

TIFFANY CREEK SUBWATERSHED

STEWARDSHIP ACTION PLAN



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

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TIFFANY CREEK SUBWATERSHED CHARACTERIZATION

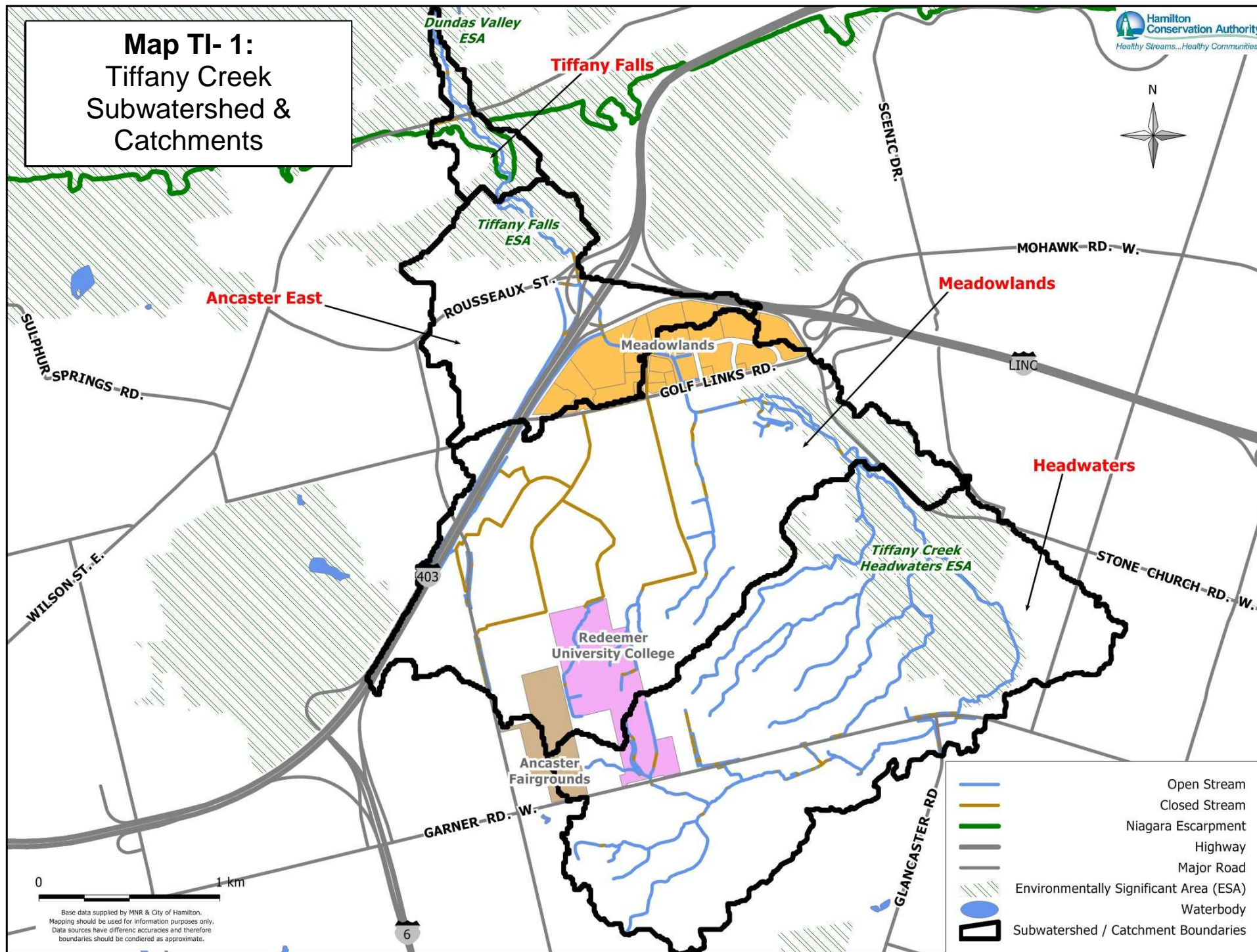
GEOGRAPHICAL LOCATION

Tiffany Creek subwatershed is 9.3 km² in area and is comprised of four catchment basins. In descending order from the headwaters to the outlet these are: Headwaters, Meadowlands, Ancaster East, and Tiffany Falls (**Map TI-1**). This subwatershed spans the former municipal boundaries of Ancaster, Hamilton and Glanbrook, and lies within three City of Hamilton wards: 8, 11 and 12. However, the subwatershed predominantly lies within the former municipality of Ancaster and within the City of Hamilton ward 12. The boundaries of the headwaters range from Southcote Road in the west to Stonechurch Road and Upper Paradise Road in the east and the southern extent is located between Garner Road and Book Road East. The subwatershed is located between Ancaster Creek subwatershed and Chedoke Creek subwatershed and is triangular in shape with the majority of its land base being located above the Niagara Escarpment until it falls over Tiffany Falls at the escarpment brow south of Wilson Street, and finally outlets into Ancaster Creek. Highway 403 passes through this subwatershed and one interchange is present: Rousseaux Street / Lincoln Alexander Parkway. Major transportation routes found within this subwatershed are Southcote Road, Upper Paradise Road, Garner Road, Stonechurch Road, Golf Links Road, Rousseaux Street, and Wilson Street.

Tiffany Creek is the only cool water system of the three subwatersheds in this Stewardship Action Plan. The headwaters are located on the tablelands southeast of Ancaster village, and south of Garner Road; they flow east, until they bend north after crossing Garner Road.

The creek descends the south wall of the Dundas Valley at Tiffany Falls before entering Ancaster Creek just south of Old Dundas Road. Although Tiffany Creek appears to have remained for the most part natural, stream system alterations have been undertaken in order to accommodate for the residential and commercial development needs of the local communities. The following locations are where major alterations to the natural stream channel have occurred: north and south of Garner Road, southeast of the intersection of Southcote Road and Golf Links Road, north of Golf Links Road through the Meadowlands commercial complex, south of Wilson Street, and where Highway 403 intersects the stream bed. An area that has been altered but is not apparent within the map shown on the following page is located west of the Tiffany Creek Headwaters Environmentally Significant Area (ESA). The hydrology of this area has been completely altered to accommodate residential development (**Map TI-6**).

The Niagara Escarpment is located within both the Tiffany Falls catchment of this subwatershed. Additionally, three municipally designated ESAs are located within this subwatershed: Tiffany Creek Headwaters, Tiffany Falls, and Dundas Valley. 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

The maximum and minimum elevation in the Tiffany Creek subwatershed is about 250 masl and 105 masl, respectively and the topography of this subwatershed ranges from a 0.5% to greater than 30% slope (Source Water Protection Halton-Hamilton Region, January 2006). In the headwaters the soil type is predominantly sandy loam and silt loam. Silt loam soils follow the main stream corridor (along the southern and eastern boundaries of the subwatershed), while sandy loam soils surround the tributaries of Tiffany Creek. North of Rousseaux Street, within the Tiffany Falls Environmentally Significant Area (ESA) ravine soils are present with silt loam soils present at the top of this ravine. After Tiffany Creek flows over the escarpment it flows through ravine soils typical of the Dundas Valley until reaching its outlet (**Map TI-2**).

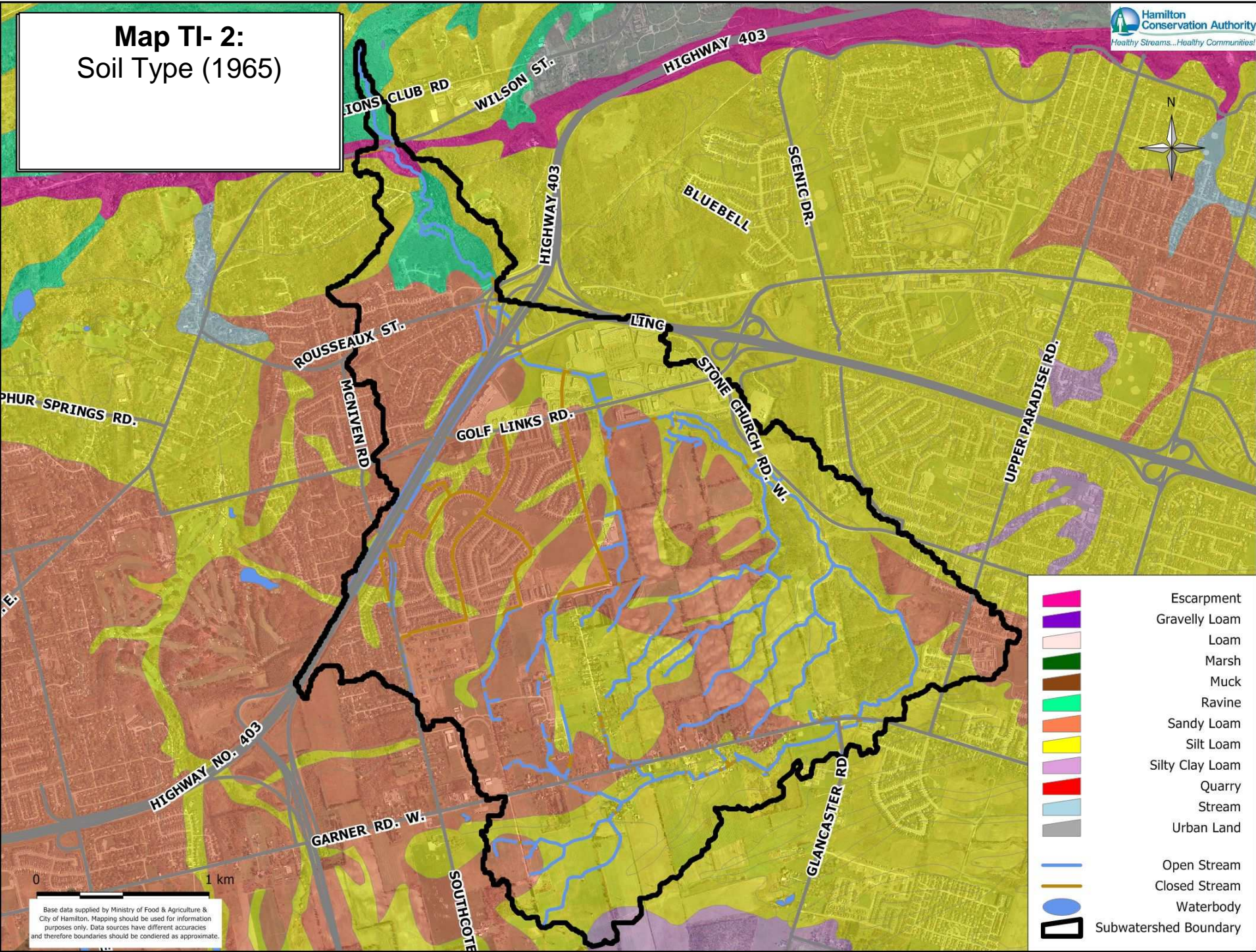
Wetlands that were present within the Tiffany Creek subwatershed prior to the mid-1980's as well as those wetlands that are still present today are displayed within **Map TI-3**. It is apparent that hydrological alterations have occurred within this subwatershed in order to accommodate development and agricultural practices. Historically, wetlands followed much of the stream corridor until it met with present day Highway 403. The Tiffany Creek Headwaters ESA houses much of the historical wetland area still present today; this wetland area is classified as a swamp. However, a portion of historical wetland remains within the

City of Hamilton properties east of Meadowlands Boulevard and north of Stonehenge Drive, and between Lowinger Avenue and Joshua Avenue. Additionally, remnant wetlands are located within the Redeemer University College property, north of Garner Road, and on three private properties south of Garner Road. The wetland areas located within the ESA are primarily classified as marshlands with some locations of swampy areas, while the wetlands located within the City of Hamilton properties are classified as marshlands. The areas surrounding Garner Road are classified as swamps. All wetlands located within this subwatershed are designated as Provincially Significant Wetlands by the Ontario Ministry of Natural Resources (OMNR). Historically, wetland cover accounted for 1.9 km², or 20.4%, of the subwatershed area. Now, only 0.5 km² of wetland area remains, which is only 5.4% of the subwatershed area, therefore this subwatershed has lost 73.7% of its historical wetland cover.

Historical information was not recorded for forest or meadow cover, however current natural land cover statistics are noted within **Table TI-1**. Forest cover makes up for 11.8% of this subwatershed, while meadow cover accounts for 3.2%. Based on the digital data provided for this analysis, stream length of the Tiffany Creek and all of its tributaries is 38 km.

Table TI- 1: Natural Land Cover Statistics

Forest Cover (km ²)	Wetland Cover (km ²)	Meadow Cover (km ²)	Stream Length (km)
1.1	0.5	0.3	38



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 (not regulated)

- Acadian Flycatcher
- American Chestnut
- Butternut
- American Ginseng
- American Chestnut

Special Concern

- Broad Beech Fern
- Cerulean Warbler
- Louisiana Waterthrush
- Monarch
- Northern Ribbon Snake
- Eastern Milksnake

Threatened

- Hooded Warbler
- Jefferson Salamander

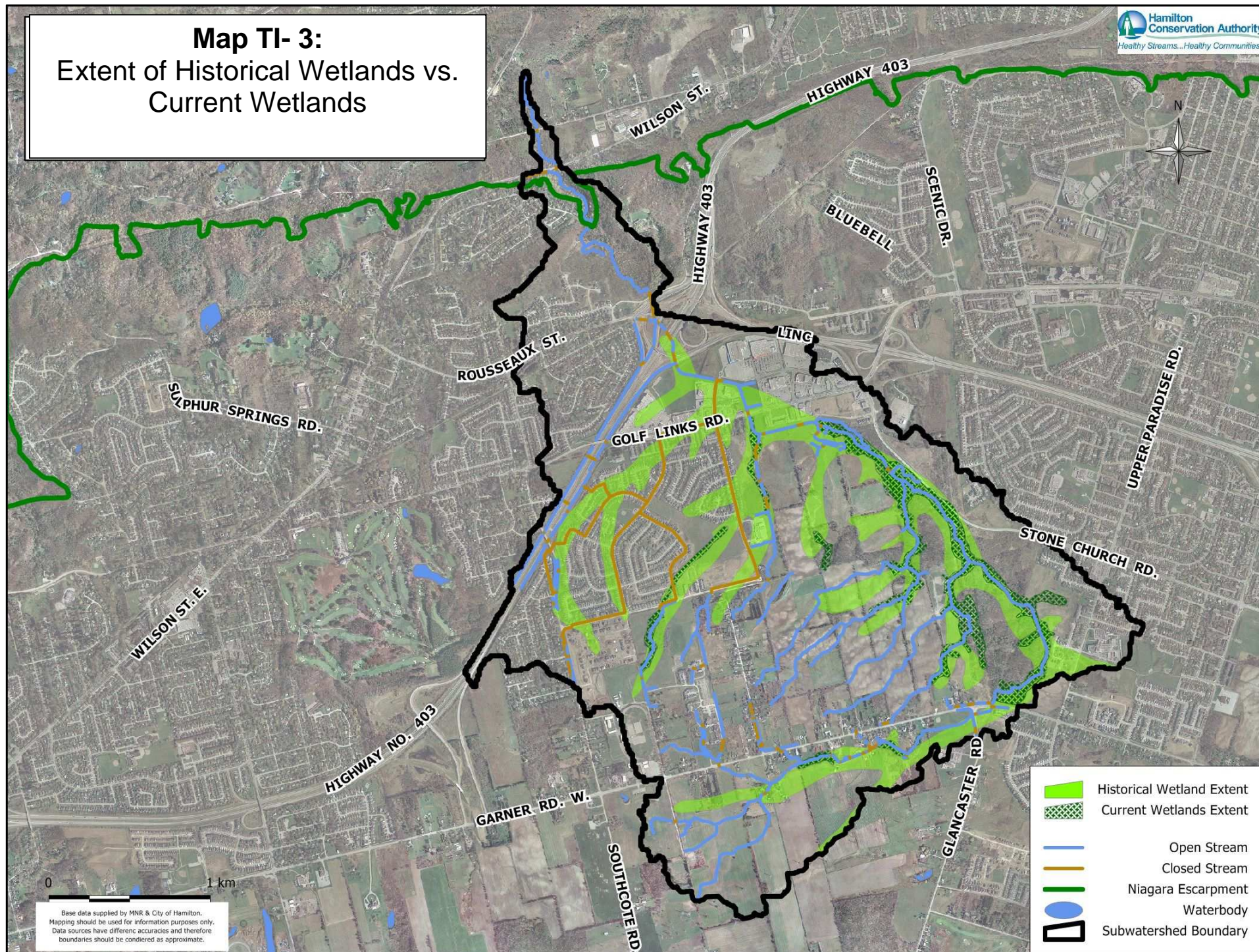
Not at Risk

- Cooper's Hawk
- Northern Harrier
- Pickerel Frog
- Sedge Wren
- Sharp-shinned Hawk

It will be important to create awareness and 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 soils in this subwatershed, headwater wetlands must be restored to meet the How Much Habitat is Enough Guidelines as set by Environment Canada, to reduce sediment loading in Spencer Creek and ultimately Cootes Paradise. This may be achieved through the approval of development applications and resultant compensation projects for the proposed development within the Headwaters catchment, with an opportunity for an eco-industrial park that spans westward into Ancaster Creek subwatershed.

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), the Nature Counts: Hamilton Natural Areas Inventory (Dwyer, J. et al., 2003), and the Tiffany Creek Subwatershed Plan (Hamilton Region Conservation Authority, July 2000).



CULTURAL & STEWARDSHIP HISTORY

Settlers came to the Ancaster area as early as 1790 for the high well-drained land, clean spring water, streams for water power, and because the site was on the early road from Niagara to the western part of the province (Spencer Creek Conservation Authority, 1965). Although the village was founded by Jean Baptiste Rousseaux from Lower Canada and James Wilson from Pennsylvania, Governor Simcoe gave it its name, after the hamlet in Lincolnshire, England (Spencer Creek Conservation Authority, 1965). Tiffany Creek, a tributary of Ancaster Creek, was given its name after Dr. Oliver Tiffany, the first known physician to take up practice in Ancaster, which occurred sometime between 1796 and 1798 (HCA, 2007). Dr. Tiffany built his home on a parcel of land north of Rousseaux Street (formerly Mohawk Road) and west of Filman Road, where both Tiffany Creek and Tiffany Falls were located.

The approximate population of the Tiffany Creek subwatershed is 3500 persons with a population density of about 376 persons per square kilometre. Current land use within the Tiffany Creek subwatershed is predominantly residential, with transportation and agricultural lands being the secondary land uses (**Table TI-2**). As late as 1990, land use was predominantly agricultural in Tiffany Creek, with these lands stretching from south of Golf Links Road to the subwatershed's southern boundary. Although **Map TI-4** indicates agricultural lands are still present north of Garner Road, these lands have been developed for residential purposes; however, agricultural land use is currently still prominent south of Garner Road. Highway 403 intersects through this subwatershed along with many minor roadways accommodating the increasing residential lands. Although commercial land use is evident along Garner Road, the major commercial district is found within the Meadowlands complex, north of Golf Links Road. Open space and institutional lands are strategically placed among residential areas. It appears as though one property within this subwatershed is being used for industrial purposes. This property is located along Garner Road and a tributary of Tiffany Creek is present at this location. Two major utility corridors exist, and both span the Headwaters to Meadowlands catchments. Impervious surfacing within this subwatershed exceeds standards recommended for healthy stream systems.

In Tiffany Creek subwatershed there is potential to naturalize an additional 400 m² 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 many properties that do not have natural features present, there are 284 properties that do accommodate forest, wetland, meadow or riparian / aquatic habitat (**Table TI- 3**). Of these landowners, 52 (or 18%) have been contacted by the Hamilton-Halton Watershed Stewardship Program, and 4 (or 8%) have become Watershed Stewards (**Map TI-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 Tiffany Falls catchment; therefore this would be a good catchment in which to start a community greening project and Friends of Tiffany group. In addition to this area of the subwatershed, private landowner contact within the newly developed residential area surrounding Tiffany Creek Headwaters ESA, south of the intersection of Stone Church Road and Stonehenge Drive, has demonstrated some interest in stewardship and therefore this area could also be a potential area to start a community greening project or Friends of Tiffany group. Additionally, Redeemer University College has been recognized as a Watershed Steward within the Headwaters catchment. There is great opportunity for landowner contact within the Headwaters and Meadowlands catchments, along the stream corridor and surrounding the Tiffany Creek Headwaters ESA.

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 TI- 4** displays the status of Tiffany Creek subwatershed when compared to these Federal guidelines.

Due to the high percentage of impervious surfacing and because this subwatershed is a historically cool water system, proper BMPs regarding storm water management must be enforced and must encourage groundwater infiltration in order to maintain or enhance cool water fisheries. This is especially important in the Headwaters catchment as a great deal of development is planned for this area of the subwatershed.

This subwatershed has undergone several land cover and hydrologic alterations over the past 25 years, and as a result the water quality and fisheries potential are suffering. Upland forest and wetland cover must increase for this subwatershed to be able to meet the demands of current and proposed development plans. In order to de-list Hamilton Harbour as an Area of Concern, it is important that restoration efforts occur within this subwatershed, resulting in a decrease in sedimentation in Ancaster Creek and ultimately Cootes Paradise

Marsh. This can be achieved through urban storm water 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 preserving natural land cover and stream corridors. It is also thought that phosphorus loading may increase in this subwatershed in the future due to the increase in residential development and anticipated use of lawn fertilizers.

Table TI- 2: Land Use Statistics

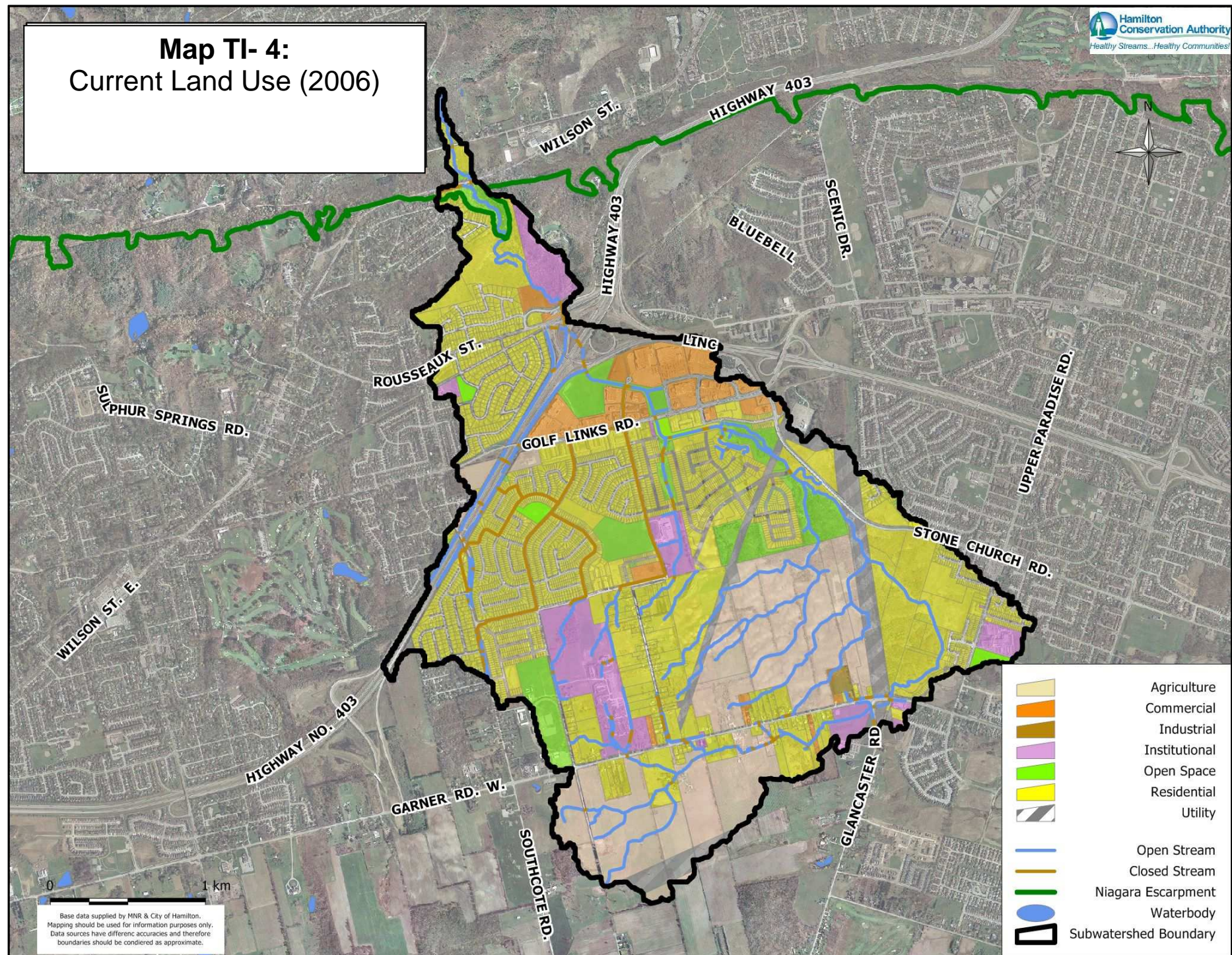
Area (km ²)	Agricultural (km ²)	Commercial (km ²)	Industrial (km ²)	Institutional (km ²)	Open Space (km ²)	Residential (km ²)	Transportation (km ²)	Utility (km ²)	Impervious Surfacing (%)
9.3	1.7	0.5	0.03	0.67	0.7	3.9	1.4	0.4	34

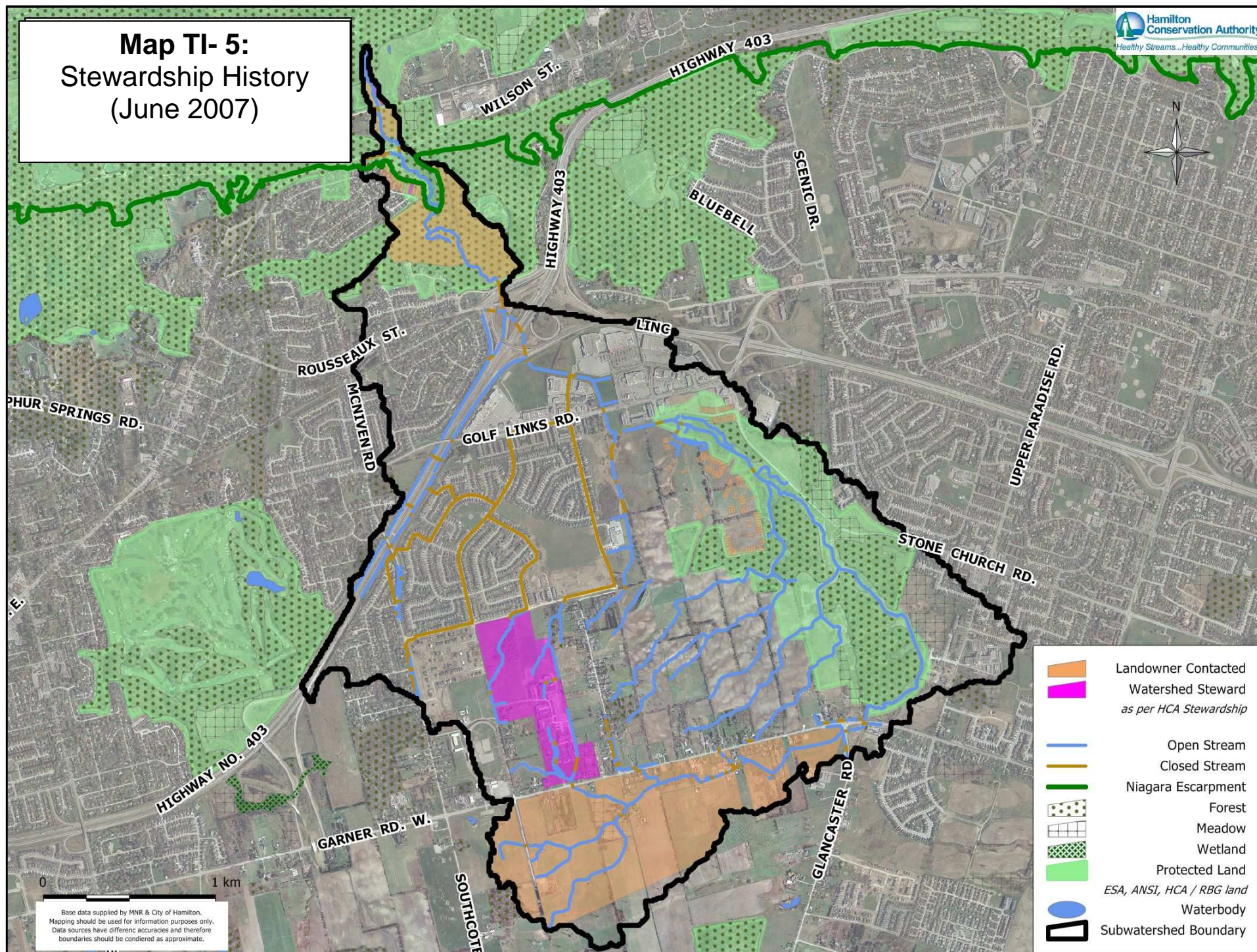
Table TI- 3: Stewardship Statistics

Approximate Population	Population Density (persons / km ²)	Total # of Properties with Forest, Wetland, Meadow or Watercourse	# of Landowners with Forest, Wetland, Meadow or Watercourse & Contacted by HCA Stewardship	# of HCA Stewardship Watershed Stewards with Forest, Wetland, Meadow or Watercourse	Total # of Landowners in Subwatershed Contacted by HCA Stewardship	Total # HCA Stewardship Watershed Stewards in Subwatershed
3500	376	284	52	4	174	4

Table TI- 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
<i>GUIDELINE</i>	6	75% with 30m buffer on either side	Below 25 mg/L	< 10	Based on historical data / watershed characteristics	30	2km ² & min 500m wide	10% < 100m from forest edge
<i>SUBWATERSHED STATUS</i>	5.4	n/a	n/a	34	Historically cool – now cool to warm	11.8	0.4km ² & sections are 500m wide	n/a





SUBWATERSHED STRESSES & STEWARDSHIP ACTIONS

There are fifteen Subwatershed-wide Stresses identified within the Tiffany 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 Error! Reference source not found..

Table TI - 6 outlines the Stewardship Actions and measurable targets for each of the Subwatershed-wide Stresses listed in **Table TI-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 Tiffany Creek subwatershed, 58 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 TI-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 development in the headwaters of this subwatershed is of great concern to the fisheries potential as it increases the potential for erosion downstream. Present natural systems (aquatic & terrestrial) must remain intact and preserved in order to maintain the integrity of this historically coolwater 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 forest restoration in the headwaters may also be of benefit to mitigate existing erosion resulting from past and present development. Additionally, phosphorus loading and the use of pesticides are of concern in this area.



Areas to highlight in this subwatershed are the natural areas surrounding the Tiffany Creek Headwaters ESA and the existing historical wetlands at that location, as well as the potential for establishing a Friends of Tiffany group within the Tiffany Falls catchment, south of the intersection of Stone Church Road and Stonehenge Drive. 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 TI- 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)


Table TI- 6: Stewardship Actions & Inventories of Site-level Stresses


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Channelization / Buried Streams Map Code: CB</p>  <p>Definition: The structural alteration of a stream channel, usually involves straightening of meanders and increasing gradient which increases velocity and erosion potential.</p> <hr/> <p>Inventory of Sites Identified = 2</p> <hr/> <p>Catchment Locations: Meadowlands (2)</p> <hr/> <p>Audience: CITY / HHHBA / developers / private & public landowners</p>	<p>2008-2012: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct landowner contact to create awareness regarding the detrimental effects of channelized and buried streams;</p> <ul style="list-style-type: none"> ▪ Partners: DFO / HCA / MNR / Ont. Stewardship Council / HHWSP 	<p>By 2010: Identify sites for undertaking buried stream “daylighting” projects in the subwatershed;</p> <ul style="list-style-type: none"> • Partners: HCA / CITY / MNR / post-sec. schools / HHWSP <p>By 2010: Assess landowner motivation for contributing to natural channel design;</p> <ul style="list-style-type: none"> • Partners: HCA / MNR / post-sec. schools / HHWSP <p>By 2012: 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"> ▪ Partners: HCA / MNR / post-sec. schools 	<p>2011-2012: 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"> ▪ Partners: CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP ▪ <p>By 2012: Work with private landowners to undertake one “daylighting” / natural channel design project;</p> <ul style="list-style-type: none"> ▪ Partners: CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP
<p>Debris Jams Map Code: DJ</p>  <p>Definition: The accumulation of large woody debris across a stream channel which impedes flow and prevents fish migration.</p> <hr/> <p>Inventory of Sites Identified = 0</p> <hr/> <p>Audience: CITY / private & public landowners</p>	<p>2008-2012: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct landowner contact to create awareness regarding the environmental impacts of debris jams as fish barriers & flooding hazards;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / MNR / Ont. Stewardship Council / HHWSP 	<p>By 2010: 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"> ▪ Partners: HCA / MNR / post-sec. schools / HHWSP <p>By 2010: Assess landowner motivation for contributing to barrier removal projects;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / MNR / post-sec. schools / HHWSP 	<p>2011-2012: Remove debris jams based on the barrier removal project recommendations;</p> <ul style="list-style-type: none"> ▪ Partners: CITY / DFO / FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Detachment from Nature Map Code: DT</p> <p>Definition: The condition of people disassociating their existence from nature.</p>  <p>Inventory of Sites Identified = 12</p> <p>Catchment Locations: Headwaters (5) Meadowlands (6) Ancaster East (1)</p> <p>Audience: private & public landowners</p>	<p>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;</p> <ul style="list-style-type: none"> ▪ Partners: BARC / CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council <p>2008-2012: Erect creek crossing & ecological corridor signage along roadways;</p> <ul style="list-style-type: none"> ▪ Partners: BARC / CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / WPN <p>2008-2012: Implement Adopt-a-Creek projects in communities where Friends of groups are possible;</p> <ul style="list-style-type: none"> ▪ Partners: BARC / Environment Hamilton / HCA / school boards / landowners & citizens / HHWSP <p>2008-2012: Continue to implement the Watershed Steward Award Program;</p> <ul style="list-style-type: none"> ▪ Partners: BARC / Environment Hamilton / HCA / school boards / landowners & citizens / HHWSP 	<p>By 2011: Utilize citizen groups to conduct local watershed monitoring & reporting projects (including water quality, naturalization projects & litter hotspots);</p> <ul style="list-style-type: none"> ▪ Partners: BARC / Environment Hamilton / HCA / school boards / landowners & citizens 	<p>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.;</p> <ul style="list-style-type: none"> ▪ Partners: FSRT / HCA / Ont. Stewardship Council / school boards landowners & citizens / HHWSP


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Development Map Code: DV</p> <p>Definition: The process of developing populated settlements; including housing and supporting infrastructure.</p>  <p>Inventory of Sites Identified = 8</p> <p>Catchment Locations: Headwaters (5) Meadowlands (2) Ancaster East (1)</p> <p>Audience: CITY / HHHBA / developers / private landowners</p>	<p>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.);</p> <ul style="list-style-type: none"> ▪ Partners: BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO <p>2008-2012: Apply Yellow Fish Road to all catchbasins on streets and in parking areas to educate private landowners post-development;</p> <ul style="list-style-type: none"> ▪ Partners: BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO 	<p>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;</p> <ul style="list-style-type: none"> • Partners: CITY / HCA / post-sec. schools <p>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;</p> <ul style="list-style-type: none"> • Partners: CITY / HCA / post-sec. schools <p>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;</p> <ul style="list-style-type: none"> • Partners: BARC / CITY / DFO / FSRT / Green Venture / HCA / MTO 	<p>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;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / CITY <p>2008-2012: Enhance groundwater recharge by ensuring that 70% of all land, post construction must remain pervious as a condition for development application approval;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / CITY <p>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);</p> <ul style="list-style-type: none"> ▪ Partners: HCA / CITY



SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Encroachment Map Code: EN</p>  <p>Definition: The act of undertaking practices on another person's property, i.e. erecting structures, planting gardens, disposal of waste.</p> <hr/> <p>Inventory of Sites Identified = 0</p> <hr/> <p>Audience: private & public landowners</p>	<p>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);</p> <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / Ont. Stewardship Council / RBG / local nurseries & landscaping co.'s / HHWSP <p>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);</p> <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / Ont. Stewardship Council / RBG / local nurseries & landscaping co.'s / HHWSP <p>By 2010: Work with local nurseries & landscaping co.'s to educate / encourage landowners to use native plants;</p> <ul style="list-style-type: none"> • Partners: CITY / HCA / Ont. Stewardship Council / RBG / Green Venture / local nurseries & landscaping co.'s / HHWSP 	<p>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;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / landowners & citizens / HHWSP / CITY / RBG 	<p>2008-2012: Continue to work with neighbours to encourage community events to remove existing encroachments on public lands;</p> <ul style="list-style-type: none"> ▪ Partners: FSRT / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP/ RBG / CITY


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Erosion Map Code: ER</p>  <p>Definition: The process of eroding or the condition of being eroded; commonly occurs as scouring or slumping.</p> <hr/> <p>Inventory of Sites Identified = 9</p> <p>Catchment Locations: Headwaters (1) Meadowlands (4) Ancaster East (1) Tiffany Falls (3)</p> <hr/> <p>Audience: CITY / HHHBA / developers / private & public landowners</p>	<p>2008-2012: Host training sessions for City staff and developers to create awareness regarding BMPs & importance of properly maintained erosion / sediment control measures & enforcement; <ul style="list-style-type: none"> • Partners: CITY / DFO / HCA / Ont. Stewardship </p> <p>2008-2012: Utilize workshops, information sessions, literature, webpages, interpretive signage & direct private & public landowner contact to create awareness regarding the importance of riparian buffers & proper land management practices; <ul style="list-style-type: none"> ▪ Partners: CITY / DFO / HCA / Ont. Stewardship Council / HHWSP </p>	<p>By 2010: Complete field study of stream morphology, determining erosion hotspots & associated causes; <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / post-sec. schools </p>	<p>2008-2012: Utilize enforcement scheme to enforce maintenance of erosion / sediment control measures on new development sites; <ul style="list-style-type: none"> ▪ Partners: DFO / CITY / HCA / Ont. Stewardship Council / landowners & citizens </p> <p>2008-2012: Reduce erosion and promote awareness through the completion of a streambank stabilization / natural channel design demonstration project; <ul style="list-style-type: none"> ▪ Partners: DFO / CITY / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP </p> <p>2008-2012: Undertake a minimum of one riparian buffer project on private & public lands to reduce erosion. Promote no mow zones a minimum of 3m from top of bank on public and private lands; <ul style="list-style-type: none"> ▪ Partners: DFO / CITY / HCA / Ont. Stewardship Council / landowners & citizens / HHWSP </p>


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Eco-Tourism Related Degradation Map Code: ET</p>  <p>Definition: Recreational activities occurring in natural areas that inadvertently degrade the natural features of the area.</p> <hr/> <p>Inventory of Sites Identified = 2</p> <p>Catchment Locations: Tiffany Falls (2)</p> <hr/> <p>Audience: visitors to natural areas</p>	<p>2008-2012: Provide signage noting the environmental significance of natural areas & BMPs for eco-tourists;</p> <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / Ont. Stewardship Council / RBG 	<p>2009-2012: When undertaking master planning exercises, consider developing trails along ecological linkages noted in study area;</p> <ul style="list-style-type: none"> ▪ Partners: BTA / CITY / HCA / RBG 	<p>2010-2012: Develop trails to meet guidelines set in HCA's Planning & Regulation Policies & Guidelines;</p> <ul style="list-style-type: none"> ▪ Partners: BTA / CITY / HCA / RBG


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Terrestrial Habitat Fragmentation & Lack of Riparian Buffers Map Code: HR</p>  <p>Definition: Disruption of large continuous tracts of habitat; often occurring along watercourses.</p> <hr/> <p>Inventory of Sites Identified = 7</p> <p>Catchment Locations: Headwaters (4) Meadowlands (2) Ancaster East (1)</p> <hr/> <p>Audience: private & public landowners (CITY / golf courses / HCA / HYDRO ONE / MTO / RBG / school boards)</p>	<p>2008-2012: Meet with public landowners to create working relationship for land stewardship on public lands; <ul style="list-style-type: none"> Partners: HCA / Ont. Stewardship Council / HHWSP </p> <p>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; <ul style="list-style-type: none"> Partners: HCA / Ont. Stewardship Council / HHWSP </p> <p>2009-2012: Create demonstration sites on public lands that focus on varying types of terrestrial and aquatic restoration projects; <ul style="list-style-type: none"> Partners: CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP </p>	<p>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; <ul style="list-style-type: none"> Partners: CITY / HCA / post-sec. schools / HHWSP </p> <p>2008-2009: Assess landowner motivation for increasing forest, wetland, riparian & meadow / prairie habitat; <ul style="list-style-type: none"> Partners: CITY / HCA / post-sec. schools / HHWSP </p>	<p>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; <ul style="list-style-type: none"> Partners: CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP </p> <p>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; <ul style="list-style-type: none"> Partners: CITY / FSRT / HCA / Ont. Stewardship Council / school boards / landowners & citizens / HHWSP </p>


SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>On-line Ponds and Culverts Map Code: PC</p>  <p>Definition: In-stream structures that when improperly designed, inadvertently create barriers to water flow and fish migration.</p> <hr/> <p>Inventory of Sites Identified = 3</p> <p>Catchment Locations: Headwaters (1) Meadowlands (2)</p> <hr/> <p>Audience: CITY / private & public landowners</p>	<p>2008-2012: Utilize workshops, information sessions, literature & webpage, interpretive signage & direct landowner contact to create awareness regarding environmental effects of on-line ponds; <ul style="list-style-type: none"> Partners: DFO / HCA / MNR / Ont. Stewardship Council / HHWSP </p> <p>2008-2011: Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental effects of perched & closed bottom culverts; <ul style="list-style-type: none"> Partners: DFO / HCA / MNR / Ont. Stewardship Council / HHWSP </p>	<p>By 2010: Assess landowner motivation for removing/retrofitting existing on-line ponds; <ul style="list-style-type: none"> Partners: HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP </p> <p>2008-2012: Use local colleges / universities or volunteer consultants to complete studies & design for rehabilitation projects <ul style="list-style-type: none"> Partners: HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP </p> <p>2010: Assess landowner motivation for removing/retrofitting existing perched and/or closed bottom culverts; <ul style="list-style-type: none"> Partners: HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP </p> <p>2008-2012: Use local colleges / universities or volunteer consultants to complete studies & designs for rehabilitation projects; <ul style="list-style-type: none"> Partners: HCA / MNR / post-sec. schools / local eng. co.'s / HHWSP </p>	<p>2008-2012: Rehabilitate/retrofit a minimum of one on-line pond; <ul style="list-style-type: none"> Partners: DFO / CITY / HCA / post-sec. schools / local eng. co.'s / HHWSP </p> <p>2008-2012: Rehabilitate/retrofit a minimum of one perched & closed bottom culvert; <ul style="list-style-type: none"> Partners: DFO / CITY / HCA / post-sec. schools / local eng. co.'s / HHWSP </p>

SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
Phosphorous Loading Map Code: PL  <p>Definition: Excessive phosphorous being inputted into a watercourse; often resulting from the application of fertilizer.</p> <hr/> <p>Inventory of Sites Identified = 0</p> <hr/> <p>Audience: private & public landowners</p>	<p>2008-2012: Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental impacts of phosphorus loading & alternatives to lawn fertilization;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / RBG / HHWSP / Green Venture 	<p>In 2009: Develop reduction in phosphorus loading targets & identify potential mitigation sites for each subwatershed;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / RBG / post-sec. schools / HHWSP <p>2009: Assess landowner motivation for reducing lawn fertilization;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / RBG / post-sec. schools / HHWSP / Green Venture <p>In 2008: Model phosphorus loading in the subwatersheds and compare against RAP objectives;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / RBG / post-sec. schools / RAP 	<p>2009-2012: 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 & BMPs);</p> <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / Ont. Stewardship Council / HHWSP / Green Venture
Pesticide Use Map Code: PS  <p>Definition: The application of pesticides to control perceived pests.</p> <hr/> <p>Inventory of Sites Identified = 0</p> <hr/> <p>Audience: private & public landowners</p>	<p>2008-2009: Utilize workshops, information sessions, literature & webpages, interpretive signage & direct landowner contact to create awareness regarding environmental impacts of pesticide / herbicide use & alternatives to pesticide / herbicide use;</p> <ul style="list-style-type: none"> ▪ Partners: Green Venture / Hamilton Coalition on Pesticide Issues / OMAFRA <p>2008-2012: Support the City's Pesticide By-law;</p> <ul style="list-style-type: none"> ▪ Partners: Green Venture / Hamilton Coalition on Pesticide Issues / OMAFRA 	<p>In 2008: Determine percentage of pesticide / herbicide use in each subwatershed;</p> <ul style="list-style-type: none"> ▪ Partners: Green Venture / HCPI / OMAFRA <p>In 2009: Develop reduction in pesticide / herbicide use targets & potential mitigation sites for each subwatershed;</p> <ul style="list-style-type: none"> ▪ Partners: Green Venture / HCPI / OMAFRA <p>In 2009: Assess landowner motivation for reducing pesticide use;</p> <ul style="list-style-type: none"> ▪ Partners: Green Venture / HCPI / OMAFRA 	<p>By 2011: Work toward decreasing pesticide use by 50% and by 75% in 2012 using integrated pest management, lawn naturalization, over-seeding, mulching, BMPs, etc.;</p> <ul style="list-style-type: none"> ▪ Partners: Green Venture / HCA / Hamilton Coalition on Pesticide Issues / Ont. Stewardship Council / OMAFRA

SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Plowed Watercourse Map Code: PW</p>  <p>Definition: Headwater swales or small watercourses that are worked for agricultural production.</p> <hr/> <p>Inventory of Sites Identified = 1</p> <p>Catchment Locations: (Headwaters (1))</p> <hr/> <p>Audience: private agricultural landowners</p>	<p>2008-2012: Utilize workshops, information sessions, literature & webpages & direct private landowner contact to create awareness regarding environmental effects of plowed watercourses;</p> <ul style="list-style-type: none"> ▪ Partners: DFO / HCA / OMAFRA / Ont. Stewardship Council / HHWSP <p>2008-2012: 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"> ▪ Partners: Stewardship Council / HHWSP / OSCIA 	<p>2010: Assess landowner motivation for installing grassed waterways and riparian buffers;</p> <ul style="list-style-type: none"> ▪ Partners: HCA / OMAFRA / HHWSP / HWSCIA 	<p>2008-2012: 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"> ▪ Partners: HCA / landowner / HHWSP

SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Stormsewer Outfalls / CSO's Map Code: SO</p>  <p>Definition: The point where a combined sewer overflow system discharges into a watercourse during a storm event.</p> <hr/> <p>Inventory of Sites Identified = 4</p> <p>Catchment Locations: Meadowlands (2) Ancaster East (1) Tiffany Falls (1)</p> <hr/> <p>Audience: children & private landowners (residential / commercial / industrial)</p>	<p>2008-2012: Implement the Stream of Dreams and Yellow Fish Road Programs with local schools, scout, girl guides and other children's groups, to create awareness regarding stormwater input & the impacts of CSO outfalls on stream systems; <ul style="list-style-type: none"> • Partners: BARC / CITY / FSRT / HCA </p> <p>2008-2012: Support Sewer-Use Bylaw enforcement (City of Hamilton By-law No. 04-150); <ul style="list-style-type: none"> ▪ Partners: BARC / CITY / FSRT / HCA </p>	<p>2008-2012: Conduct water quality testing at storm sewer outfalls to support a study on illegal sewer hookups, Sewer Use Bylaw enforcement, & restoration efforts; <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / post-sec. schools </p> <p>2008-2012: Conduction water quality testing at CSO outfalls pre and post mitigation to support mitigation measures; <ul style="list-style-type: none"> ▪ Partners: CITY / HCA / post-sec. schools </p>	<p>2008-2010: Reduce flows & sedimentation through riparian buffer establishment downstream of CSO outfalls (public lands); <ul style="list-style-type: none"> ▪ Partners: CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / landowners & citizens </p> <p>By 2012: 80% of connected downspouts to be disconnected & rain barrels to be utilized as an alternative; <ul style="list-style-type: none"> ▪ Partners: CITY / FSRT / Green Venture / HCA / Ont. Stewardship Council / landowners & citizens </p>

SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Stormwater Mismanagement Map Code: SWM</p>  <p>Definition: Inadequately managing stormwater to control flooding and protect property; often associated with the drainage of developed lands.</p> <hr/> <p>Inventory of Sites Identified = 9</p> <p>Catchment Locations: Meadowlands (5) Ancaster East (2) Tiffany Falls (2)</p> <hr/> <p>Audience: HHHBA / developers / private & public landowners (residential / commercial / industrial)</p>	<p>2008-2012: Continue to promote Best Management Practices as per HCA Planning and Regulations Policy and Guidelines and new provincial directives for new developments; <ul style="list-style-type: none"> ▪ Partners: CITY / Green Venture / HCA </p> <p>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); <ul style="list-style-type: none"> ▪ Partners: CITY / Green Venture / HCA </p>	<p>By 2010: Determine percentage of landowners with connected downspouts; <ul style="list-style-type: none"> ▪ Partners: CITY / Green Venture / HCA </p> <p>By 2010: Assess landowner motivation for disconnection & implementing source control measures; <ul style="list-style-type: none"> ▪ Partners: CITY / Green Venture / HCA </p>	<p>By 2012: 80% of connected downspouts to be disconnected & rain barrels to be utilized as an alternative; <ul style="list-style-type: none"> ▪ Partners: CITY / Green Venture / HCA / landowners </p> <p>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; <ul style="list-style-type: none"> ▪ Partners: CITY / Green Venture / HCA / landowners </p>

SUBWATERSHED-WIDE STRESS	STEWARDSHIP ACTIONS		
	Awareness Opportunity	Special Study Opportunity	Restoration Opportunity
<p>Water Contamination through Transportation Corridors Map Code: TC</p>  <p>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.</p> <hr/> <p>Inventory of Sites Identified = 1</p> <p>Catchment Locations: Meadowlands (1)</p> <hr/> <p>Audience: CITY / MTO</p>	<p>2008-2012: Host training sessions for City staff to create awareness & encourage environmentally friendly road salt alternatives & proper snow removal practices;</p> <ul style="list-style-type: none"> ▪ Partners: CITY / DFO / HCA / MTO / Ont. Stewardship Council 	<p>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;</p> <ul style="list-style-type: none"> ▪ Partner: CITY / HCA / MTO / post-sec. schools 	<p>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;</p> <ul style="list-style-type: none"> ▪ 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 Conserver 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)

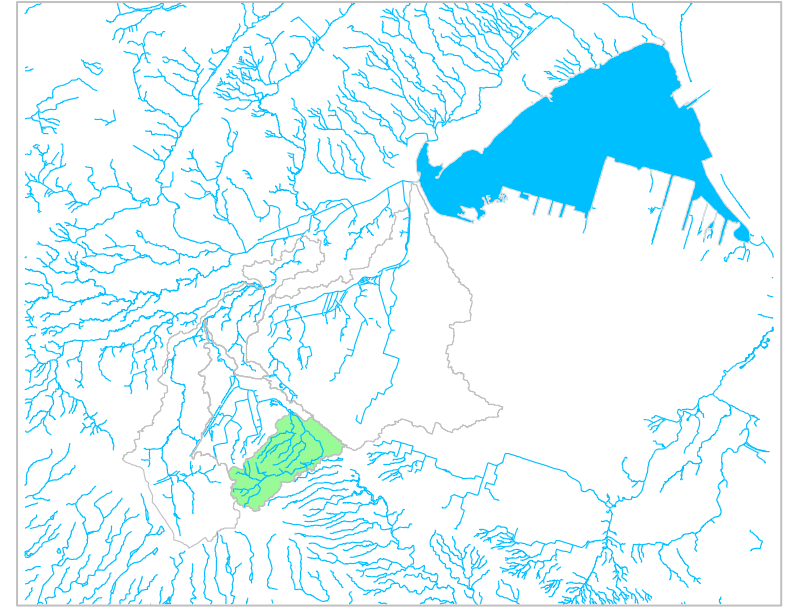
TARGET AUDIENCES:

- 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

CATCHMENT SUMMARIES

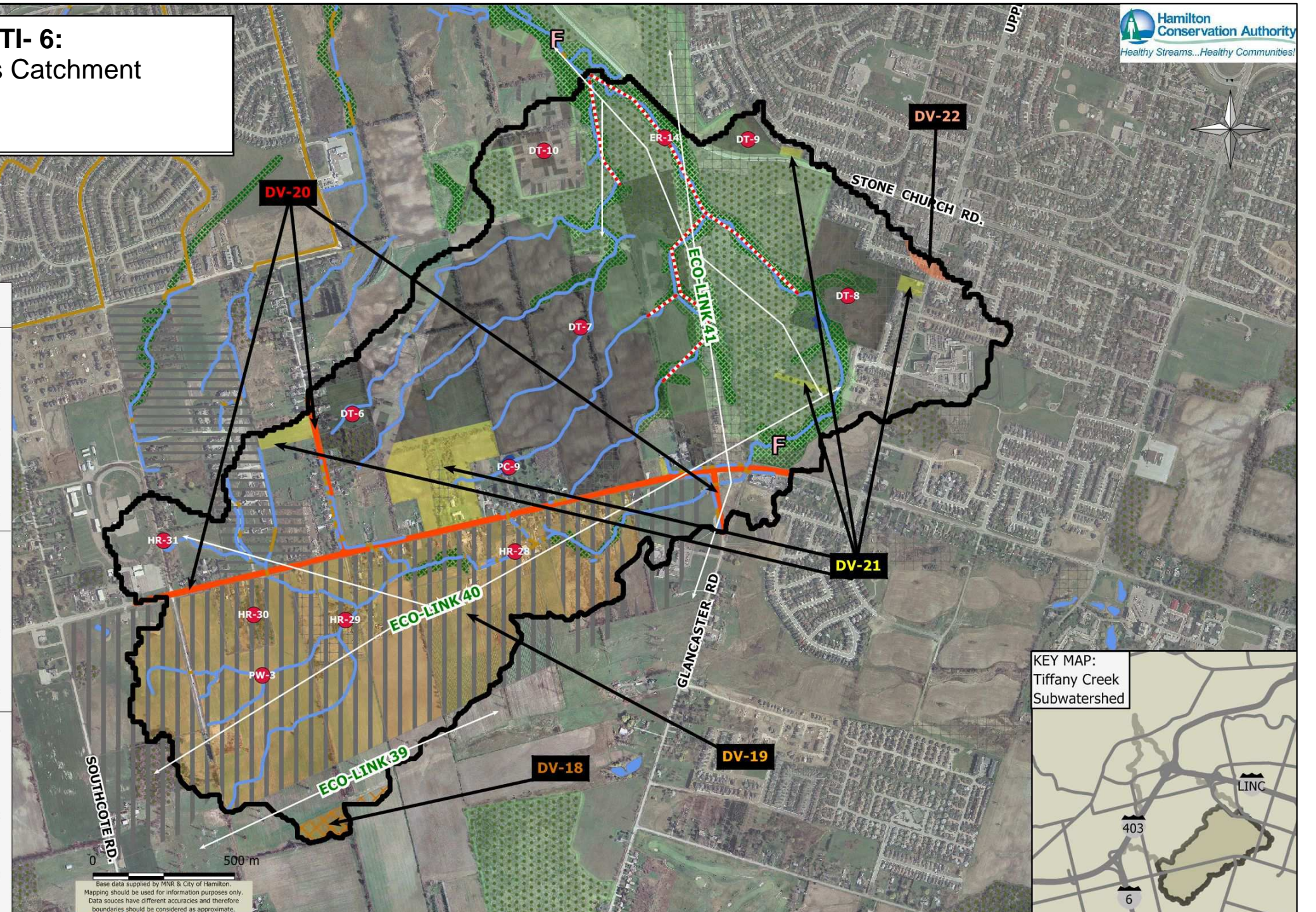
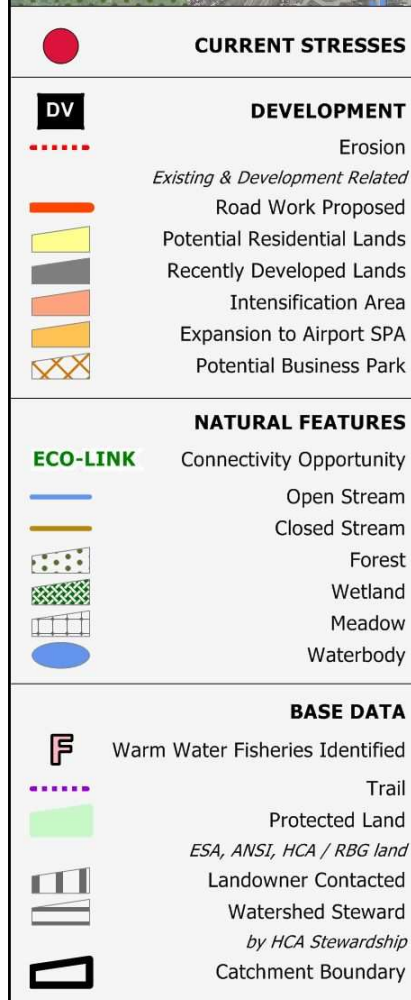
This section of the plan identifies the Site-level Stresses within each catchment of Tiffany Creek subwatershed. A summary of these stresses, proposed ecological linkage / trail opportunities, and associated watershed monitoring results are indicated in the data sheets following the catchment map. Ecological Linkage Opportunities have been identified

between fragments of large tracts of land where the potential for re-establishing connectivity between the natural areas exists. Opportunities for the construction of trail systems are also present in these corridors. In total, 58 Site-level Stresses were identified for the Ancaster Creek subwatershed and inventory counts are presented in Table TI- 6.



HEADWATERS CATCHMENT
DATA SHEETS

Map TI- 6: Headwaters Catchment



Base data supplied by MNR & City of Hamilton.
Mapping should be used for information purposes only.
Data sources have different accuracies and therefore
boundaries should be considered as approximate.

HEADWATERS DATA SHEET

SITE-LEVEL STRESSES

FUTURE STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS		
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY
DV-18	Expansion to Airport SPA / Airport Employment Area Business Park	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DV-19	Expansion to Airport SPA	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DV-20	Road Work Proposed – widening & improvements	<input checked="" type="checkbox"/>		
DV-21	Potential Residential Lands	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DV-22	Intensification Area	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ER-14	See below			

CURRENT STRESSES	DESCRIPTION	PUBLIC LAND	PRIVATE LAND	STEWARDSHIP ACTIONS			DFO COMP PROJECT POTENTIAL	DEMO SITE POTENTIAL
				AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY		
DT-6	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-7	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-8	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-9	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-10	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
ER-14	Existing & development related erosion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HR-28	Habitat fragmentation – loss of wetland habitat		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
HR-29	Habitat fragmentation – loss of meadow habitat		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
HR-30	Habitat fragmentation – loss of forest habitat		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
HR-31	Habitat restoration – increase riparian habitat		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
PC-9	Online pond		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
PW-3	Plowed watercourse		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		

HEADWATERS DATA SHEET

ECOLOGICAL LINKAGE / TRAIL OPPORTUNITIES

ECO-LINK	DESCRIPTION
39	<p>East to West Link:</p> <ul style="list-style-type: none">Hydro corridor with low-lying native vegetation connecting to Ancaster Creek Headwaters catchment to west & Niagara Peninsula Conservation Authority to east re-connecting to Tiffany Creek Headwaters catchment Eco-link 41Incorporate existing meadow, wetland & forest habitat adjacent within hydro corridor & Tiffany Creek Headwaters ESA / protected landsECO-LINK Connections: 1Audience: Hydro One
40	<p>East to West Link:</p> <ul style="list-style-type: none">Stream corridor with meadow, wetland, forest & riparian habitat connecting to hydro corridor & stream corridor to east & Ancaster Creek Headwaters catchment to westIncorporate existing meadow, forest, wetland & riparian habitat (HR-29, HR-30, HR-31)Incorporate stream corridor passing through hydro corridor & within Tiffany Creek Headwaters ESA to south-east & north-west north & north of Garner Rd & incorporate riparian buffersConnect to forest habitat to west on private property in Ancaster Creek Headwaters catchmentIncrease riparian buffers & eliminate plowing through watercourses (PW-3) to reduce erosion downstreamPotential for historical wetland restoration to reduce erosion downstream & maintain base flows incorporating existing wetland (HR-28)ECO-LINK Connections: 1, 41Audience: Hydro One, developers, private & commercial landowners
41	<p>South to North Link:</p> <ul style="list-style-type: none">Hydro corridor to with low-lying native vegetation connecting to Niagara Peninsula Conservation Authority watershed to south re-connecting to Tiffany Creek Headwaters catchment Eco-link 39 & Tiffany Creek Meadowlands catchment to northIncorporate existing forest, wetland & riparian habitatIncorporate stream corridors through Tiffany Creek Headwaters ESA / protected landsPotential for reduction of erosion stress (ER-14) through increased riparian buffers (DFO compensation project potential)ECO-LINK Connections:Audience: City Parks, HCA, Hydro One, school boards, private landowners

HEADWATERS DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	DESCRIPTION
Downstream of Garner Rd. east of Glancaster Rd.	June 1992	Warm water fish identified
North of catchment boundary	June 1992	Warm water fish identified

BENTHICS ASSESSMENT

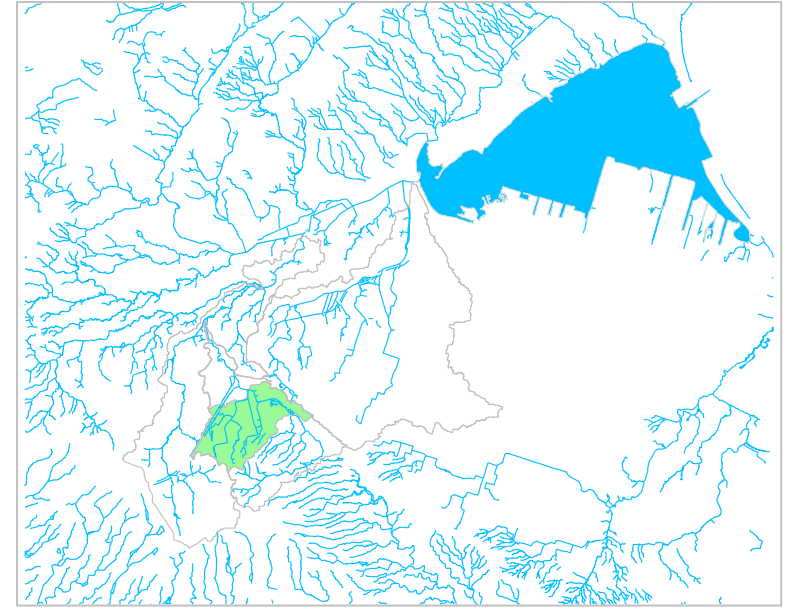
LOCATION	DATE	DESCRIPTION
n/a		

WATER QUALITY ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		

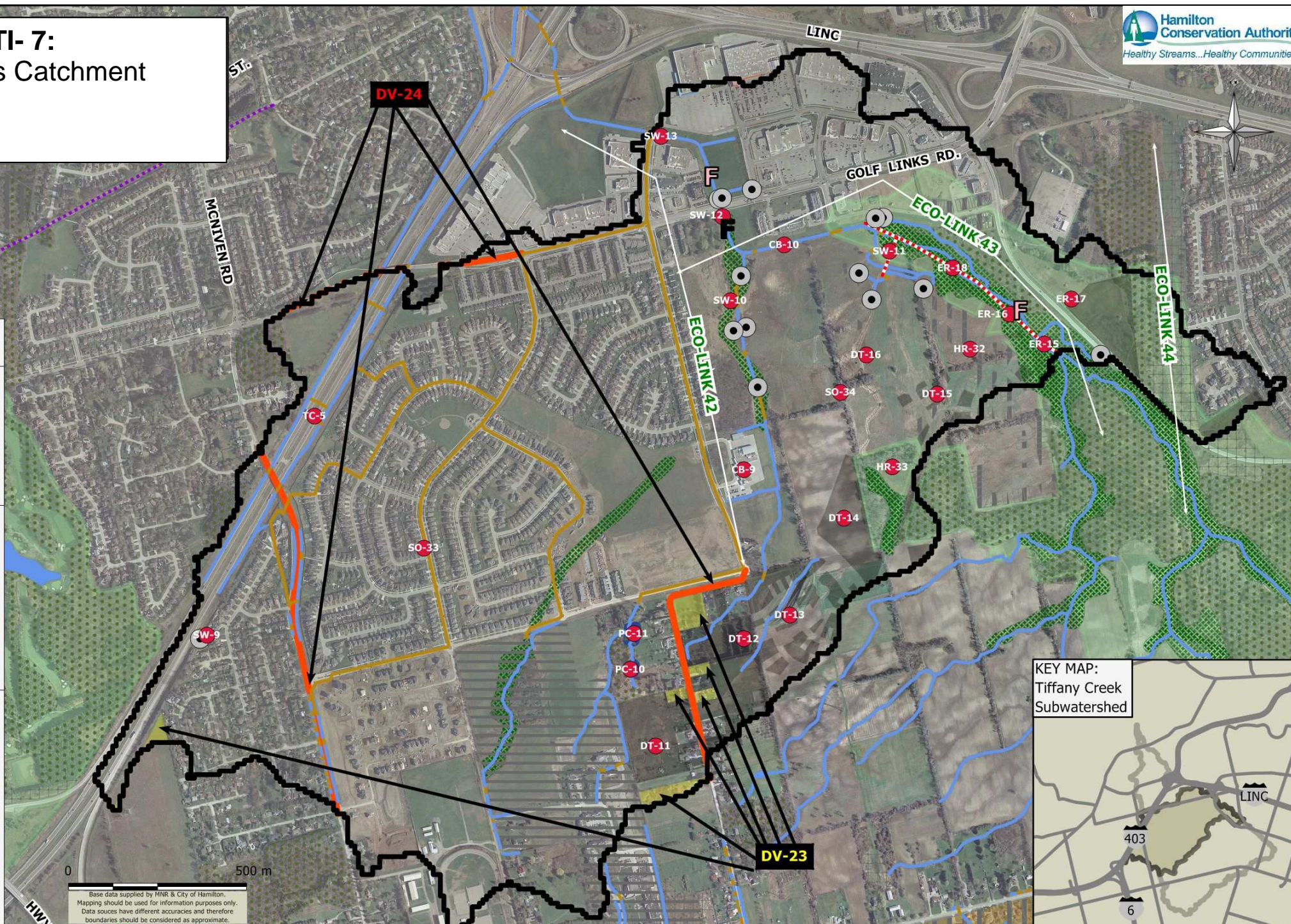
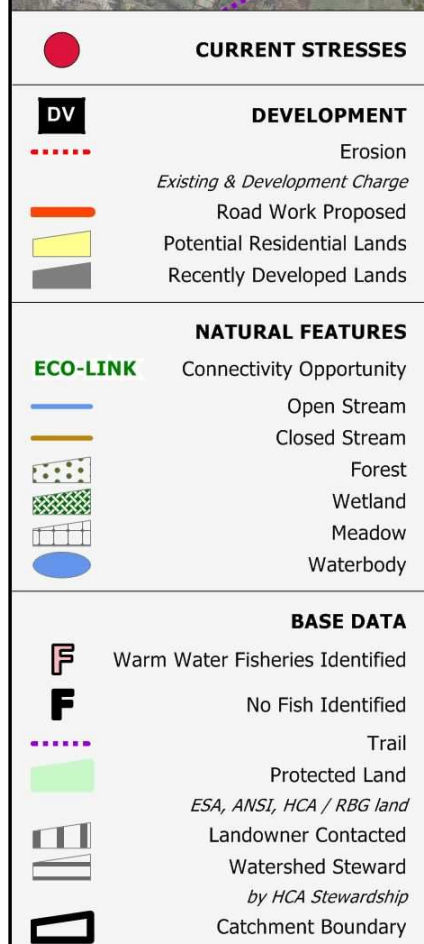
WATER FLOW ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		



MEADOWLANDS CATCHMENT
DATA SHEETS

Map TI- 7: Meadowlands Catchment



MEADOWLANDS DATA SHEET

SITE-LEVEL STRESSES

FUTURE STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS		
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY
DV-23	Potential Residential Lands	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DV-24	Road Work Proposed – widening & improvements	<input checked="" type="checkbox"/>		
ER-18	See below			

CURRENT STRESSES	DESCRIPTION	PUBLIC LAND	PRIVATE LAND	STEWARDSHIP ACTIONS			DFO COMP PROJECT POTENTIAL	DEMO SITE POTENTIAL
				AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY		
CB-9	Channelized stream		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CB-10	Channelized stream	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DT-11	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-12	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-13	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-14	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-15	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
DT-16	New residential developments		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
ER-15	Erosion / sediment control measures remaining after development complete	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
ER-16	Erosion / sediment control measures remaining after development complete	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
ER-17	Erosion / sediment control measures remaining after development complete		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
ER-18	Existing & development related erosion	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
HR-32	Habitat restoration – increase meadow habitat	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
HR-33	Habitat restoration – increase forest habitat			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
PC-10	Online pond		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
PC-11	Online pond		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
SO-33	Storm sewers		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
SO-34	Multiple storm sewer outfall locations along creek	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
SW-9	Dry storm water management pond naturalization			<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
SW-10	Dry storm water management pond naturalization	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
SW-11	Dry storm water management pond naturalization	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
SW-12	Storm water management retrofit of dry pond to wet pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
SW-13	Storm water management retrofit of dry pond to wet pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
TC-5	Water contamination from Hwy 403	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

MEADOWLANDS DATA SHEET

ECOLOGICAL LINKAGE / TRAIL OPPORTUNITIES

ECO-LINK	DESCRIPTION
42	<p>South to North Link:</p> <ul style="list-style-type: none">Stream corridor with wetland & riparian habitat connecting to Tiffany Creek Ancaster East catchment to north & stream corridor to eastIncorporate existing wetland & riparian habitatIncrease riparian buffers along corridor with potential for natural channel design (CB-9)Incorporate dry storm water management pond naturalization (SW-10) & dry to wet pond retrofit (SW-12, SW-13) to reduce erosion downstreamPotential for historical wetland restoration to reduce erosion downstream & maintain base flows incorporating existing wetlandECO-LINK Connections: 43Audience: City Parks, private landowners
43	<p>South to North Link:</p> <ul style="list-style-type: none">Stream corridor with wetland, forest & riparian habitat connecting to Tiffany Creek Headwaters catchment to south & stream corridor to westIncorporate existing forest, wetland & riparian habitatIncrease low-lying native vegetation & connection to hydro corridor (HR-32)Increase terrestrial wildlife passage to stream corridor through removal of erosion / sediment control measures (ER-15, ER-16)Preserve / enhance existing forest & wetland habitat along stream corridor to reduce erosion (ER-18)In-stream plantings downstream of outfalls (SO-34) to reduce erosion (ER-18) downstreamIncorporate dry storm water management pond naturalization (SW-11) to reduce erosion / sedimentation downstreamEnhance riparian habitat & potential for natural channel design (CB-10) to reduce erosion / sedimentation downstreamPotential for historical wetland restoration to reduce erosion downstream & maintain base flows incorporating existing wetlandECO-LINK Connections: 41, 42Audience: City Parks, HCA Land Mgmt
44	<p>South to North Link:</p> <ul style="list-style-type: none">Hydro corridor to with low-lying native vegetation within Tiffany Creek ESA / protected land connecting to Tiffany Creek Headwaters catchment & stream corridor to south & Chedoke Creek Mid-Chedoke catchment to northIncorporate & enhance existing forest & meadow habitat (potential demonstration site)ECO-LINK Connections: 41Audience: Hydro One

MEADOWLANDS DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	DESCRIPTION
Within Tiffany Creek Headwaters ESA	June 1992	Warm water fish identified
Upstream of dry storm water management pond (SW-12)	n/a	No fish identified
Downstream of dry storm water management pond (SW-12)	June 1992	Warm water fish identified

BENTHICS ASSESSMENT

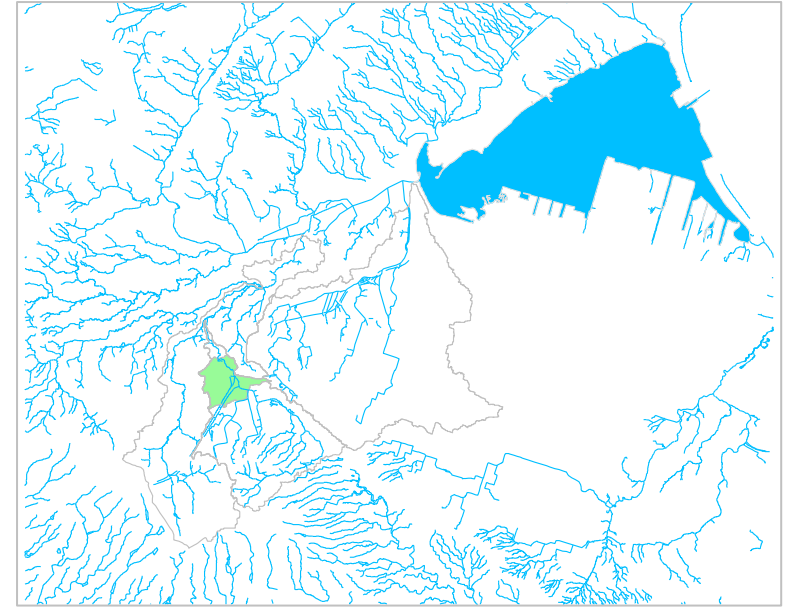
LOCATION	DATE	DESCRIPTION
n/a		

WATER QUALITY ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		

WATER FLOW ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		



ANCASTER EAST CATCHMENT
DATA SHEETS

Map TI-8 Ancaster East Catchment

CURRENT STRESSES

DEVELOPMENT

- Erosion
- Road Work Proposed
- Existing & Development Charge
- Recently Developed Lands

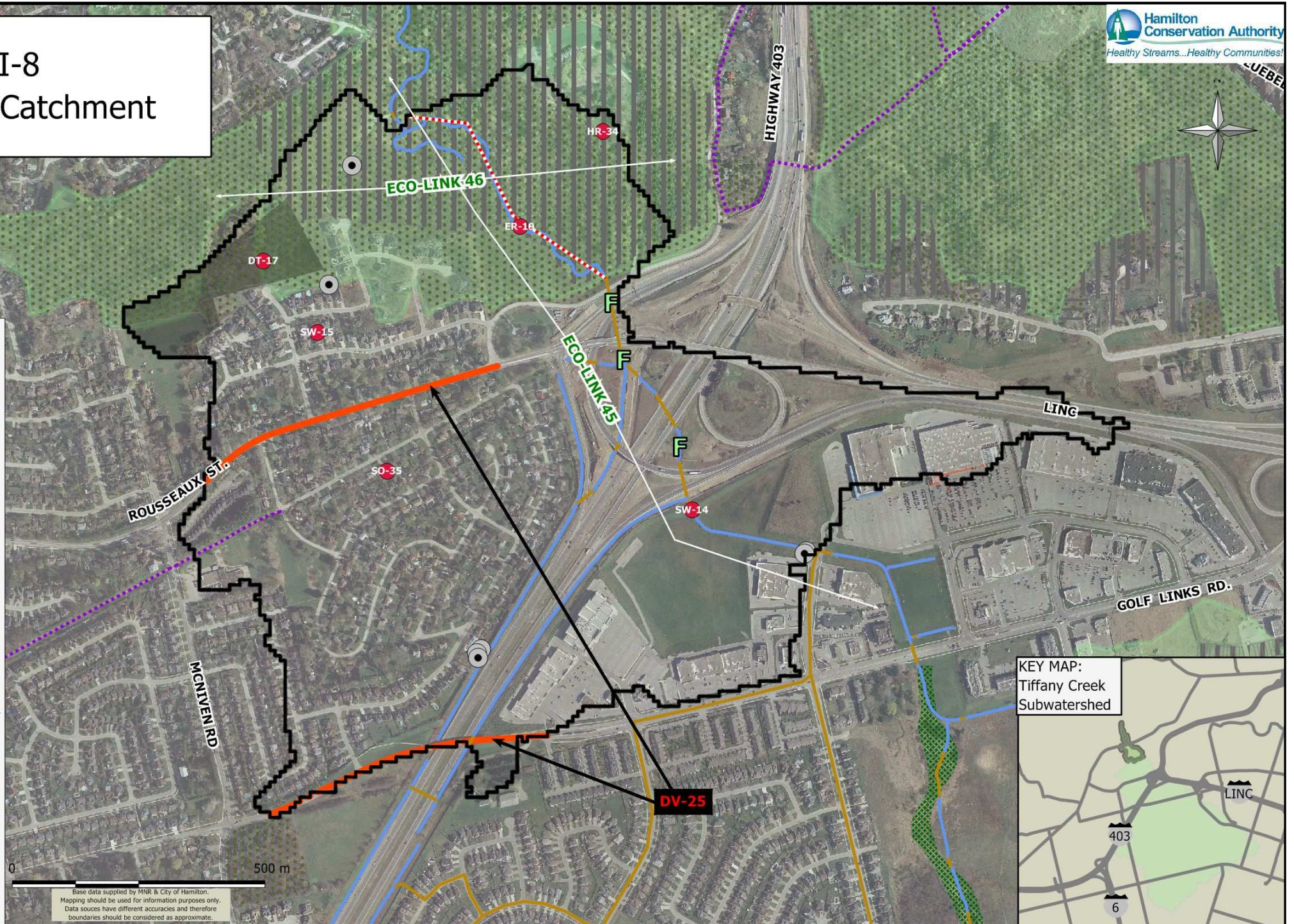
NATURAL FEATURES

ECO-LINK

- Connectivity Opportunity
- Open Stream
- Closed Stream
- Forest
- Wetland
- Meadow
- Waterbody

BASE DATA

- Cool to Warm Water Fish Identified
- Trail
- Protected Land
- ESA, ANSI, HCA / RBG land
- Landowner Contacted
- Watershed Steward
- by HCA Stewardship
- Catchment Boundary



ANCASTER EAST DATA SHEET

SITE-LEVEL STRESSES

FUTURE STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS		
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY
DV-25	Road Work Proposed – widening & improvements	<input checked="" type="checkbox"/>		
ER-19	See below			

CURRENT STRESSES	DESCRIPTION	PUBLIC LAND	PRIVATE LAND	STEWARDSHIP ACTIONS			DFO COMP PROJECT POTENTIAL	DEMO SITE POTENTIAL
				AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY		
DT-17	New residential development		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
ER-19	Existing & development related erosion / noted in HCA 1996 study		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
HR-34	Habitat restoration – increase forest habitat		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
SO-35	Storm sewers		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
SW-14	Storm water management retrofit of dry pond to wet pond	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
SW-15	Dry storm water management pond naturalization		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		

ANCASTER EAST DATA SHEET

ECOLOGICAL LINKAGE / TRAIL OPPORTUNITIES

ECO-LINK	DESCRIPTION
45	<p>South to North Link:</p> <ul style="list-style-type: none">Stream corridor with forest & riparian habitat connecting to Tiffany Creek Meadowlands catchment to south & Tiffany Creek Tiffany Falls catchment to northIncorporate existing forest & riparian habitatIncrease forest habitat riparian buffers along corridor to reduce erosion / sedimentation downstream (ER-19)Potential for wildlife overpass / underpass crossing Hwy 403 to increase connectivity between Tiffany Creek Meadowlands catchment & Tiffany Falls ESA / protected landsIncorporate dry to wet pond retrofit (SW-14) to reduce erosion downstreamPotential for historical wetland restoration to reduce erosion downstream & maintain base flowsWildlife crossing signage / creek crossing signage potentialECO-LINK Connections: 42Audience: City Parks, MTO, Tamahaac Club, private landowners
46	<p>West to East Link:</p> <ul style="list-style-type: none">Connection with Ancaster Creek Upper Valley catchment to west through Tiffany Falls ESA / protected lands to Ancaster Creek Lower Valley catchmentIncorporate existing forest & riparian habitat within ESA / protected landPreserve & enhance forest habitat on private property (HR-34)Wildlife crossing signage / creek crossing signage potentialECO-LINK Connections: 45Audience: private landowners

ANCASTER EAST DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	DESCRIPTION
Downstream of SW-14	August 1999	No Fish Identified
Downstream of the site above	August 1999	Cool to warm water fish identified
Downstream of the site above	August 1995	Cool to warm water fish identified

BENTHICS ASSESSMENT

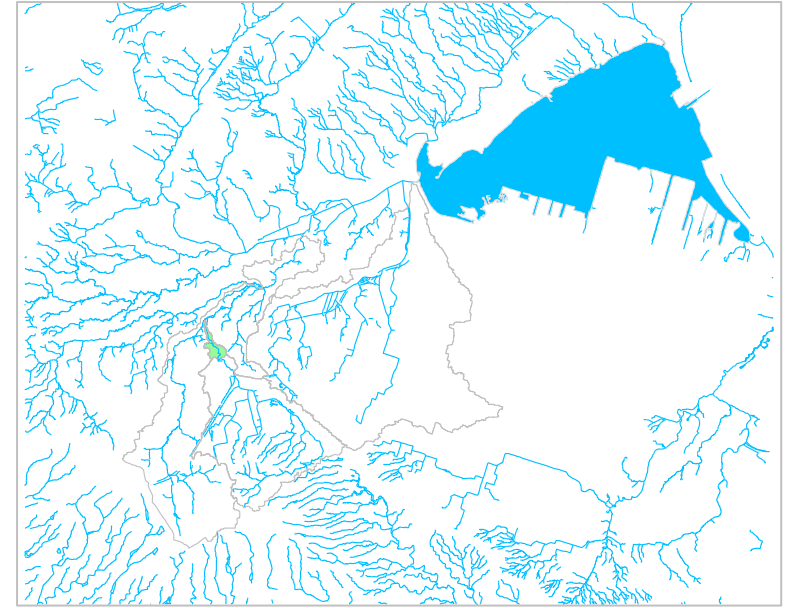
LOCATION	DATE	DESCRIPTION
n/a		

WATER QUALITY ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		

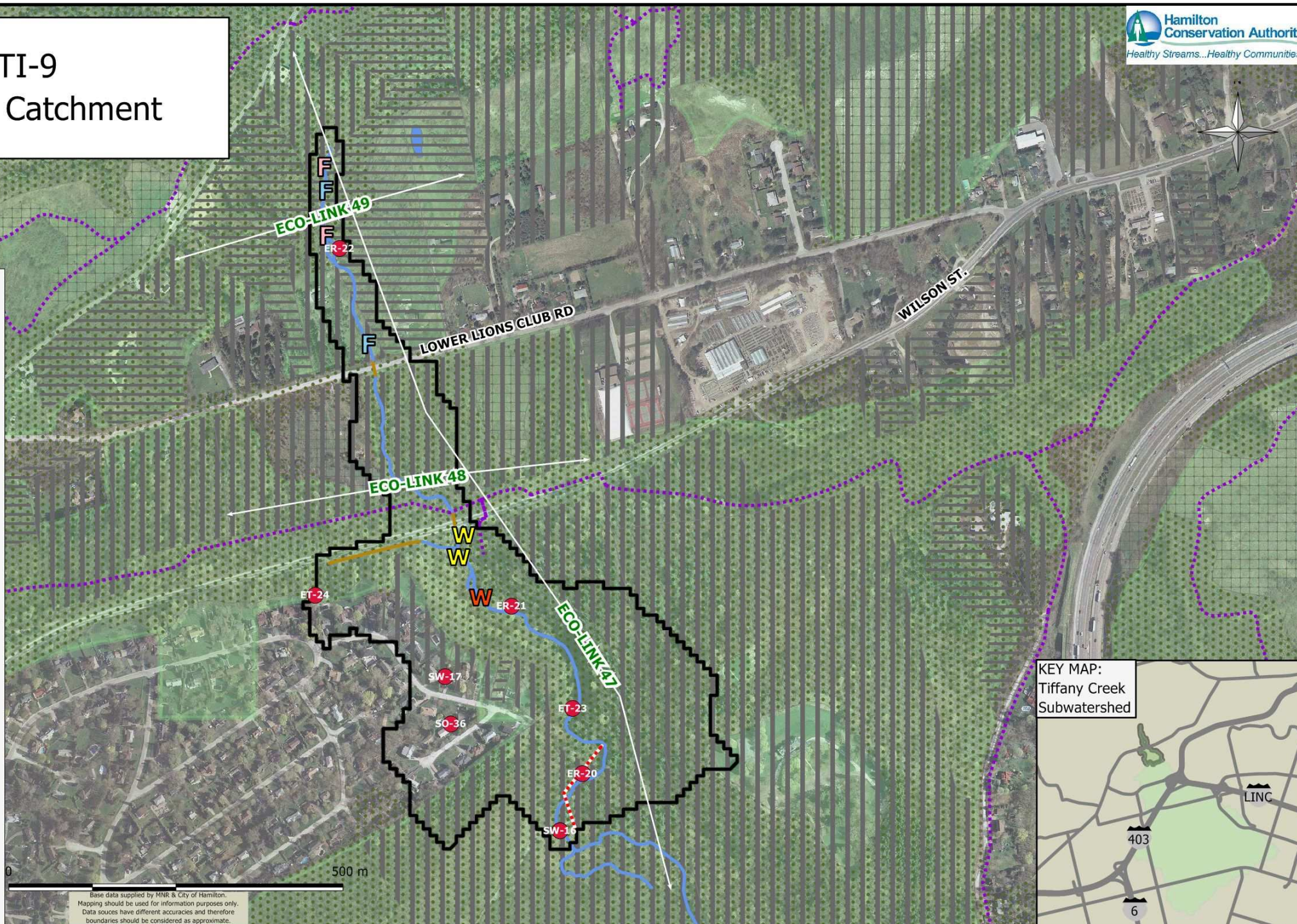
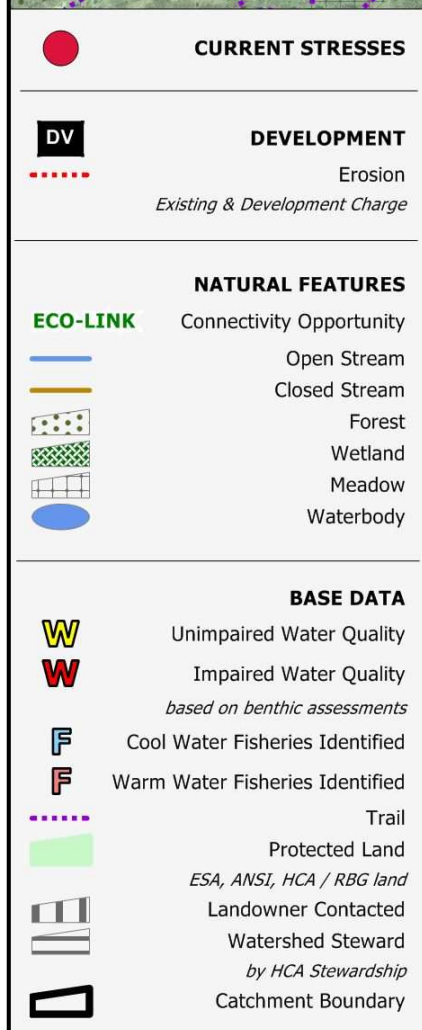
WATER FLOW ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		



TIFFANY FALLS CATCHMENT
DATA SHEETS

Map TI-9 Tiffany Falls Catchment



TIFFANY FALLS DATA SHEET

SITE-LEVEL STRESSES

FUTURE STRESSES	DESCRIPTION	STEWARDSHIP ACTIONS		
		AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY
ER-20	See below			

CURRENT STRESSES	DESCRIPTION	PUBLIC LAND	PRIVATE LAND	STEWARDSHIP ACTIONS			DFO COMP PROJECT POTENTIAL	DEMO SITE POTENTIAL
				AWARENESS OPPORTUNITY	SPECIAL STUDY OPPORTUNITY	RESTORATION OPPORTUNITY		
ER-20	Existing & development related erosion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ER-21	Existing erosion noted in 1996 HCA study	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ER-22	Existing erosion noted in 1996 HCA study		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ET-23	Ecotourism at Tiffany Falls	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>
ET-24	Ecotourism at Ancaster Heights Falls	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
SO-36	Storm sewers		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
SW-16	Dry storm water management pond naturalization		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
SW-17	Connected downspouts		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		

TIFFANY FALLS DATA SHEET

ECOLOGICAL LINKAGE / TRAIL OPPORTUNITIES

ECO-LINK	DESCRIPTION
47	<p>South to North Link:</p> <ul style="list-style-type: none">▪ Stream corridor with forest & riparian habitat connecting to Tiffany Creek Ancaster East catchment to south through Tiffany Falls ESA / protected lands & Dundas Valley ESA / protected lands & Ancaster Creek Lower Valley catchment to north▪ Incorporate existing forest & riparian habitat▪ Increase forest habitat riparian buffers along corridor to reduce erosion / sedimentation downstream (ER-20, ER-21, ER-22)▪ Incorporate dry pond naturalization (SW-16) to reduce erosion downstream▪ Wildlife crossing signage / creek crossing signage potential▪ ECO-LINK Connections: 12, 15, 16, 18, 19, 45▪ Audience: City Transportation, HCA, private landowners
48	<p>West to East Link:</p> <ul style="list-style-type: none">▪ Connection with Ancaster Creek Upper Valley catchment to west through Tiffany Falls ESA / protected lands to Ancaster Creek Lower Valley catchment▪ Incorporate existing meadow, forest & riparian habitat within ESA / protected land▪ Preserve & enhance meadow & forest habitat on private property▪ Wildlife crossing signage / creek crossing signage potential▪ Trail currently in place▪ ECO-LINK Connections: 15, 19, 47▪ Audience: HCA, private landowners
49	<p>West to East Link:</p> <ul style="list-style-type: none">▪ Connection with Ancaster Creek Upper Valley catchment to west through Tiffany Falls ESA / protected lands to Ancaster Creek Lower Valley catchment▪ Incorporate existing forest & riparian habitat within ESA / protected land▪ Preserve & enhance forest habitat on private property▪ ECO-LINK Connections: 12, 18, 47▪ Audience: private landowners

TIFFANY FALLS DATA SHEET

FISHERIES ASSESSMENT

LOCATION	DATE	DESCRIPTION
Downstream of Lower Lions Club Rd.	August 2000	Cool water fish identified (18.5°C)
Downstream of ER-22	June 1992	Warm water fish identified
Downstream of above	June 1998	Cool water fish identified
Downstream of above	July 2000	Warm water fish identified (16°C)

BENTHICS ASSESSMENT

LOCATION	DATE	DESCRIPTION
Downstream of ER-21	2001	Impaired
Downstream of above	2001	Unimpaired
Downstream of above	2000	Unimpaired

WATER QUALITY ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		

WATER FLOW ASSESSMENT

LOCATION	DATE	DESCRIPTION
n/a		

