E	HHSWP / MOE / MNR	
			Work with landowners to implement water conservation techniques.	CITY HW / GV / HCA WP&E	BARC / HHSWP / MOE / OMAFRA / OSCIA	
			Work with landowners who have groundwater taking systems to decommission unused wells in accordance with the Ontario Water Resources Act.	CITY HW / HCA WP&E	HHSWP / MOE / OSCIA	
<b>Wildlife Collisions Map Code: WC</b>	Erect additional wildlife caution signage that is species specific, along roadways at known points of frequent collisions.			CITY Op. (Roads)	HCA / HNC / MNR / MTO	British Columbia Wildlife Collision Prevention Program Report

## STRESSES AND STEWARDSHIP ACTIONS

STRESSES	AWARENESS OPPORTUNITIES	SPECIAL PROJECT OPPORTUNITIES	RESTORATION OPPORTUNITIES	LEAD AGENCY	PARTNER AGENCIES	RELATED DOCUMENTS
<b>Definition:</b> <b>Incidences where animals are struck by vehicles or where animals collide with buildings, often occurring with buildings with large windows.</b>	Utilize literature, websites, public service announcements, interpretive signage & direct landowner contact to create awareness regarding managing human-wildlife conflicts.			CITY Op. (Roads) / HCA Comm. / HCA WP&E	HNC / MNR / MTO	City of Ottawa Wildlife/Vehicle Collision Prevention Program
		Evaluate the effectiveness of the MTO roadside prairie and wildlife shrub corridor projects in preventing wildlife collisions.		CITY Op.	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 HW	HCA / HNC / MNR / MTO	
			Produce and distribute window decals for large windows of homes and high rise buildings to prevent bird collisions.	CITY Bldg. Serv. / HCA WP&E	HNC / MNR	
			Reduce the use of road salt or consider alternatives that do not attract wildlife.	CITY Op. (Roads)	MOE / MNR / MTO / RAP	

## STRESSES AND STEWARDSHIP ACTIONS

**Table UD - 27: Partner Agency Acronyms**

BARC	Bay Area Restoration Council	HCA Lands	Hamilton Conservation Authority - Land Management
BTC	Bruce Trail Conservancy	HCA Op.	Hamilton Conservation Authority - Customer Service & Operations
CC	Carolinian Canada	HHHBA	Hamilton-Halton Home Builders Association
CITY	City of Hamilton	HHSWP	Halton Hamilton Source Water Protection
CITY Bldg. Serv.	City of Hamilton - Building Services	HHWSP	Hamilton-Halton Watershed Stewardship Program
CITY Dev. Eng.	City of Hamilton - Development Engineering	HIEA	Hamilton Industrial Environmental Association
CITY HW	City of Hamilton - Hamilton Water	HNC	Hamilton Naturalists Club
CITY L.A.S.	City of Hamilton - Landscape Architectural Services	HWCDSB	Hamilton Wentworth Catholic District School Board
CITY Op.	City of Hamilton - Operations - General	HWDSB	Hamilton Wentworth District School Board
CITY Op. (Outreach)	City of Hamilton - Operations - Outreach	IBTC	Iroquoia Bruce Trail Club
CITY Op. (Roads)	City of Hamilton - Operations - Roads	MAC	McMaster University
CITY Plan.	City of Hamilton - Planning	MMAH	Ministry of Municipal Affairs and Housing
CITY SPP	City of Hamilton – Source Protection Planning	MNR	Ministry of Natural Resources
DFO	Department of Fisheries and Oceans	MOE	Ministry of the Environment
DU	Ducks Unlimited	MTO	Ministry of Transportation
EDHB	Earth Day Hamilton-Burlington	OIPC	Ontario Invasive Plant Council
EH	Environment Hamilton	OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
FOTEK	Friends of the Eramosa Karst	OSCIA	Ontario Soil and Crop Improvement Association
FSRT	Field and Stream Rescue Team	RAP	Hamilton Harbour Remedial Action Plan
GV	Green Venture	RBG	Royal Botanical Gardens
HCA	Hamilton Conservation Authority	TU	Trout Unlimited
HCA Comm.	Hamilton Conservation Authority - Communications	WPN	Watershed Planning Network
HCA WP&E	Hamilton Conservation Authority – Watershed Planning & Engineering		