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## **CHEDOKE CREEK SUBWATERSHED**

STEWARDSHIP ACTION PLAN



1958 • Celebrating 50 Years of Conservation • 2008

Endorsed by the Hamilton Conservation Authority  
Board of Directors April 3, 2008



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## **CHEDOKE CREEK SUBWATERSHED CHARACTERIZATION**

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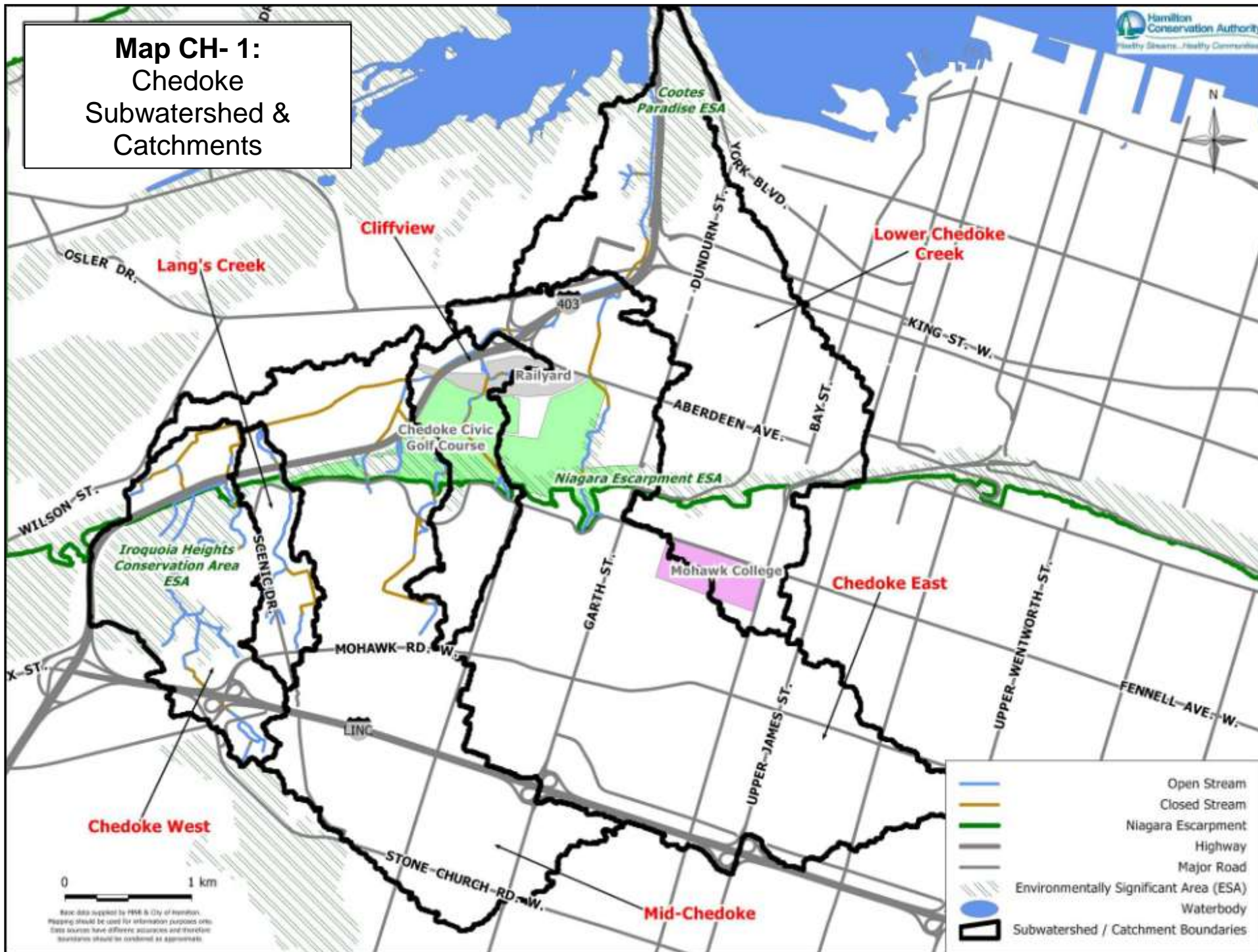
### **GEOGRAPHICAL LOCATION**

Chedoke Creek subwatershed is 25.1 km<sup>2</sup> in area and is comprised of six catchment basins. In descending order from the headwaters to the outlet these are: Chedoke West, Lang's Creek, Mid-Chedoke, Cliffview, Chedoke East, and Lower Chedoke Creek (**Map CH- 1**). This subwatershed spans the former municipal boundaries of Ancaster and Hamilton, and is also located within five City of Hamilton wards: 1, 2, 7, 8 and 12. The boundaries of this subwatershed are Stonechurch Road West in the south to Highway 403 in the west; the eastern extent ranges between Upper James Street and Upper Wentworth Street. The subwatershed originates above the Niagara Escarpment and outlets directly into the south shore of Cootes Paradise Marsh, parallel to Highway 403. Highway 403 passes through this subwatershed below the escarpment and three interchanges are present: Main Street East, Main Street West and Aberdeen Avenue. Additionally, the Lincoln M. Alexander Parkway (LINC) travels east to west above the escarpment and three interchanges are present in the subwatershed: Golf Links Road / Mohawk Road, Garth Street and Upper James Street. Major transportation routes found within this subwatershed are Bay Street, Queen Street, Dundurn Street, Upper James Street, West 5<sup>th</sup> Street, Garth Street, Upper Paradise, Scenic Drive, Main Street, King Street, Aberdeen Avenue, Fennell Avenue, Mohawk Road, and Stonechurch Road.

Chedoke Creek is the only warm water system of the three subwatersheds in this Stewardship Action Plan. The headwaters are located above the Niagara Escarpment with the only tributaries still present above the surface being located within Chedoke West,

Lang's Creek and Mid-Chedoke catchments. The headwaters of the Chedoke West catchment are piped upstream but still supply the year round flowing Chedoke Falls. All of the tributaries flow over the escarpment and then travel eastward and align parallel with Highway 403 before outletting into Cootes Paradise. Much of the Chedoke Creek subwatershed has been altered over time as a result of intense urban development within the Hamilton area; subsequently the majority of the stream flow directly results from storm water input. Therefore, erosion, sedimentation and insufficient channel sizes occur at the outlet. The following locations are where natural stream channels can be found within the subwatershed: southwest of Golf Links Road and Scenic Drive, through Iroquoia Heights Conservation Area, through Olympic Park / Hydro lands east of Scenic Drive, through Lang's Park east of Scenic Drive, Hydro lands north of Highway 403, northwest of Upper Paradise Road and Mohawk Road, through Chedoke Golf Course, west of Chedoke Avenue, and parallel to Highway 403.

The Niagara Escarpment is present within all catchments of this subwatershed. Additionally, three municipally designated Environmentally Significant Areas (ESAs) are located within this subwatershed: Iroquoia Heights Conservation Area, Hamilton Escarpment, and Cootes Paradise. These natural areas act as major ecological corridors for terrestrial species as well as serve to maintain water quality and quantity within the stream reaches that pass through these areas, to the benefit of aquatic species.



## NATURAL HISTORY & SIGNIFICANT SPECIES

In the headwaters the soil type is predominantly silt loam with a few pockets of sandy loam and silty clay loam. Upstream of Chedoke Falls, located at the escarpment brow west of Garth Street, soil types indicate that a stream corridor was historically present. It is thought that this tributary began approximately one kilometre upstream of the falls originating at a spring. Soil type below the Niagara Escarpment abruptly changes to soils that are characteristic of an urbanized landscape. It is worth noting that the soil analysis shown in **Map CH- 2** indicates a quarry to have been present at the intersection of West 5<sup>th</sup> Street and Limeridge Road.

Wetlands that existed within the Chedoke Creek subwatershed prior to the mid-1980's as well as those wetlands that are still present today are displayed within **Map CH- 3**. It is apparent that hydrological alterations have occurred within this subwatershed in order to accommodate urban development. Historically, wetlands were located above the escarpment adjacent to the stream corridor that still flows through Iroquoia Heights Conservation Area, Olympic Park / Hydro lands and Lang's Park, parallel to Scenic Drive on both the east and west sides. Wetlands historically existed within the Mid-Chedoke catchment along the stream corridor and extended to the southern boundary of Chedoke

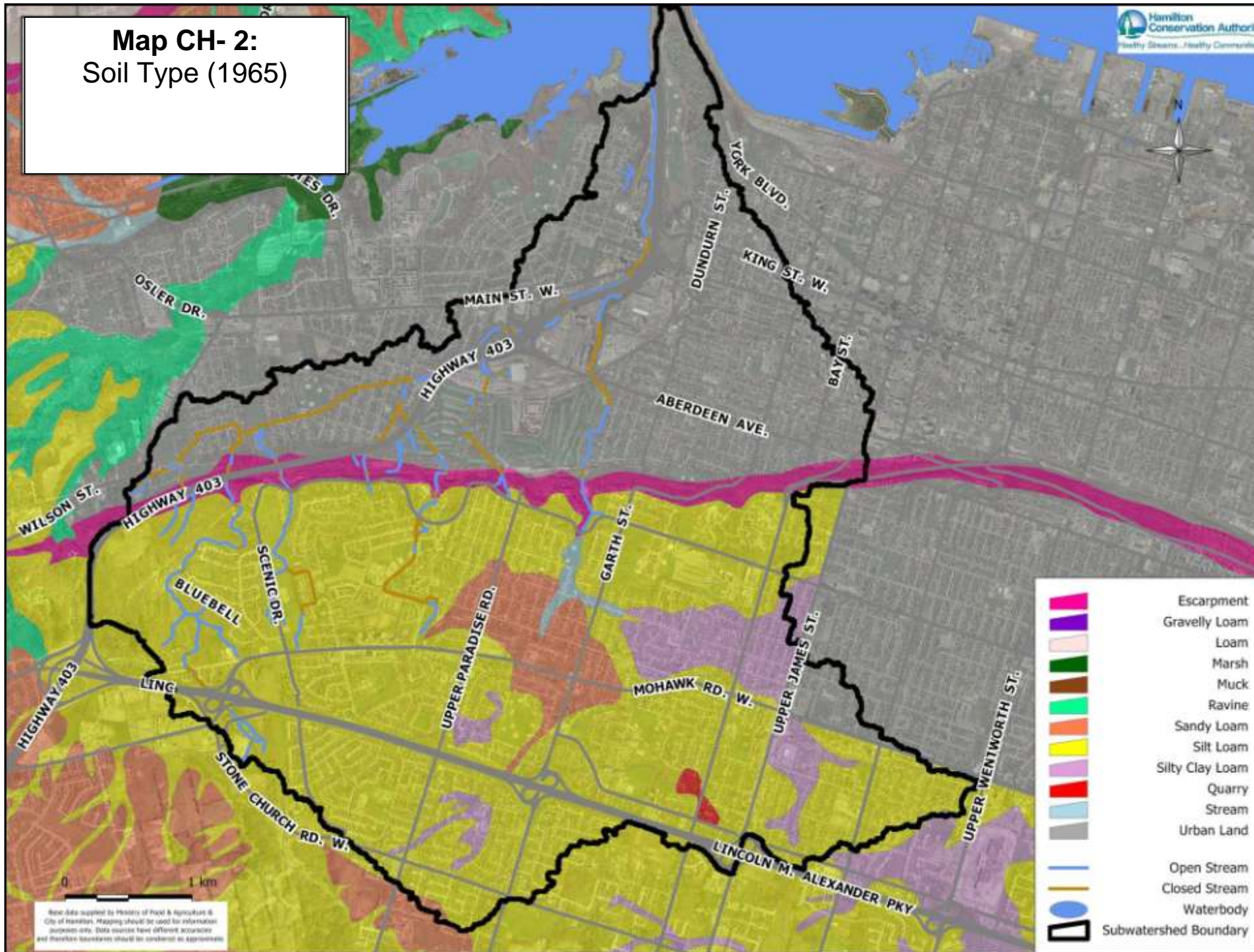
subwatershed. Also, a vast area of wetland existed east of the historical tributary that supplied Chedoke Falls. There is a very small area of wetland habitat remaining within this subwatershed; it is located below the Niagara Escarpment and along the Chedoke Ravine on the east side of the Chedoke Golf Course. This wetland area is not designated by the Ontario Ministry of Natural Resources (OMNR) as a Provincially Significant Wetland; further examination is needed to determine the type of wetland habitat that exists. Historically wetland cover made up 2.9 km<sup>2</sup>, or 11.6%, of the subwatershed area. Now only 0.006 km<sup>2</sup> of wetland area can be found in this subwatershed, which is only 0.02% of the subwatershed area. Current wetland habitat is not located on or near a historical wetland site. Therefore it can be surmised that 100% of historical wetland cover has been lost from this subwatershed.

Historical information was not recorded for forest or meadow cover, however current natural land cover statistics are noted within **Table CH- 1**. Forest cover accounts for 9.6% of this subwatershed, while meadow cover accounts for 0.8%. Based on the digital data provided for this analysis, stream length of the Chedoke Creek and all of its tributaries is 26 km.

**Table CH- 1: Natural Land Cover Statistics**

| Forest Cover (km <sup>2</sup> ) | Wetland Cover (km <sup>2</sup> ) | Meadow Cover (km <sup>2</sup> ) | Stream Length (km) |
|---------------------------------|----------------------------------|---------------------------------|--------------------|
| 2.4                             | 0.006                            | 0.2                             | 26                 |

**Map CH- 2:  
Soil Type (1965)**



Significant species found within the natural areas of this subwatershed are noted within Appendix C. The majority of these species are rare or uncommon within the City of Hamilton and where a species has been designated by the OMNR it is indicated in the appendix. The following are species that are designated by the OMNR under the Ontario Endangered Species Act and can be found within this subwatershed:

#### Endangered

- Bashful Bulrush
- Red Mulberry
- Prothonotary Warbler

#### Endangered (not regulated)

- American Chestnut
- Butternut

#### Threatened

- Blanding's Turtle
- Common Musk Turtle
- Eastern Spiny Softshell
- Hooded Warbler
- Least Bittern
- White Wood Aster
- Jefferson Salamander

#### Special Concern

- Bigmouth Buffalo
- Black Tern
- Broad Beech Fern
- Cerulean Warbler
- Monarch
- Northern Map Turtle
- Yellow-breasted Chat
- Eastern Milksnake
- Northern Ribbon Snake
- Woodland Vole

#### Not at Risk

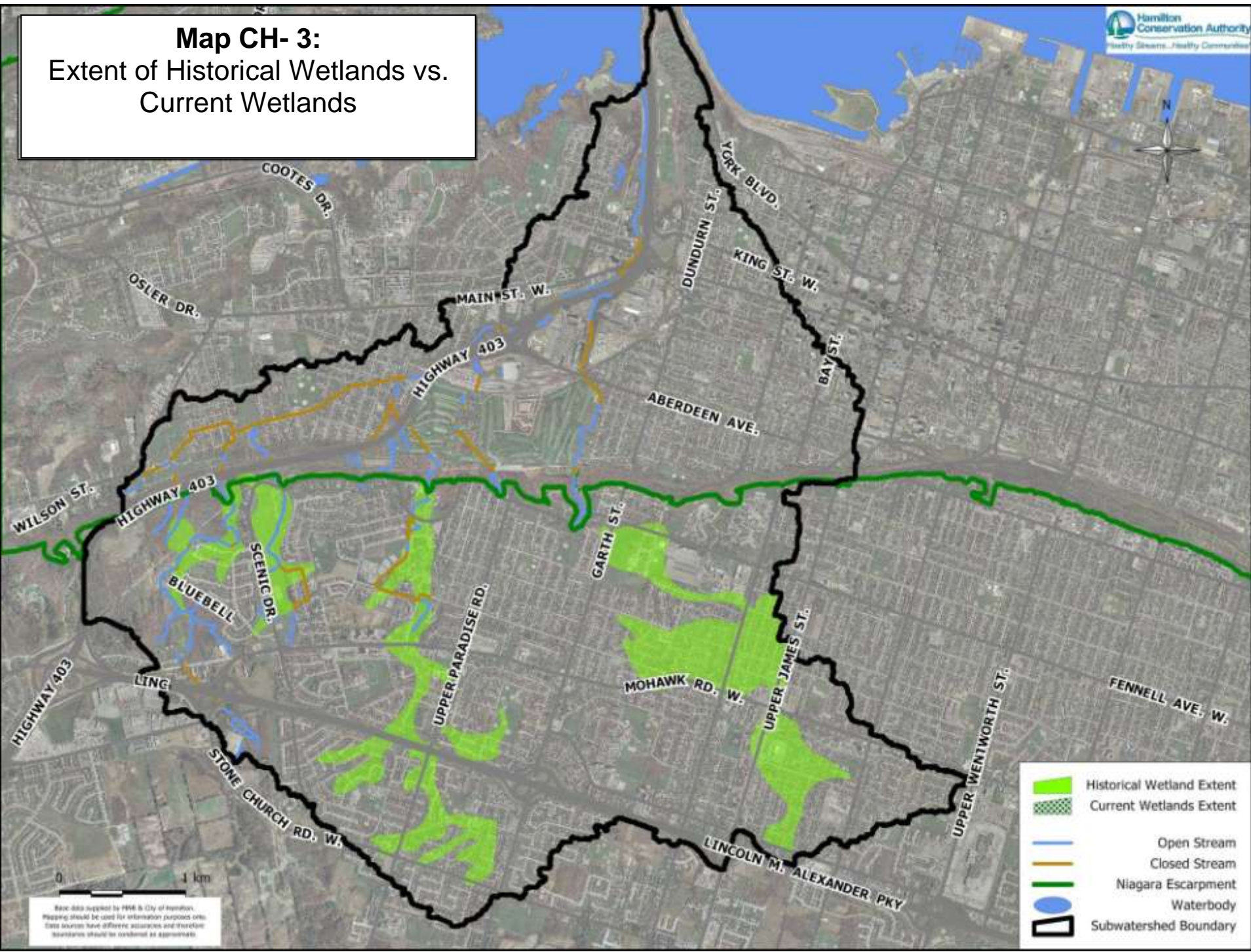
- American Coot
- Common Mudpuppy
- Cooper's Hawk
- Longear Sunfish
- Rosyface Shiner

It will be important to create awareness and undertake habitat restoration activities related to these species designated by the OMNR, especially those species that are endangered (not regulated).

Due to the erosivity of the fine silt soils found in this subwatershed, headwater wetlands must be restored to meet the How Much Habitat is Enough Guidelines in order to reduce sedimentation occurring downstream. Historical piping and channelization of this stream system only exacerbate the sedimentation problem occurring in Cootes Paradise. Historical wetland restoration may be achieved through the approval of development applications and resultant compensation projects for the proposed development located along existing stream reaches and on public lands. Alternatively, wetland creation may be possible below the escarpment to mitigate upstream sedimentation and attenuate high flows.

For more information regarding the natural history of this subwatershed please refer to the Preliminary Watershed Description Report: Hamilton Conservation Watersheds (Source Water Protection Halton-Hamilton Region, January 2006) and the Nature Counts: Hamilton Natural Areas Inventory (Dwyer, J. et al., 2003).

**Map CH- 3:**  
Extent of Historical Wetlands vs.  
Current Wetlands



Basic data supplied by PHR & City of Hamilton.  
Mapping should be used for information purposes only.  
Data sources have different accuracies and therefore  
boundaries should be confirmed as appropriate.

## CULTURAL & STEWARDSHIP HISTORY

The first property in Hamilton to be referred to as Chedoke was the property perched at the edge of the Chedoke Ravine and Falls near Fennell Avenue West and Garth Street (HCA, 2007). Although it is not clearly understood why this area was named Chedoke, some theories have been put forth. One of the most common theories is that Chedoke was a First Nations word, perhaps Iroquoian or Algonkian, and meant a collection of oaks. Another theory is that 'Chedoke' is a corruption of two English words 'seven' and 'oaks'. This theory draws its meaning from the property at the top of the Chedoke Ravine since seven oaks once stood at this location. Today three of those oaks remain and date back over 150 years. It is thought that the local aboriginal people misunderstood the settlers when they referred to this land as 'Seven Oaks' and in turn named it 'Chedoke'. Yet another theory is that 'Chedoke' is derived from the Anishnabek language where this area was referred to as 'Gchi wiidoke gamig' or the 'big healing place'.

The approximate population of the Chedoke Creek subwatershed is 66 000 persons with a population density of about 2629 persons per square kilometre. Current land use within the Chedoke Creek subwatershed is predominantly residential, with transportation corridors being the secondary land use (**Table CH- 2**). When traveling to the City of Hamilton, Chedoke Creek subwatershed is one in which all visitors will pass through when entering from the west as the Lincoln Alexander Parkway and Highway 403 are major corridors, above and below the escarpment, respectively. Institutional and open space is the third most common land use in this subwatershed, complementing the 44% of residential lands (**Map CH- 4**). Commercial land use is evident along major transportation routes with the main commercial areas above the escarpment being Mohawk Road and Upper James Street, and below the escarpment being Main Street and King Street. Major industrial land use is located south of Highway 403 adjacent to stream corridors. Two major utility corridors exist, one above and one below the Niagara Escarpment. Above the escarpment the corridor spans the boundaries of the Chedoke West, Lang's Creek and Mid-Chedoke catchments, while the corridor below the escarpment is used as a rail corridor and travels through Cliffview, Chedoke East and Lower Chedoke Creek catchments. Impervious surfacing within this subwatershed exceeds standards recommended for healthy stream systems.

In this subwatershed there is potential to naturalize an additional 1100 m<sup>2</sup> by enhancing utility corridors to serve as terrestrial habitat. Therefore, it is important to work with our large landowners to restore terrestrial and aquatic habitat in the subwatershed. Additionally, it is

equally important to work with our ward councilors to generate support for local stewardship initiatives with the public and private sectors as well as our development industry.

Although there are not many properties in this subwatershed that have natural features present, there are 483 properties that do accommodate forest, wetland, meadow and riparian/aquatic habitat (**Table CH- 3**). Of these landowners, 153 (or 32%) have been contacted by the Hamilton-Halton Watershed Stewardship Program, and 7 (or 5%) have become Watershed Stewards (**Map CH- 5**). This analysis includes rural and urban, public and private landowners by individual property, not landowner name. Therefore, there is much potential within this subwatershed for landowner contact and in turn the establishment of Watershed Stewards. In addition to those landowners who have natural features on their properties, those landowners who do not also act as Watershed Stewards as everyone is affected by what one person does on their property. There is also great opportunity to contact those landowners and create awareness regarding BMPs in an urban environment as they relate to local significant species and storm water management practices.

Currently Watershed Stewards are predominantly located in the Chedoke East catchment surrounding the historical Chedoke Ravine. This area also boasts an active Friends of Chedoke group along Chedoke Avenue, below the escarpment. Isolated steward areas are located adjacent to Iroquoia Heights Conservation Area in Chedoke West catchment, within the Cliffview catchment and adjacent to the Hamilton Escarpment Environmentally Significant Area (ESA). The Royal Botanical Gardens is also named a Watershed Steward for its protection of the ecologically significant lands at Cootes Paradise Marsh in the Lower Chedoke Creek catchment. The majority of landowner contact initiatives have been completed adjacent to the Hamilton Escarpment ESA; therefore there is much opportunity to contact the remaining landowners within this subwatershed, especially public landowners along stream corridors.

Environment Canada has provided guidelines for forest, wetland and riparian habitat for subwatershed areas and in turn a preliminary analysis has been completed using the guidelines set out by this agency. **Table CH- 4** displays the status of Ancaster Creek subwatershed when compared to these Federal guidelines.

Due to the high percentage of impervious surfacing and as a result of this subwatershed being altered to such a great extent through urban development, proper BMPs regarding storm water management must be enforced and must encourage groundwater infiltration in order to maintain or enhance warm water fisheries.

This subwatershed is severely degraded due to urban development and intensification. Much of the natural land cover has been replaced with impervious surfacing and many of

the Chedoke Creek tributaries have been buried over time. To de-list Hamilton Harbour as an Area of Concern it is important that restoration occurs within this subwatershed, by reducing sedimentation and phosphorous loading. This can be achieved through the implementation of urban stormwater best management practices (before and after development occurs), by increasing natural cover (upland forest and restoration of historical wetlands), through increased awareness of practices contributing to phosphorus loading, and through the completion of natural channel design projects where viable.

**Table CH- 2: Land Use Statistics**

| Area (km <sup>2</sup> ) | Agricultural (km <sup>2</sup> ) | Commercial (km <sup>2</sup> ) | Industrial (km <sup>2</sup> ) | Institutional (km <sup>2</sup> ) | Open Space (km <sup>2</sup> ) | Residential (km <sup>2</sup> ) | Transportation (km <sup>2</sup> ) | Utility (km <sup>2</sup> ) | Impervious Surfacing (%) |
|-------------------------|---------------------------------|-------------------------------|-------------------------------|----------------------------------|-------------------------------|--------------------------------|-----------------------------------|----------------------------|--------------------------|
| 25.1                    | 0.001                           | 0.7                           | 0.6                           | 3.2                              | 3.0                           | 11.0                           | 5.5                               | 1.1                        | 76                       |

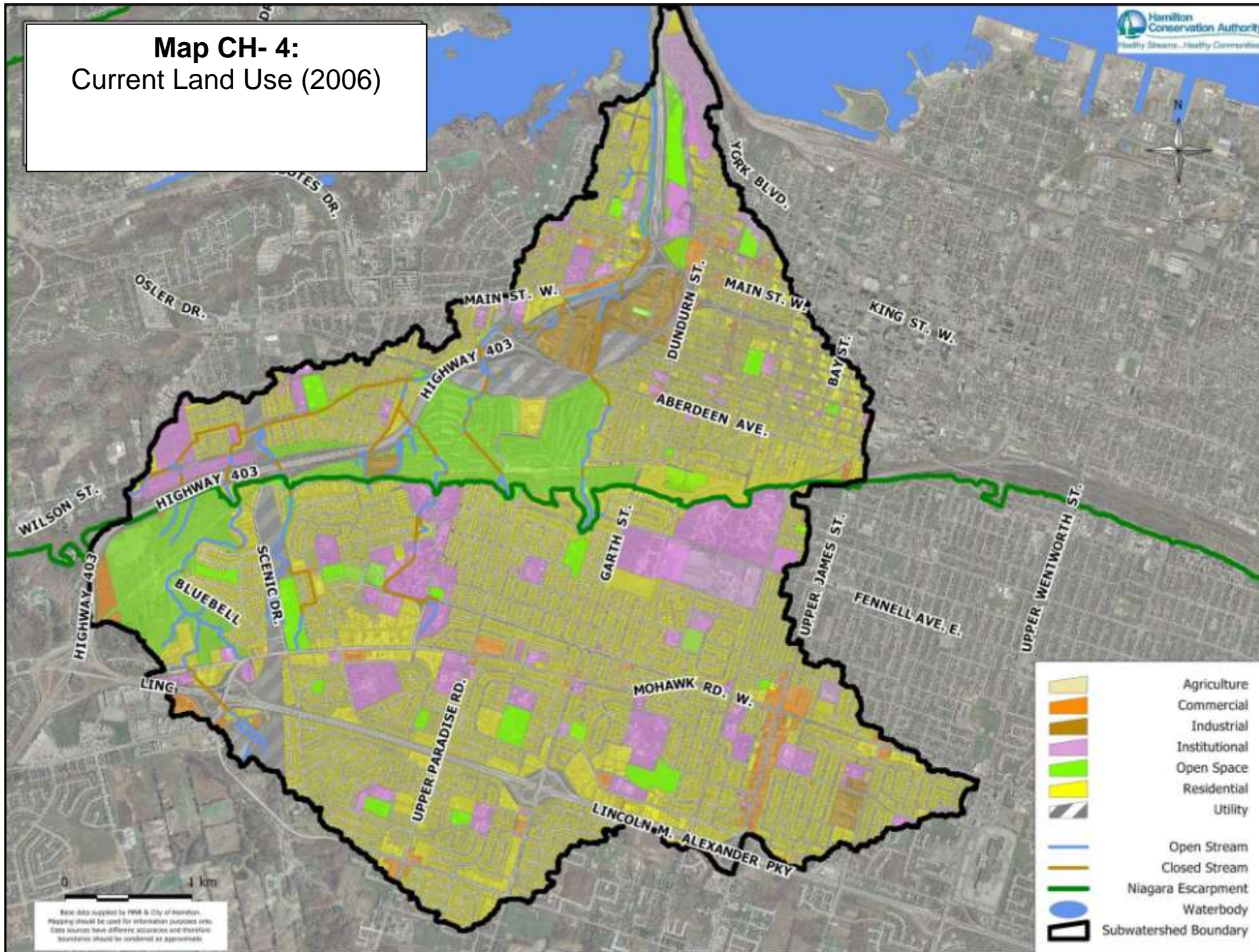
**Table CH- 3: Stewardship Statistics**

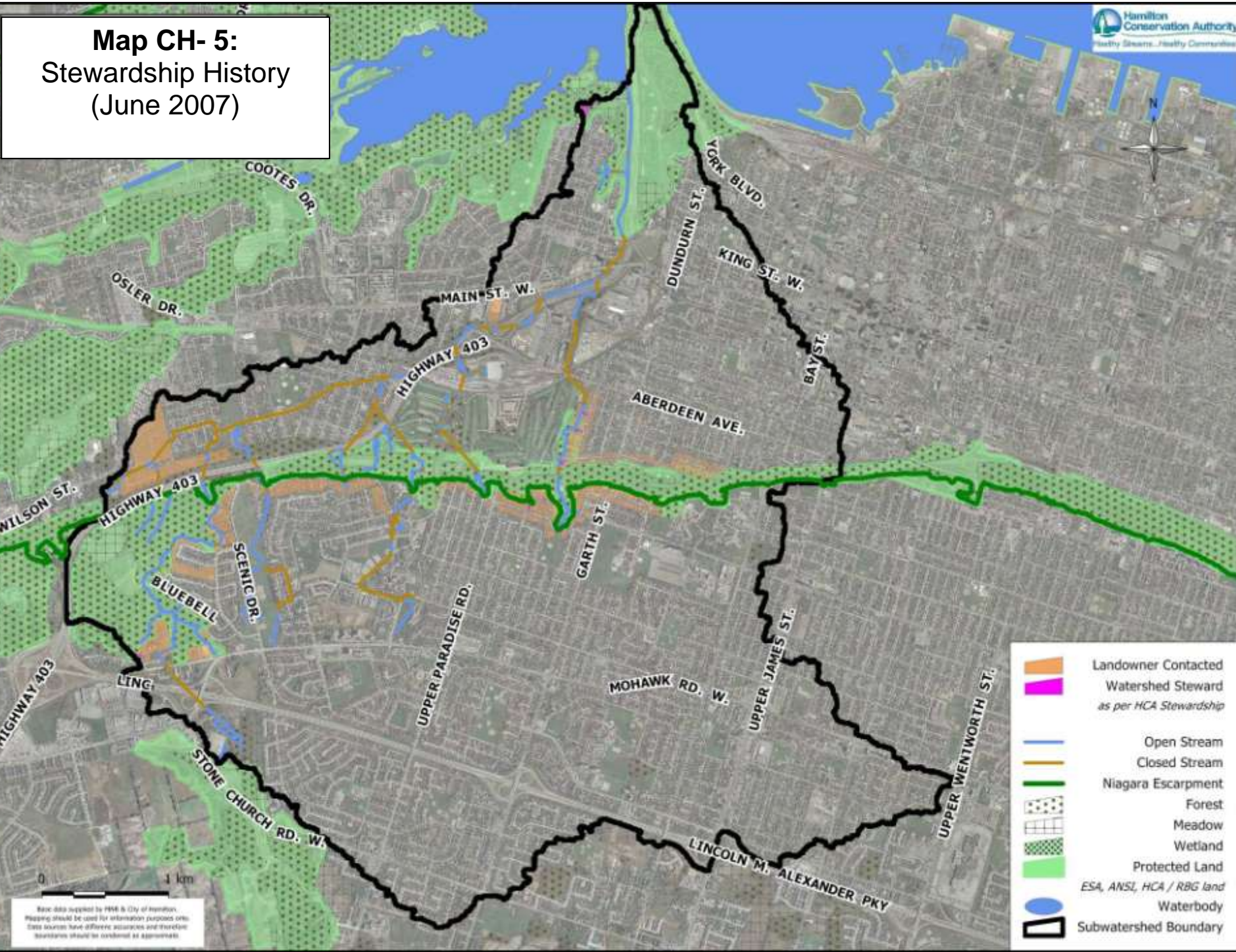
| Approximate Population | Population Density (persons / km <sup>2</sup> ) | Total # of Properties with Forest, Wetland, Meadow or Watercourse | # of Landowners with Forest, Wetland, Meadow or Watercourse & Contacted by HCA Stewardship | # of HCA Stewardship Watershed Stewards with Forest, Wetland, Meadow or Watercourse | Total # of Landowners in Subwatershed Contacted by HCA Stewardship | Total # HCA Stewardship Watershed Stewards in Subwatershed |
|------------------------|---|---|--|---|--|--|
| 66 000                 | 2629  | 483   | 153  | 7   | 449  | 8  |

**Table CH- 4: 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> | 0.02       | n/a                                | n/a                       | 76                     | Historically warm – now warm                         | 9.6            | 0.7km <sup>2</sup> & a section is > 500m wide | n/a   |

**Map CH- 4:**  
Current Land Use (2006)





## SUBWATERSHED STRESSES & STEWARDSHIP ACTIONS

There are fifteen Subwatershed-wide Stresses identified within the Chedoke Creek subwatershed. Three of these are considered Dominant Stresses while the others are considered Associated Stresses as they directly relate to the Dominant Stresses. These stresses and their relationships to one another are listed in **Table CH-5**. Error! Reference source not found.

**Table CH-6** outlines the Stewardship Actions and measurable targets for each of the Subwatershed-wide Stresses listed in **Table CH-5**; the Dominant Stresses are highlighted in yellow for quick reference. Additionally, each Dominant and Associated Stress has Site-level Stresses identified on the catchment maps, the details of which are within the corresponding catchment datasheets. Within the Chedoke Creek subwatershed, 82 Site-level Stresses have been identified. Inventories and the location of the Site-level stresses found in each of the catchments are listed under the Stress description in **Table CH-6**.

Erosion stresses have been noted within both the Development and Habitat Degradation Dominant Stress categories and all Storm water Mismanagement Stresses have been noted under both the Development and Detachment from Nature Dominant Stress categories as the Stewardship Actions directly relate to both of these Dominant Stresses.

In summary, future urban intensification in the Mid-Chedoke, Chedoke East and Lower Chedoke Creek catchments of this subwatershed is of main concern to the fisheries potential as it increases the potential for erosion downstream. Present natural systems (aquatic & terrestrial) must remain intact and preserved and be used as a foundation for restoration in this warm water system. In order to maintain or enhance the water quality of this subwatershed, contamination as a result of salt application on major arterial roadways must be reduced. Wetland and upland forest restoration above the escarpment may also be of benefit to mitigate existing erosion resulting from past development. Additionally, phosphorus loading and pesticide use are of great concern in this urban area of the City of Hamilton.



Findings of note in this subwatershed to highlight in this plan are the extensive natural areas bordering the Niagara Escarpment, the open stream tributaries and the Friends of Chedoke

### Table CH-6 Stewardship Actions & Inventories of Site Level Stresses

group along the Chedoke Ravine. Also, there are many accessible waterfalls located within in this subwatershed that have the potential to serve as excellent awareness opportunities through interpretive signage & trail opportunities. These eco-tourism sites can be incorporated into the enhancement of noted ecological linkages, ensuring connectivity for terrestrial species to reach Cootes Paradise Marsh through this urban environment.

**Table CH- 5: Dominant & Associated Subwatershed-wide Stresses**

| DOMINANT STRESS  | ASSOCIATED STRESS   |
|--|---|
| Development (DV)   | Erosion (ER)  |
|  | Storm Water Mismanagement (SW)                            |
|  | Water Contamination through Transportation Corridors (TC) |
| Detachment from Nature (DT)                                    | Eco-tourism Related Degradation (ET)                      |
|  | Storm Sewer Outfalls (SO)                                 |
|  | Storm Water Mismanagement (SW)                            |
| Terrestrial Habitat Degradation & Lack of Riparian Buffer (HR) | Channelized / Buried Streams (CB)                         |
|  | Debris Jams (DJ)  |
|  | Encroachment (EN)   |
|  | Erosion (ER)  |
|  | On-line Ponds / Culverts (PC)                             |
|  | Phosphorus Loading (PL)                                   |
|  | Pesticide Use (PS)  |
|  | Plowed Watercourses (PW)                                  |

| SUBWATERSHED-WIDE STRESS  | STEWARDSHIP ACTIONS   |   |   |
|---|---|---|---|
|   | Awareness Opportunity   | Special Study Opportunity   | Restoration Opportunity   |
| <p><b>Channelization / Buried Streams</b><br/><b>Map Code: CB</b></p>  <p><b>Definition:</b> The structural alteration of a stream channel, usually involves straightening of meanders and increasing gradient which increases velocity and erosion potential.</p> <hr/> <p><b>Inventory of Sites Identified</b> = 6</p> <p><b>Catchment Locations:</b><br/>Mid-Chedoke (2)<br/>Cliffview (1)<br/>Chedoke East (3)</p> <hr/> <p><b>Audience:</b> CITY / HHHBA / developers / private &amp; public landowners</p> | <p><b>2008-2012:</b> Utilize workshops, information sessions, literature, webpages, interpretive signage &amp; direct landowner contact to create awareness regarding the detrimental effects of channelized and buried streams;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> DFO / HCA / MNR / Ont. Stewardship Council / HHWSP</li> </ul>                  | <p><b>By 2010:</b> Identify sites for undertaking buried stream “daylighting” projects in the subwatershed;</p> <ul style="list-style-type: none"> <li>• <b>Partners:</b> HCA / CITY / MNR / post-sec. schools / HHWSP</li> </ul> <p><b>By 2010:</b> Assess landowner motivation for contributing to natural channel design;</p> <ul style="list-style-type: none"> <li>• <b>Partners:</b> HCA / MNR / post-sec. schools / HHWSP</li> </ul> <p><b>By 2012:</b> Inventory illegal sewer hookups by building on the Cross Connections of Sanitary Services into Storm Sewers study undertaken in 2003;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / MNR / post-sec. schools</li> </ul> | <p><b>2011-2012:</b> Focus riparian zone rehabilitation to areas downstream of channelized sites, to reduce flow velocities, erosion and sedimentation, with a goal of two projects per year;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners &amp; citizens / HHWSP</li> <li>▪</li> </ul> <p><b>By 2012:</b> Work with private landowners to undertake one “daylighting” / natural channel design project;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners &amp; citizens / HHWSP</li> </ul> |
| <p><b>Debris Jams</b><br/><b>Map Code: DJ</b></p>  <p><b>Definition:</b> The accumulation of large woody debris across a stream channel which impedes flow and prevents fish migration.</p> <hr/> <p><b>Inventory of Sites Identified</b> = 0</p> <hr/> <p><b>Audience:</b> CITY / private &amp; public landowners</p>  | <p><b>2008-2012:</b> Utilize workshops, information sessions, literature, webpages, interpretive signage &amp; direct landowner contact to create awareness regarding the environmental impacts of debris jams as fish barriers &amp; flooding hazards;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / MNR / Ont. Stewardship Council / HHWSP</li> </ul> | <p><b>By 2010:</b> Complete an assessment of creek/in-stream flow barriers that are prone to debris jams and cause barriers to fish migration, including the prioritization of barriers to be removed;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / MNR / post-sec. schools / HHWSP</li> </ul> <p><b>By 2010:</b> Assess landowner motivation for contributing to barrier removal projects;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / MNR / post-sec. schools / HHWSP</li> </ul>   | <p><b>2011-2012:</b> Remove debris jams based on the barrier removal project recommendations;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners &amp; citizens / HHWSP</li> </ul>   |

**Detachment from Nature**  
**Map Code: DT**



**Definition:** The condition of people disassociating their existence from nature.

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**Inventory of Sites Identified = 0**

---

**Audience:** private & public landowners

**2008-2012:** Initiate a community greening project with watershed partners to deliver messaging to targeted audiences. Utilize workshops, information sessions, literature, webpages & direct landowner contact to create awareness regarding urban BMPs and the ecological significance of natural features;

- **Partners:** BARC / CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council

**2008-2012:** Erect creek crossing & ecological corridor signage along roadways;

- **Partners:** BARC / CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / WPN

**2008-2012:** Implement Adopt-a-Creek projects in communities where Friends of groups are possible;

- **Partners:** BARC / Environment Hamilton / HCA / school boards / landowners & citizens / HHWSP

**2008-2012:** Continue to implement the Watershed Steward Award Program;

- **Partners:** BARC / Environment Hamilton / HCA / school boards / landowners & citizens / HHWSP

**By 2011:** Utilize citizen groups to conduct local watershed monitoring & reporting projects (including water quality, naturalization projects & litter hotspots);

- **Partners:** BARC / Environment Hamilton / HCA / school boards / landowners & citizens

**By 2010:** Initiate a minimum of one volunteer-based program to complete restoration projects on private & public lands with local landowners including schoolyard naturalization, litter clean up, removal of encroaching material, etc.;

- **Partners:** FSRT / HCA / Ont. Stewardship Council / school boards landowners & citizens / HHWSP

**Development  
Map Code: DV**

**Definition:** The process of developing populated settlements; including housing and supporting infrastructure.



**Inventory of Sites Identified = 12**

**Catchment Locations:**

- Chedoke West (2)
- Lang's Creek (1)
- Mid-Chedoke (2)
- Cliffview (1)
- Chedoke East (3)
- Lower Chedoke Creek (3)

**Audience:** CITY / HHHBA / developers / private landowners

**2008-2012:** Host annual training sessions for City staff & developers to create awareness regarding the incorporation of development related BMPs into planning applications (i.e. pervious pavement, green rooftops, storm water management, road-salt alternatives, snow-piling, erosion & sediment control measures, compliance & enforcement, etc.);

- **Partners:** BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO

**2008-2012:** Apply Yellow Fish Road to all catchbasins on streets and in parking areas to educate private landowners post-development;

- **Partners:** BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO

**2008-2012:** Continue to complete ecological surveys (using the Ecological Land Classification system) to ensure species at risk habitat or rare ecological areas are not disrupted;

- **Partners:** CITY / HCA / post-sec. schools

**2008-2012:** Continue to incorporate downstream assessments of creek conditions, with recommendations for improvement, as part of the subwatershed-wide subwatershed studies conducted as part of new Greenfield development planning;

- **Partners:** CITY / HCA / post-sec. schools

**2008-2012:** HCA staff to develop an internal mechanism to ensure that BMP's and Stewardship Actions to preserve and enhance habitat are addressed in development application prior to construction;

- **Partners:** BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO

**2008-2012:** Use the terrestrial habitat and ecological linkages identified in this plan to preserve & rehabilitate these areas as part of new Greenfield developments in the subwatershed;

- **Partners:** HCA / CITY

**2008-2012:** Enhance groundwater recharge by ensuring that 70% of all land, post construction must remain pervious as a condition for development application approval;

- **Partners:** HCA / CITY

**2008-2012:** Implement the fish habitat buffer requirements for warm and coldwater streams as outlined in the HCA Planning and Regulations Policy and Guidelines document (30m setback for coldwater systems and 15m setback for warmwater systems);

- **Partners:** HCA / CITY

**Encroachment  
Map Code: EN**



**Definition:** The act of undertaking practices on another person's property, i.e. erecting structures, planting gardens, disposal of waste.

**Inventory of Sites Identified = 3**

**Catchment Locations:**

Chedoke West (1)  
Lang's Creek (2)

**Audience:** private & public landowners

**2008-2012:** Utilize workshops, information sessions, literature, webpages, signage & direct landowner contact to create awareness regarding encroachment impacts to terrestrial habitat as well as the ecological significance of riparian buffers & natural areas (public lands);

- **Partners:** CITY / HCA / Ont. Stewardship Council / RBG / local nurseries & landscaping co.'s / HHWSP

**2008-2012:** Utilize workshops, information sessions, literature, webpages, interpretive signage & direct landowner contact to create awareness regarding encroachment impacts to terrestrial habitat as well as the ecological significance of riparian buffers & natural areas (private lands);

- **Partners:** CITY / HCA / Ont. Stewardship Council / RBG / local nurseries & landscaping co.'s / HHWSP

**By 2010:** Work with local nurseries & landscaping co.'s to educate / encourage landowners to use native plants;



- **Partners:** CITY / HCA / Ont. Stewardship Council / RBG / Green Venture / local nurseries & landscaping co.'s / HHWSP

**2009-2012:** Utilize citizen groups to monitor restored sites on an annual basis to ensure mitigation of encroachment on public lands remains effective & to encourage neighbour-to-neighbour mentoring;

- **Partners:** HCA / landowners & citizens / HHWSP / CITY / RBG

**2008-2012:** Continue to work with neighbours to encourage community events to remove existing encroachments on public lands;

- **Partners:** FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP / RBG / CITY

|   |   |  |  |
|---|---|--|--|
| <p><b>Erosion</b><br/><b>Map Code: ER</b></p>  <p><b>Definition:</b> The process of eroding or the condition of being eroded; commonly occurs as scouring or slumping.</p> <hr/> <p><b>Inventory of Sites Identified = 3</b></p> <p><b>Catchment Locations:</b><br/>Lang's Creek (1)<br/>Cliffview (1)<br/>Lower Chedoke Creek (1)</p> <hr/> <p><b>Audience:</b> CITY / HHHBA / developers / private &amp; public landowners</p>   | <p><b>2008-2012:</b> Host training sessions for City staff and developers to create awareness regarding BMPs &amp; importance of properly maintained erosion / sediment control measures &amp; enforcement;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / DFO / HCA / Ont. Stewardship</li> </ul> <p><b>2008-2012:</b> Utilize workshops, information sessions, literature, webpages, interpretive signage &amp; direct private &amp; public landowner contact to create awareness regarding the importance of riparian buffers &amp; proper land management practices;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / DFO / HCA / Ont. Stewardship Council / HHWSP</li> </ul> | <p><b>By 2010:</b> Complete field study of stream morphology, determining erosion hotspots &amp; associated causes;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / HCA / post-sec. schools</li> </ul>                | <p><b>2008-2012:</b> Utilize enforcement scheme to enforce maintenance of erosion / sediment control measures on new development sites;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> DFO / CITY / HCA / Ont. Stewardship Council / landowners &amp; citizens</li> </ul> <p><b>2008-2012:</b> Reduce erosion and promote awareness through the completion of a streambank stabilization / natural channel design demonstration project;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> DFO / CITY / HCA / Ont. Stewardship Council / landowners &amp; citizens / HHWSP</li> </ul> <p><b>2008-2012:</b> Undertake a minimum of one riparian buffer project on private &amp; public lands to reduce erosion. Promote no mow zones a minimum of <b>3m</b> from top of bank on public and private lands;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> DFO / CITY / HCA / Ont. Stewardship Council / landowners &amp; citizens / HHWSP</li> </ul> |
| <p><b>Eco-Tourism Related Degradation</b><br/><b>Map Code: ET</b></p>  <p><b>Definition:</b> Recreational activities occurring in natural areas that inadvertently degrade the natural features of the area.</p> <hr/> <p><b>Inventory of Sites Identified = 14</b></p> <p><b>Catchment Locations:</b><br/>Chedoke West (2)<br/>Lang's Creek (2)<br/>Mid-Chedoke (3)<br/>Cliffview (4)<br/>Chedoke East (3)</p> <hr/> <p><b>Audience:</b> visitors to natural areas</p> | <p><b>2008-2012:</b> Provide signage noting the environmental significance of natural areas &amp; BMPs for eco-tourists;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / HCA / Ont. Stewardship Council / RBG</li> </ul>   | <p><b>2009-2012:</b> When undertaking master planning exercises, consider developing trails along ecological linkages noted in study area;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> BTA / CITY / HCA / RBG</li> </ul> | <p><b>2010-2012:</b> Develop trails to meet guidelines set in HCA's Planning &amp; Regulation Policies &amp; Guidelines;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> BTA / CITY / HCA / RBG</li> </ul>   |

**Terrestrial  
Habitat  
Fragmentation &  
Lack of Riparian  
Buffers  
Map Code: HR**



**Definition:** Disruption of large continuous tracts of habitat; often occurring along watercourses.

**Inventory of Sites Identified = 16**

**Catchment Locations:**

- Chedoke West (5)
- Lang's Creek (4)
- Mid-Chedoke (3)
- Cliffview (1)
- Chedoke East (1)
- Lower Chedoke Creek (2)

**Audience:** private & public landowners (CITY / golf courses / HCA / HYDRO ONE / MTO / RBG / school boards)

**2008-2012:** Meet with public landowners to create working relationship for land stewardship on public lands;

- **Partners:** HCA / Ont. Stewardship Council / HHWSP

**2008-2012:** Utilize workshops, information sessions, literature, webpages, interpretive signage & direct private landowner contact to create awareness regarding the importance of riparian buffers & natural areas;

- **Partners:** HCA / Ont. Stewardship Council / HHWSP

**2009-2012:** Create demonstration sites on public lands that focus on varying types of terrestrial and aquatic restoration projects;

- **Partners:** CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP

**2008-2009:** Develop How Much Habitat is Enough targets & potential restoration sites for each subwatershed, as well as specific areas to connect using eco-link recommendations in catchment summaries & determine specific species habitat to target;

- **Partners:** CITY / HCA / post-sec. schools / HHWSP

**2008-2009:** Assess landowner motivation for increasing forest, wetland, riparian & meadow / prairie habitat;

- **Partners:** CITY / HCA / post-sec. schools / HHWSP

**2008-2012:** Contact all landowners of natural areas and watercourses. A minimum of one Watershed Steward Award Recipient and one rehabilitation project to be completed;

- **Partners:** CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP

**2009-2012:** Undertake a minimum of one restoration project per year on public lands, with an emphasis on utility corridors, for connectivity and demonstration sites;

- **Partners:** CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP

**On-line Ponds and Culverts**  
**Map Code: PC**



**Definition:**

In-stream structures that when improperly designed, inadvertently create barriers to water flow and fish migration.

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**Inventory of Sites Identified = 1**

**Catchment Locations:**

Chedoke West (1)

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**Audience:** CITY / private & public landowners

**2008-2012:** Utilize workshops, information sessions, literature & webpage, interpretive signage & direct landowner contact to create awareness regarding environmental effects of on-line ponds;

- **Partners:** DFO / HCA / MNR / Ont. Stewardship Council / HHWSP

**2008-2011:** Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental effects of perched & closed bottom culverts;

- **Partners:** DFO / HCA / MNR / Ont. Stewardship Council / HHWSP

**By 2010:** Assess landowner motivation for removing/retrofitting existing on-line ponds;

- **Partners:** HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP

**2008-2012:** Use local colleges / universities or volunteer consultants to complete studies & design for rehabilitation projects

- **Partners:** HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP

**2010:** Assess landowner motivation for removing/retrofitting existing perched and/or closed bottom culverts;

- **Partners:** HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP

**2008-2012:** Use local colleges / universities or volunteer consultants to complete studies & designs for rehabilitation projects;



- **Partners:** HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP


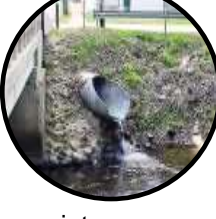
**2008-2012:** Rehabilitate/retrofit a minimum of one on-line pond;

- **Partners:** DFO / CITY / HCA / post-sec. schools / local eng. co.'s / HHWSP

**2008-2012:** Rehabilitate/retrofit a minimum of one perched & closed bottom culvert;

- **Partners:** DFO / CITY / HCA / post-sec. schools / local eng. co.'s / HHWSP

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|---|--|--|--|
| <p><b>Phosphorous Loading</b><br/><b>Map Code: PL</b></p>  <p><b>Definition:</b><br/>Excessive phosphorous being inputted into a watercourse; often resulting from the application of fertilizer.</p> <hr/> <p><b>Inventory of Sites Identified = 1</b></p> <p><b>Catchment Locations:</b><br/>Cliffview (1)</p> <hr/> <p><b>Audience:</b> private &amp; public landowners</p> | <p><b>2008-2012:</b> Utilize workshops, information sessions, literature &amp; webpages, interpretive signage &amp; direct landowner contact to create awareness regarding environmental impacts of phosphorus loading &amp; alternatives to lawn fertilization;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / RBG / HHWSP / Green Venture</li> </ul>  | <p><b>In 2009:</b> Develop reduction in phosphorus loading targets &amp; identify potential mitigation sites for each subwatershed;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / RBG / post-sec. schools / HHWSP</li> </ul> <p><b>2009:</b> Assess landowner motivation for reducing lawn fertilization;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / RBG / post-sec. schools / HHWSP / Green Venture</li> </ul> <p><b>In 2008:</b> Model phosphorus loading in the subwatersheds and compare against RAP objectives;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / RBG / post-sec. schools / RAP</li> </ul> | <p><b>2009-2012:</b> Work toward an 80% reduction in phosphorus loading by encouraging citizens to conduct a reduction in lawn fertilization (20% reduction/yr through the promotion of over-seeding, mulching &amp; BMPs);</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / HCA / Ont. Stewardship Council / HHWSP / Green Venture</li> </ul> |
| <p><b>Pesticide Use</b><br/><b>Map Code: PS</b></p>  <p><b>Definition:</b> The application of pesticides to control perceived pests.</p> <hr/> <p><b>Inventory of Sites Identified = 1</b></p> <p><b>Catchment Locations:</b><br/>Cliffview (1)</p> <hr/> <p><b>Audience:</b> private &amp; public landowners</p>  | <p><b>2008-2009:</b> Utilize workshops, information sessions, literature &amp; webpages, interpretive signage &amp; direct landowner contact to create awareness regarding environmental impacts of pesticide / herbicide use &amp; alternatives to pesticide / herbicide use;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Green Venture / Hamilton Coalition on Pesticide Issues / OMAFRA</li> </ul> <p><b>2008-2012:</b> Support the City's Pesticide By-law;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Green Venture / Hamilton Coalition on Pesticide Issues / OMAFRA</li> </ul> | <p><b>In 2008:</b> Determine percentage of pesticide / herbicide use in each subwatershed;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Green Venture / HCPI / OMAFRA</li> </ul> <p><b>In 2009:</b> Develop reduction in pesticide / herbicide use targets &amp; potential mitigation sites for each subwatershed;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Green Venture / HCPI / OMAFRA</li> </ul> <p><b>In 2009:</b> Assess landowner motivation for reducing pesticide use;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Green Venture / HCPI / OMAFRA</li> </ul>   | <p><b>By 2011:</b> Work toward decreasing pesticide use by 50% and by 75% <b>in 2012</b> using integrated pest management, lawn naturalization, over-seeding, mulching, BMPs, etc.;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Green Venture / HCA / Hamilton Coalition on Pesticide Issues / Ont. Stewardship Council / OMAFRA</li> </ul>      |

|   |  |   |   |
|---|--|---|---|
| <p><b>Plowed Watercourse</b><br/><b>Map Code: PW</b></p>  <p><b>Definition:</b><br/>Headwater swales or small watercourses that are worked for agricultural production.</p> <hr/> <p><b>Inventory of Sites Identified = 0</b></p> <hr/> <p><b>Audience:</b> private agricultural landowners</p>  | <p><b>2008-2012:</b> Utilize workshops, information sessions, literature &amp; webpages &amp; direct private landowner contact to create awareness regarding environmental effects of plowed watercourses;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> DFO / HCA / OMAFRA / Ont. Stewardship Council / HHWSP</li> </ul> <p><b>2008-2012:</b> Promote the Environmental Farm Plan program and associated Cost Sharing Programs for the implementation of Beneficial Management Practices projects;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> Stewardship Council / HHWSP / OSCIA</li> </ul> | <p><b>2010:</b> Assess landowner motivation for installing grassed waterways and riparian buffers;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / OMAFRA / HHWSP / HWSCIA</li> </ul>   | <p><b>2008-2012:</b> Reduce sedimentation through the creation of a minimum of one riparian buffer on private lands, target 15m from top of bank for warm water systems and 30m from top of bank for coldwater systems;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> HCA / landowner / HHWSP</li> </ul>  |
| <p><b>Stormsewer Outfalls / CSO's</b><br/><b>Map Code: SO</b></p>  <p><b>Definition:</b> The point where a combined sewer overflow system discharges into a watercourse during a storm event.</p> <hr/> <p><b>Inventory of Sites Identified = 19</b></p> <hr/> <p><b>Catchment Locations:</b><br/>Chedoke West (2)<br/>Lang's Creek (2)<br/>Mid-Chedoke (5)<br/>Cliffview (2)<br/>Chedoke East (4)<br/>Lower Chedoke Creek (4)</p> <hr/> <p><b>Audience:</b> children &amp; private landowners (residential / commercial / industrial)</p> | <p><b>2008-2012:</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 &amp; the impacts of CSO outfalls on stream systems;</p> <ul style="list-style-type: none"> <li>• <b>Partners:</b> BARC / CITY / FSRT / HCA</li> </ul> <p><b>2008-2012:</b> Support Sewer-Use Bylaw enforcement (City of Hamilton By-law No. 04-150);</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> BARC / CITY / FSRT / HCA</li> </ul>   | <p><b>2008-2012:</b> Conduct water quality testing at storm sewer outfalls to support a study on illegal sewer hookups, Sewer Use Bylaw enforcement, &amp; restoration efforts;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / HCA / post-sec. schools</li> </ul> <p><b>2008-2012:</b> Conduction water quality testing at CSO outfalls pre and post mitigation to support mitigation measures;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / HCA / post-sec. schools</li> </ul> | <p><b>2008-2010:</b> Reduce flows &amp; sedimentation through riparian buffer establishment downstream of CSO outfalls (public lands);</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / landowners &amp; citizens</li> </ul> <p><b>By 2012:</b> 80% of connected downspouts to be disconnected &amp; rain barrels to be utilized as an alternative;</p> <ul style="list-style-type: none"> <li>▪ <b>Partners:</b> CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / landowners &amp; citizens</li> </ul> |

**Stormwater  
Mismanagement  
Map Code: SWM**



**Definition:**  
Inadequately managing stormwater to control flooding and protect property; often associated with the drainage of developed lands.

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**Inventory of Sites Identified = 3**

**Catchment Locations:**  
Chedoke West (2)  
Mid-Chedoke (1)

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**Audience:** HHHBA / developers / private & public landowners (residential / commercial / industrial)

**2008-2012:** Continue to promote Best Management Practices as per HCA Planning and Regulations Policy and Guidelines and new provincial directives for new developments;  
▪ **Partners:** CITY / Green Venture / HCA

**2008-2012:** Utilize workshops, information sessions, literature, webpages & direct landowner contact to create awareness regarding BMPs for storm water source control measures (i.e. disconnected downspouts, roof gardens, rain barrels, biofilters, trees, pervious pavement, rain gardens);  
▪ **Partners:** CITY / Green Venture / HCA

**By 2010:** Determine percentage of landowners with connected downspouts;  
▪ **Partners:** CITY / Green Venture / HCA

**By 2010:** Assess landowner motivation for disconnection & implementing source control measures;  
▪ **Partners:** CITY / Green Venture / HCA

**By 2012:** 80% of connected downspouts to be disconnected & rain barrels to be utilized as an alternative;  
▪ **Partners:** CITY / Green Venture / HCA / landowners

**2008-2012:** Retro-fit a minimum of one existing storm water management pond to a wet pond based on water quality, aquatic habitat & erosion control benefits;  
▪ **Partners:** CITY / Green Venture / HCA / landowners

**Water Contamination through Transportation Corridors**  
**Map Code: TC**



**Definition:** Contamination resulting from stormwater runoff from major arterial roadways; often associated with the application of salts for de-icing and the residual precipitate created by automobile exhaust.

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**Inventory of Sites Identified = 3**

**Catchment Locations:**

Mid-Chedoke (2)  
Chedoke East (1)

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**Audience:** CITY / MTO

**2008-2012:** Host training sessions for City staff to create awareness & encourage environmentally friendly road salt alternatives & proper snow removal practices;

- **Partners:** CITY / DFO / HCA / MTO / Ont. Stewardship Council

**By 2010:** Determine the best method to mitigate contamination from transportation corridors into watercourses by studying alternatives to road salt for de-icing & incorporating into a road salt management plan;

- **Partner:** CITY / HCA / MTO / post-sec. schools

**2010-2012:** Implement road salt management plans & reduce use of salt for de-icing by 15% over 5yrs; Increase use of vacuum street sweepers; Increase vegetated filter strips / grassed swales along medians & roadsides, where ditches are present incorporate non-invasive native vegetation;

- **Partners:** CITY / MTO

Agencies identified as partners in order to carry out these Stewardship Actions are listed below in alphabetical order, with target audiences also noted. This information will be valuable in forming an Implementation Team, sub-committees and in knowing which audiences Stewardship Actions are directed.

**PARTNER AGENCIES:**

- Bay Area Restoration Council (BARC)
- Bruce Trail Association (BTA)
- City of Hamilton (CITY)
- Environment Hamilton (EH)
- Field and Stream Rescue Team (FSRT)
- Fisheries & Oceans Canada (DFO)
- Green Venture (GV)
- Hamilton Coalition on Pesticide Issues (HCPI)
- Hamilton Conservation Authority (HCA)
- Hamilton Conservator Society (HCS)
- Hamilton Naturalists Club (HNC)
- Landowners & citizens (LO)
- Local nurseries & landscaping companies (Nursery)
- Local engineering companies (local eng. co.'s)
- Ministry of Agriculture, Food & Rural Affairs (OMAFRA)
- Ministry of Natural Resources (MNR)
- Ministry of Transportation (MTO)
- Ontario Stewardship Council (Ont. Stewardship Council)
- Post-secondary schools (post-sec. schools)
- Royal Botanical Gardens (RBG)
- School boards (Sch. Brds)
- Watershed Planning Network (WPN)

**TARGET AUDIENCES:**

- Children
- City of Hamilton (CITY)
- Developers
- Golf courses
- Hamilton Halton Home Builders Association (HHHBA)
- Hydro One (HYDRO ONE)
- Landowners & citizens (residential, commercial, industrial)
- Ministry of Transportation (MTO)
- Out of town visitors
- School boards