

GREENHILL, HANNON, UPPER DAVIS AND UPPER OTTAWA CREEKS STEWARDSHIP ACTION PLANS

Part of the Red Hill Creek Stewardship Action Plan 2013

STEWARDSHIP ACTION PLANS: Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks
Part of the Red Hill Creek Stewardship Action Plan
September 2013

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Without the support and continued commitment to the Red Hill Creek watershed from the above-noted individuals and organizations, these plans would not be possible and the implementation of these plans would not become a reality.

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EXECUTIVE SUMMARY

Environmental organizations in the subwatersheds of Red Hill Creek have a growing need for a coordinated effort among all stakeholders to implement stewardship activities. Stewardship is the act of managing our natural environment in a sustainable manner, to maintain it in a healthy state for today and for future generations.

Numerous organizations have been working diligently within these subwatersheds for decades. With complementary work plans, measurable targets and a coordinated implementation effort, each of the organizations will continue working, capitalizing on their collective potential to effect positive environmental change on the landscape.

A review of action items outlined in the 1998 Red Hill Watershed Action Plan, and outstanding questions outlined in the 1997 Red Hill State of the Watershed Report, revealed that many actions have been undertaken by local agencies and organizations related to these reports. For example, the City of Hamilton has incorporated recommendations from these plans into master plans and subwatershed studies.

Continuing with this type of planning, since 2007 the Hamilton Conservation Authority and many of its partners have been working together to develop and implement Stewardship Action Plans that will protect and restore the natural environment in Hamilton CA's watersheds. A five-year initiative to develop action plans for all fifteen subwatersheds of Spencer Creek was recently completed. In 2012, the continuation of the initiative into the Red Hill Creek Watershed began. Since 2008, 66% of the Stewardship Actions developed for the Spencer Creek Stewardship Action Plans have been or are being implemented by the project Implementation Team.

In the sixth year of the initiative, local stakeholders have jointly developed comprehensive Action Plans for the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks subwatersheds of Red Hill Creek. These plans will serve as a guide for local partners in the implementation of stewardship actions, capitalizing on the strengths of existing partner agencies. The coordinated effort to develop and to implement these plans will ensure efficient and effective action on the part of all organizations involved.

The Plans include detailed:

- characterizations of each subwatershed,
- descriptions of environmental stresses and associated Stewardship Actions,
- catchment-level maps depicting the specific locations of stresses, and
- ecological and water quality monitoring data, where available.

Stakeholder input and Geographic Information Systems (GIS) analysis yielded the identification of environmental stresses, both natural and human-induced, within the study area.

- 34 types of stresses were identified as impacting, or having the potential to impact, our natural environment on a subwatershed scale.
- 113 specific occurrences of stresses and/or potential stresses were identified at locations throughout the subwatersheds, 3 are in Greenhill Creek, 66 in Hannon Creek, 27 in Upper Davis Creek and 17 in Upper Ottawa Creek.
- Inventories of these occurrences are outlined in Tables 1 through 4 on pages ii and iii of this summary. Refer to these Stress Inventory Tables for statistics on the types and numbers of each stress identified within each subwatershed.
- The stresses identified within the Stewardship Action Plans are not exhaustive and therefore there may be stresses occurring within Hamilton's watersheds that are not noted within these plans. Implementation of Stewardship Actions should be undertaken on a subwatershed scale to ensure that all occurrences of stresses are mitigated.
- The stresses are listed in descending order from the most prevalent to the least prevalent. Insufficient riparian buffers were identified in all subwatersheds. Stormsewer Outfalls were indicated as the most prevalent stresses in all four subwatersheds. Development was indicated as a prevalent stress in the majority of the subwatersheds. Utility pipelines, on-line ponds, habitat fragmentation were also identified as stresses within these subwatersheds as well as other occasional occurrences / potential occurrences. The locations of stresses are illustrated on the Environmental Considerations maps in the Catchment Summaries section of each action plan.
- 315 Stewardship Actions have been identified to mitigate the impacts of these stresses, including awareness opportunities, special project opportunities and restoration opportunities.

Partners identified in the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks Stewardship Action Plans are encouraged to join the Healthy Hamilton Watersheds Action Plan Implementation Team where they will use new and existing programs to undertake the Stewardship Actions identified in the plans. The Implementation Team will be an ongoing coordinating body for the implementation of the Stewardship Action Plans for the Spencer Creek, Red Hill Creek, Stoney/Battlefield Creek and the Stoney Creek Numbered Watercourses watersheds as they are completed on a subwatershed basis. Local businesses and residents are encouraged to work with the Implementation Team to undertake stewardship projects within their communities.

EXECUTIVE SUMMARY – STRESS INVENTORY TABLES

**TABLE 1 GREENHILL CREEK SUBWATERSHED
3 STRESSES IDENTIFIED**

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

**TABLE 2 HANNON CREEK SUBWATERSHED
66 STRESSES IDENTIFIED**

STRESS	MAP CODE	NO. IN SUBWATERSHED
Insufficient Riparian Buffer	RB	See Catchment Map
Utility Pipeline	UP	37
Stormsewer Outfall	SO	10
Development	DV	7
Online Pond	OP	5
Habitat Fragmentation/Loss	HF	2
Perched Culvert	PC	2
Migration Barrier	MB	1
Transportation Corridor Expansion	TE	1
Water Quality	WQ	1
Abandoned Groundwater Wells	GW	
Buried Stream	BS	
Channelization	CH	
Debris Jam	DJ	
Detachment from Nature	DT	
Encroachment	EN	
Erosion	ER	
Faulty Septic System	SS	
Increased Impervious Surface	IS	
Intensive uses	IU	
Invasive/Introduced Species	IV	
Land Maintenance Practices	LM	
Landfill Leachate	LL	
Litter	LI	
Nutrient Loading	NL	
Pesticide/Herbicide Use	PS	
Plowed Watercourse	PW	
Runoff Contamination via Transportation Corridors	TC	
Sediment Loading	SL	
Site Clearing Prior to Development	SC	
Stormwater	SW	
Urban Creek System	UC	
Water Use	WU	
Wildlife Collision	WC	

EXECUTIVE SUMMARY – STRESS INVENTORY TABLES

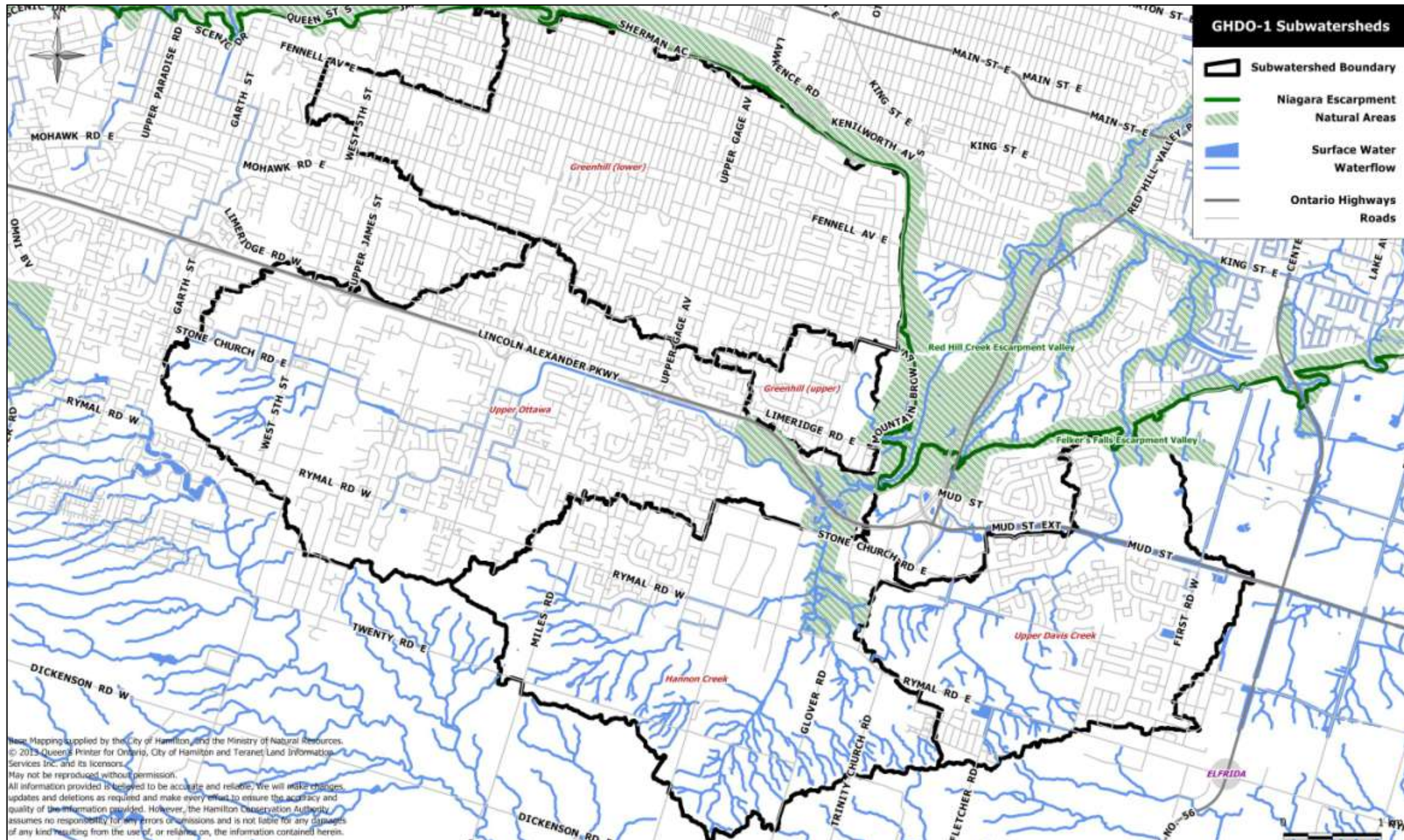
**TABLE 3 UPPER DAVIS CREEK SUBWATERSHED
27 STRESSES IDENTIFIED**

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

**TABLE 4 UPPER OTTAWA CREEK SUBWATERSHED
17 STRESSES IDENTIFIED**

STRESS	MAP CODE	NO. IN SUBWATERSHED
Insufficient Riparian Buffer	RB	See Catchment Map
Stormsewer Outfall	SO	7
Development	DV	6
Habitat Fragmentation/Loss	HF	1
Landfill Leachate	LL	1
Stormwater	SW	1
Water Quality	WQ	1
Abandoned Groundwater Wells	GW	
Buried Stream	BS	
Channelization	CH	
Debris Jam	DJ	
Detachment from Nature	DT	
Encroachment	EN	
Erosion	ER	
Faulty Septic System	SS	
Increased Impervious Surface	IS	
Intensive uses	IU	
Invasive/Introduced Species	IV	
Land Maintenance Practices	LM	
Litter	LI	
Migration Barrier	MB	
Nutrient Loading	NL	
Online Pond	OP	
Perched Culvert	PC	
Pesticide/Herbicide Use	PS	
Plowed Watercourse	PW	
Runoff Contamination via Transportation Corridors	TC	
Sediment Loading	SL	
Site Clearing Prior to Development	SC	
Transportation Corridor Expansion	TE	
Urban Creek System	UC	
Utility Pipeline	UP	
Water Use	WU	
Wildlife Collision	WC	

EXECUTIVE SUMMARY – STUDY AREA



FOREWARD

The following has been extracted from the Red Hill Creek Watershed Action Plan – First Generation Plan October, 1998. It is described as a vision reflecting the ideas provided by the Stakeholders at gatherings on October 24th and November 6th, 1997:

A Collective Vision for the Watershed

In the year 2018....

Our children and grandchildren toast those who, in spite of the challenges, collaborated to pass along a healthy and natural watershed in a caring and committed community.

Residents of this Watershed, both human and other species, mark 1998 as a great turning point for the Watershed, when decades of cumulative degradation began to be reversed. Concerns about human and industrial wastes in the creek waters is a fading memory, and the extreme flooding of the past has been replaced by a flow regime based on natural seasonal cycle.

The stream is once again healthy, supporting a diversity of aquatic life in a vibrant landscape. Natural areas are interconnected and evidence that wildlife is valued abounds.

Valley lands are especially valued as a place to demonstrate respect for all creatures and for the community to enjoy reasoned human activity.

Business, community and government organizations integrate their efforts to restore the natural capital wherever feasible, demonstrate sustainable development and pass on a well managed watershed to the next generation.

The Red Hill Creek Watershed has become known as one of the preferred places in Ontario to live because living in harmony with the natural environment is a priority.

The Watershed gives the community a sense of place so that shared stewardship is evidenced by the actions of all. All find renewal here and visitors come to learn the meaning of a commitment to sustainability.

BACKGROUND

RED HILL CREEK WATERSHED

The Red Hill Creek watershed is the second largest watershed within the jurisdiction of the Hamilton Conservation Authority (HCA) at 68 km², or 15% of the HCA watershed. The creek system outlets directly into Hamilton Harbour. HCA notes this watershed as being comprised of 8 subwatersheds. The Red Hill Creek watershed is generally characterized by escarpment and associated valley lands, as well as meadow and successional habitats. The majority of the watershed is urbanized with some agricultural land use in the upper portion of the watershed. The subwatersheds of Red Hill Creek are located within the City of Hamilton.

The Niagara Escarpment, Eramosa Karst/Escarpment and Felker's Falls Escarpment Valley are significant natural features located in the upper portion of the watershed, while the Red Hill Creek Escarpment Valley is located in lower portion of watershed.

For a full characterization of the Red Hill Creek watershed refer to the *Preliminary Watershed Description Report for the Hamilton Conservation Authority's Watersheds* (Source Water Protection Halton-Hamilton Region, 2008) and any updates thereof.

Red Hill Creek watershed is the third largest creek system within the Hamilton Harbour watershed. The Hamilton Harbour was declared an Area of Concern (AOC) in 1987 by the International Joint Commission due to its high contamination of toxic sediments and degradation of water quality and aquatic habitat. As a result, the Hamilton Harbour Remedial Action Plan (HHRAP) was initiated in order to de-list the Hamilton Harbour as an AOC. The HHRAP aims to remove this designation by 2020 by meeting specific targets as they relate to water quality and bacterial contamination, urbanization and land management, toxic substances and sediment remediation, fish and wildlife habitat, public access and aesthetics, education and public information, and research and monitoring.

The HHRAP is implemented by the Bay Area Implementation Team; which is made up of industrial, commercial and government representatives within the limits of the Hamilton Harbour watershed. The Bay Area Restoration Council was formed in response to the HHRAP and works towards community involvement and awareness on the issues surrounding this AOC and the best management practices that are needed in order to de-list this watershed. The HHRAP Beneficial Uses Fact Sheets were released in 2012 listing the targets status reached to date as well as those stresses still in need of mitigation.

The Red Hill Creek Stewardship Action Plan supersedes the current Red Hill Creek Watershed Action Plan (Region of Hamilton-Wentworth, 1998) and is a deliverable of the Hamilton Conservation Authority Five-year Strategic Plan (2007-2011), within which the completion of up-to-date subwatershed plans is listed as a strategic water management objective. The plans within this document will also contribute to both, the Hamilton Harbour Remedial Action Plan (HHRAP) and the strategic objectives for the Hamilton-Halton Watershed Stewardship Program, the Stewardship Program of the Hamilton Conservation Authority and the strategic objectives of the partner agencies.

A detailed Geographical Information Systems analysis of watershed characteristics and monitoring data was conducted to prioritize the order in which the Stewardship Action Plans would be developed for the 8 subwatersheds of Red Hill Creek. Additionally, HCA staff and staff of local environmental agencies were consulted to provide expert input into the prioritization exercise. This analysis resulted in a determination that the plans would be developed for each subwatershed using a headwaters down approach. This approach allows for a focus on protection and enhancement of the subwatersheds in developing areas in the first year of the initiative, followed by the downstream subwatersheds in the second year. Additionally, it was determined that a significant amount of restoration work had been undertaken or was planned, and implementation imminent, for the subwatersheds of Red Hill Creek below the Escarpment, thereby supporting the need for immediate attention in the headwaters areas. Maps of the Red Hill Creek watershed and its subwatersheds, as well as a schedule for the development of future Stewardship Action Plans can be found within Appendix A.

The purpose of the Red Hill Creek Stewardship Action Plan is to create awareness by educating the public on the environmental issues within their local subwatershed, and to in turn, improve the ecological functions of the subwatershed through restoration initiatives. These plans provide a comprehensive strategy to support environmental watershed stewardship within the Red Hill Creek subwatersheds by focusing on stewardship activities such as, education & awareness, habitat restoration and stress mitigation efforts. Additionally, these plans will help to guide sustainable development for the Red Hill Creek watershed. Stresses acting on the subwatersheds, priority areas for restoration, and awareness needs of the communities are specifically identified within these plans.

BACKGROUND

The Spencer Creek Stewardship Action Plan began as a coordinated effort to protect and improve the health of the natural environment within the Spencer Creek watershed and is now serving as the model for subwatershed-based stewardship action planning for the other major watersheds within HCA's jurisdictional boundaries as part of the larger Healthy Hamilton Watersheds Action Plan initiative.

GREENHILL, HANNON, UPPER DAVIS AND UPPER OTTAWA CREEKS

The Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks subwatersheds are approximately 46km², or 68% of the Red Hill Creek watershed's 68 km² area. Greenhill Creek is comprised of two subwatersheds, Upper Greenhill Creek and Lower Greenhill Creek. Due to the small size of the Upper Greenhill Creek subwatershed, for the purposes of this document, the Upper and Lower Greenhill Creek subwatersheds are treated as one subwatershed.

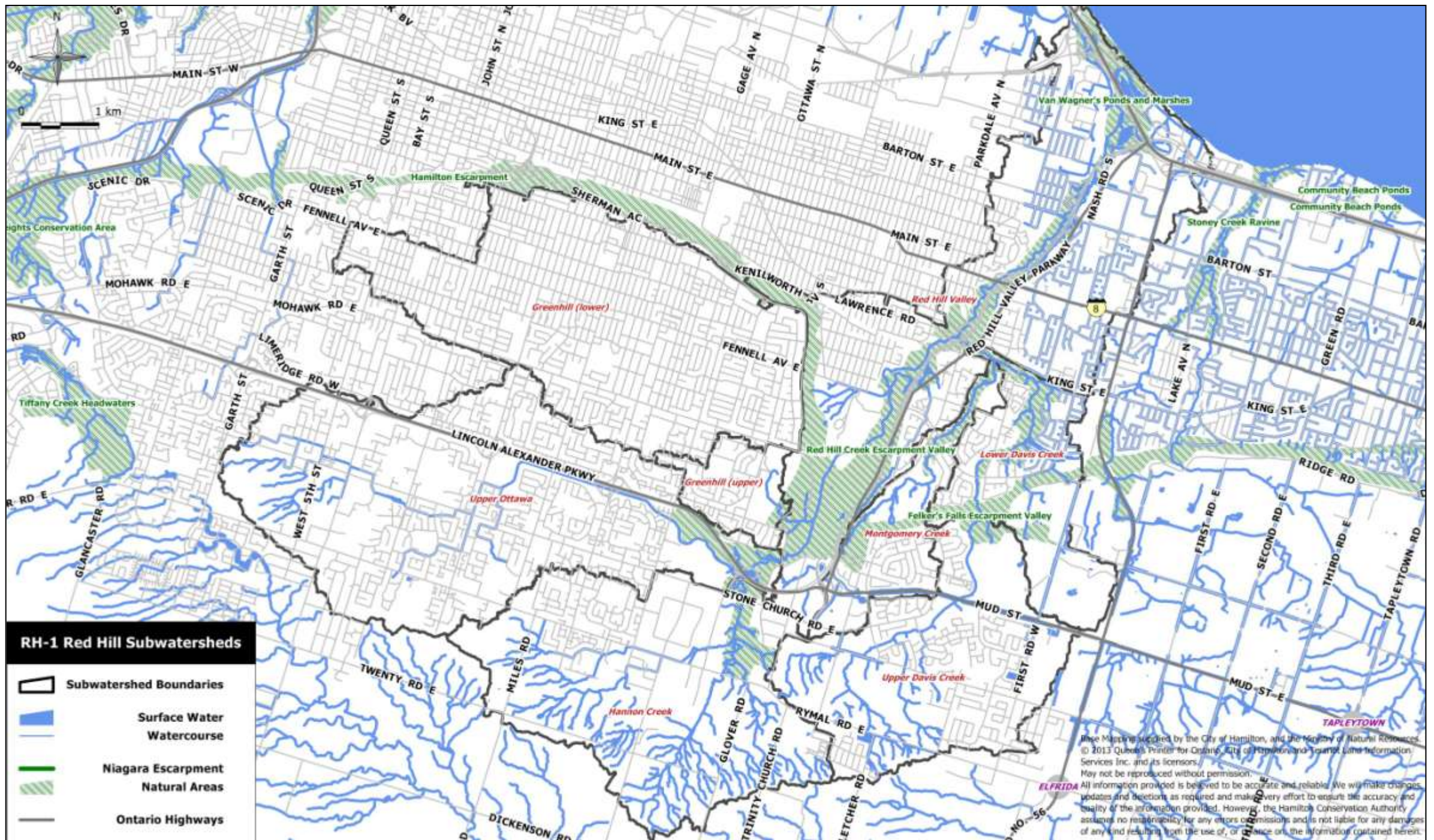
The waters of Greenhill, Hannon and Upper Ottawa Creeks flow into the Red Hill Valley subwatershed, where Upper Davis converges with Lower Davis Creek and Montgomery Creek before flowing into the Red Hill Valley subwatershed. Red Hill Creek ultimately flows into Hamilton Harbour.

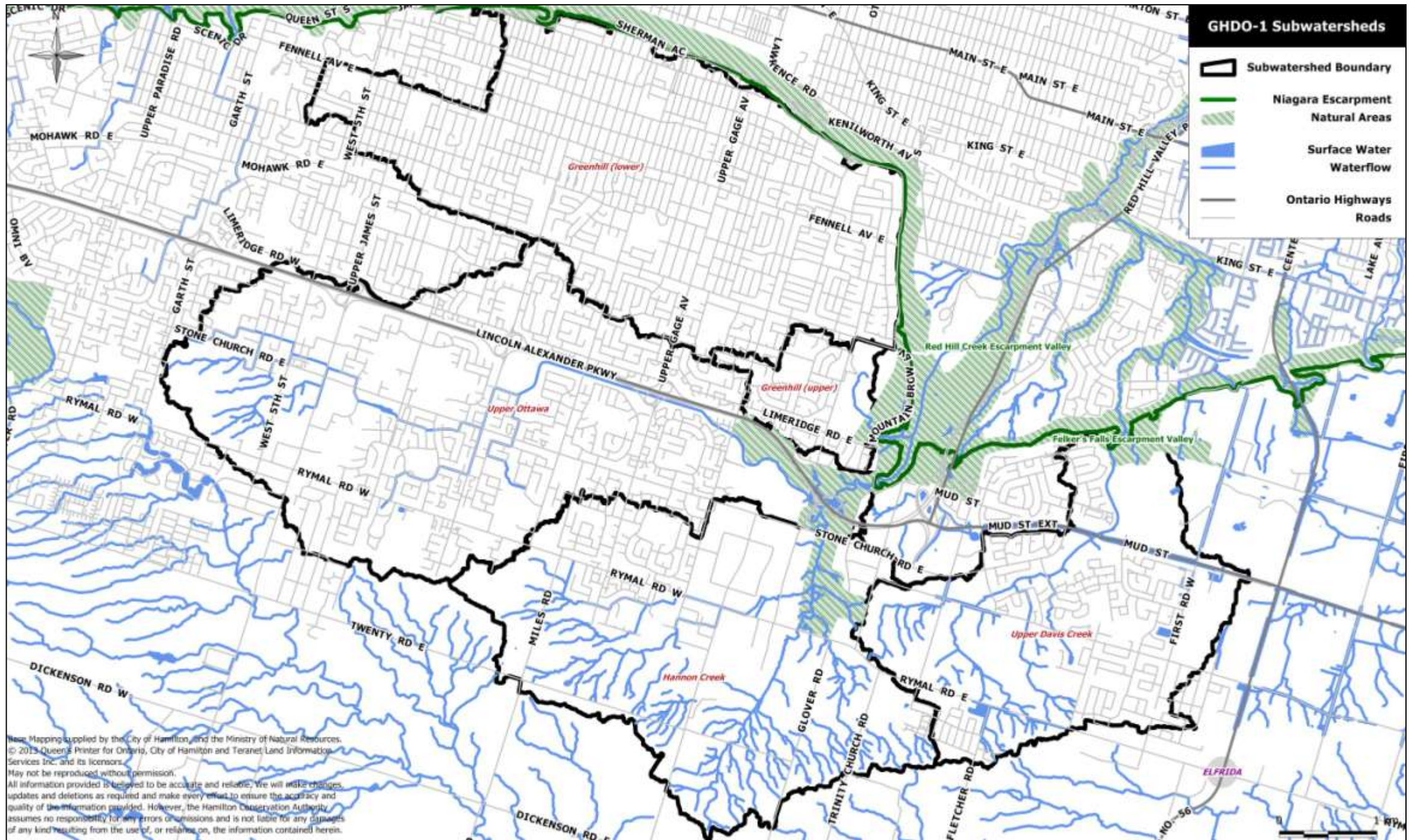
These subwatersheds lie on the table lands of the Niagara Escarpment. They are unique in that they support a variety of different land uses, including: residential housing, commercial and industrial operations, agricultural and recreational while at the same time including some of Hamilton's most significant natural areas. As a result, these subwatersheds pose unique challenges with respect to watershed management. For this reason, these subwatersheds have been identified as a priority for stewardship action.

Certain natural lands have been identified for protection in a number of legislated initiatives including the Greenbelt Plan, Niagara Escarpment Plan, City of Hamilton Official Plan and the HCA Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Regulation. Much of the area surrounding these natural areas is planned for or permits development.

Common stresses noted within these plans that are observed to be impacting these three subwatersheds are: insufficient riparian buffers, stormsewer outfalls and proposed development.

The Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks Stewardship Action Plans contain reviews of the existing Red Hill Creek Watershed Planning - State of the Watershed Report (RHSWP), 1997 and the Red Hill Creek Watershed Action Plan (RHWAP), 1998. These reviews evaluate progress to date with respect to answering Outstanding Questions as identified in the RHSWP and the implementation of recommendations and progress toward achieving the long term goals, as outlined in the RHWAP. The reviews of these documents are included in Appendices E and F.





PLAN LIMITATIONS

Although measures were taken to complete a thorough analysis of the subwatersheds of Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks, some data were missing from this analysis as some research and monitoring has not been completed to date. The following is a list of the data gaps that are present in these plans. It is important that research and monitoring regarding the status of the following characteristics within these subwatersheds is undertaken and kept up-to-date in order to measure our success through the use of these plans. For more information on ecological and water quality assessments within the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks subwatersheds, refer to the appendices.

Data Gaps

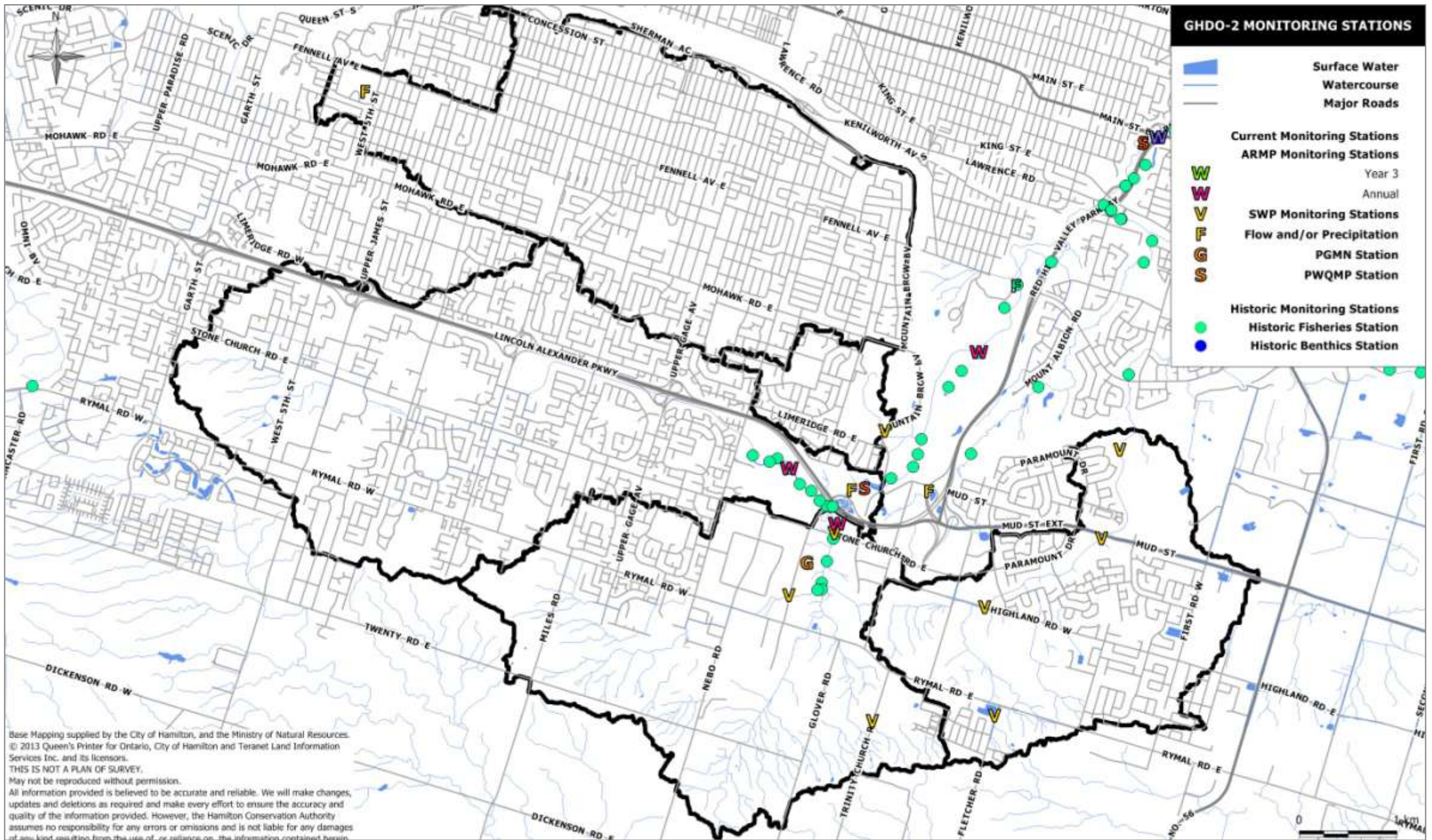
- Fisheries & benthics data
 - There are no annual fisheries/benthic monitoring stations within the Greenhill, Hannon, Upper Davis and Upper Ottawa subwatersheds. There are no fisheries/benthic monitoring stations within the Greenhill and Upper Davis Creeks subwatersheds. There is one fishery/benthic monitoring station in the Hannon Creek subwatershed and one station in the Upper Ottawa Creek subwatershed. Both stations are monitored on a three-year cycle as part of the HCA Aquatic Resources Monitoring Program, however, the regular sampling of these stations began in 2006 when the Monitoring Program was initiated and as such additional years of data are needed to generate data suitable for trend analyses.
 - There are four, three and one Source Water Protection surface water quality and flow sampling stations, in the Upper Davis, Hannon and Greenhill Creeks subwatersheds, respectively; however the sampling of these sites began in 2006 and has since been discontinued.

- Water quality and quantity data
 - There are no stream level/flow gauges in the HCA Hydrometeorological Network in the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks subwatersheds.
 - There are no Provincial Water Quality Monitoring sampling stations in the Greenhill, Hannon and Upper Davis Creeks subwatersheds.
 - There are no Provincial Groundwater Quality Monitoring sampling stations in the Greenhill, Upper Davis and Upper Ottawa Creeks subwatersheds.
- Terrestrial data
 - There are no terrestrial ecology monitoring stations in the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks subwatersheds.

A complete list of all datasets used in the development of the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks Stewardship Action Plans is included in Appendix G.

A public consultation process was initiated during the data collection phase of this project in an effort to solicit input from stakeholders representing the interests of the various sector groups operating in the study area. As a result, input into the plans is limited to those who opted to participate in the process.

Additionally, all efforts were made to identify every current and potential stress within these subwatersheds, however the stresses identified within this document are not exhaustive and therefore there may be stresses located within these subwatersheds that are not noted within these plans. Occurrences of stresses identified after publication of this document should be reported to the Project Planner for inclusion in any addendums to this document.



IMPLEMENTATION STRATEGY

The Stewardship Action Plans for the subwatersheds of Red Hill Creek identify stresses that are impacting, or have the potential to impact, the natural environment within these subwatersheds. The Plans also include Stewardship Actions that have been developed to mitigate the impacts of these stresses. These plans are meant to be used by local agencies and groups as guides to deliver programs and services in these areas. The documents also identify lead agencies responsible for the implementation of each Action and list partner agencies that may support the Healthy Hamilton Watersheds Action Plan Implementation Team members in executing their Implementation Work Plans throughout the implementation period. The Lead Agency as well as Partner Agencies were identified through a desktop exercise and these agencies have not formally assumed any of these responsibilities.

Specific locations of stresses identified through stakeholder input and GIS analyses are illustrated in detailed Catchment Maps. Descriptions of each stress and listings of appropriate Stewardship Actions are provided in corresponding Catchment Datasheets. Catchment datasheets also provide ecological and water quality monitoring data, if available, to provide users with an understanding of the “state” of the catchment prior to implementation.

The information reported within these documents was collected through public consultation, analyses using Geographical Information Systems and facilitated exercises undertaken by the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks Stakeholder Advisory Committee.

Within each Stewardship Action Plan, stresses that are impacting or have the potential to impact local ecosystems at the subwatershed level have been identified. Specific occurrences relating to these stresses have also been identified, and are inventoried and described in detail for each catchment basin of each subwatershed. The specific occurrences of each stress have been categorized as current or potential stresses and are colour coded as such in the catchment basin mapping. The potential stresses are predominantly related to the potential for emergency issues with utility pipelines and proposed development and as such may not be apparent at the present time, while current stresses are known to be impacting the local landscape presently. Specific attention should be paid to the implementation of stewardship actions associated with potential stresses as the prevention of degradation is a priority of these Stewardship Action Plans.

The details of each specific stress occurrence identified within the study area, have been incorporated into the Hamilton Conservation Authority’s Restoration Opportunities Database. The descriptions were generated through the compilation of anecdotal information gathered during the stress identification exercise undertaken by the Greenhill, Hannon, Upper Davis and Upper Ottawa Creeks Stakeholder Advisory Committee as well as through public consultation and primary research.

Through Stakeholder consultation, Stewardship Actions have been developed that address each type of stress identified. Stewardship Actions identified for the Spencer Creek Stewardship Action Plans that were likely relevant to the Red Hill Creek Watershed were also included in these draft plans for public and stakeholder comment on their relevance to the Red Hill Creek watershed. Stewardship Actions are meant to guide the activities of local agencies and groups to prevent and mitigate the impacts of these stresses that are acting upon the natural environment of each subwatershed. The Stewardship Actions that have been developed include: Awareness Opportunities, Special Project Opportunities and Restoration Opportunities. Lists of local partner agencies to assist with the implementation of the Stewardship Actions are included with each Stewardship Action.

The themes of each of the Stewardship Actions are described below:

- Awareness Opportunity: education and outreach opportunities involving residents, public and private landowners, and active associations / organizations
- Special Project Opportunity: detailed analyses to better understand the events taking place in a specific location or area of the subwatershed or to develop or plan an initiative related to an issue identified.
- Restoration Opportunity: on-the-ground restoration work

A Healthy Hamilton Watersheds Implementation Team has been established to carry out the Stewardship Actions identified within the Stewardship Action Plans for all subwatersheds of Spencer, Red Hill, Stoney/Battlefield Creeks and the Stoney Creek Numbered Watercourses as they are completed. The Hamilton Conservation Authority will serve as the coordinating body for this effort. Biannual meetings will occur throughout each implementation year.

IMPLEMENTATION STRATEGY

Upon the completion of each Subwatershed Stewardship Action Plan, interested Subwatershed Stakeholder Advisory Committee members will join the Implementation Team, and as such the Stewardship Actions identified for those subwatersheds will be incorporated into the

Implementation Team's work plan for the following year. Implementation Team meetings will be held in the following months of each year in order to discuss the topics noted:

March

- Development of annual work plan, outlining Stewardship Actions to be initiated by each partner during the following implementation year.

October

- Report on progress from each partner as to which Stewardship Actions were initiated and/or completed during the implementation year.

In most cases, the implementation of the Awareness Opportunity will need to precede all other Stewardship Actions developed. It is possible for any Special Project Opportunity to be implemented concurrently with an associated Awareness Opportunity; however Restoration Opportunities will be the final Stewardship Action to be completed for each stress identified.

Where applicable, implementation of Stewardship Actions should be undertaken on a subwatershed scale. Stewardship Actions that address specific occurrences of stresses identified within each of the subwatershed catchments should be undertaken concurrently. For example, the Awareness Opportunities associated with Detachment from Nature should be carried out over the entire subwatershed, followed by the Special Study and Restoration Opportunities that have been developed to address specific occurrences of Detachment from Nature.

Implementation of the Stewardship Actions noted in these documents is dependent on implementation team members' organizational mandates and resources. Each implementation team member will prioritize the implementation of Stewardship Actions relating to their respective organizational mandate and will incorporate planning and implementation of appropriate stewardship actions into budgeting and work planning, as resources permit.

Stewardship Actions noted in this document can be modified by the Implementation Team as they see fit but should be used as a reference when determining appropriate measures in which to mitigate the stress at hand. Additionally, the Implementation Team will need to define detailed implementation strategies and in some cases site plans to follow through with the implementation of each Stewardship Action. The Restoration Opportunities Database can be

used to target specific stress occurrences for restoration related Stewardship Actions. Implementation Team members can seek out projects by querying the database using a variety of criteria including: stress type, suitable for DFO Compensation, public or private land, etc.

Remaining Outstanding Questions, Issues, Long Term Goals, Actions Areas, Restoration and Enhancement Opportunities, Linkage Opportunities and Management Needs from the Red Hill Creek Watershed Planning - State of the Watershed Report (RHSWP), 1997 and the Red Hill Creek Watershed Action Plan (RHWAP), 1998 will be incorporated into the implementation of the Stewardship Action Plans. The members of the Healthy Hamilton Watersheds Action Plan Implementation Team will assess the findings of the reviews of these documents and will incorporate remaining actions into the HHWIT work plans.

Assessing landowner motivation for participation in restoration activities will be key in determining remediation priorities. It is recommended that an assessment of landowner motivation be completed at the outset of implementation. This will aid in determining funding and staffing requirements for upcoming initiatives, as well as provide a knowledge base for working efficiently to achieve both landowner and partner goals.

It is suggested that the following methods be utilized and built-upon when approaching landowners.

Landowner Contact Procedure Recommendations (private & public)

- Direct Contact
 - a. Door-to-door contact; deliver brochure with personalized explanation of reason for contact (stapled to brochure)
 - i. For those unavailable by door-to-door contact, leave a brochure and follow up with a mailed letter to landowner with additional information regarding the benefits to the environment and landowner
 - b. Phone landowner to set-up a site visit and/or to discuss their concerns in more detail
 - c. Add landowner to a contact list (mailing / phone) regarding relevant topics to their area or natural feature (workshops / educational sessions / activities in the area)
- Indirect Contact
 - a. At neighbourhood associations / community councils / rate-payers organizations (i.e. police associations) host:
 - ii. Information / education sessions,
 - iii. Workshops, and/or
 - iv. Deliver relevant literature

BIBLIOGRAPHY

Blackport & Associates, March 2003. The Red Hill Valley project final impact assessment report – Hydrogeologic inventory and impact assessment.

Chapman, L. J. and D. F. Putnam. 1984. The Physiography of Southern Ontario, Ontario Geological Survey, Special volume 2, Ministry of Natural Resources.

City of Hamilton. 1992. City of Hamilton Vision 2020. Available at: <http://www.hamilton.ca/ProjectsInitiatives/V2020/>. Accessed June, 2013.

City of Hamilton, 2004. Report to: Chair and Members Public Works, Infrastructure & Environment Committee – Subject: Open Space Replacement Strategy – (PW04051) – (City Wide) Available at: <http://www.hamilton.ca/NR/rdonlyres/06F58268-5CFD-449E-A7A8-27468B8364AD/0/PW0405119Apr2004OpenSpace.pdf> Accessed July, 2013.

City of Hamilton. 2006. Growth Related Integrated Development Strategy (GRIDS) Final Report. Available at: <http://www.hamilton.ca/CityDepartments/PlanningEcDev/Divisions/StrategicServicesSpecialProjects/GrowthRelatedIntegratedDevelopmentStrategy/GRIDSFinalReport.htm> Accessed June, 2013.

City of Hamilton. 2009. Urban Hamilton Official Plan. Available at: <http://www.hamilton.ca/CityDepartments/PlanningEcDev/Divisions/StrategicServicesSpecialProjects/Policy+Planning/HamiltonNewOfficialPlan/Council+Adopted+Urban+Hamilton+Official+Plan.htm> Accessed June, 2013.

City of Hamilton. 2011. Information Update: City of Hamilton Closed Landfills. Available at: http://www.hamilton.ca/NR/rdonlyres/59E2A203-11FB-4CC1-B6E9-A4B3F8CA8973/0/Mar03EDRMS_n141285_v1_7_1b_Memo_Closed_Landfill_Sites.pdf Accessed June, 2013.

City of Hamilton, ENVision – The Hough Group, Dougan & Associates and Hubbard & Associates. 2003. Draft Red Hill Valley Project Landscape Management Plan Section 3. Available at: <http://www.hamilton.ca/NR/rdonlyres/46B20AEC-E1C8-44B4-BAA1-CD2F7C0F8E26/0/04aSection31.pdf> Accessed June, 2013.

Ecoplans Limited and MRC. 2007. Dartnall Road Extension Class Environmental Assessment Environmental Study Report. Available at: <http://www.hamilton.ca/NR/rdonlyres/9B208F1A-AE8C-4994-92AA-E138F3D2D1AA/0/2930DartnallESRFINALJan52007.pdf>. Accessed June, 2013.

Dwyer, J. et al. Nature Counts: Hamilton Natural Areas Inventory. Hamilton Naturalists' Club, 2003.

Greater Toronto Conservation Authorities. Erosion and Sediment Control Guidelines for Urban Construction. Greater Toronto Conservation Authorities. March 2006.

Griffiths, R, 2004. Assessment of Water Quality Conditions at Sites in the Red Hill Creek Watershed in 2003. Unpublished, 2004.

Hamilton Conservation Authority (a), 2013 Eramosa Karst Conservation Area. Available at: <http://www.conservationhamilton.ca/eramosa-karst>. Accessed June, 2013.

Hamilton Conservation Authority (b), Eramosa Karst Conservation Area: Ecological Land Classification Report. Unpublished, 2013.

Hamilton Conservation Authority (d), 2013. Hamilton Natural Heritage Database. Unpublished database.

Hamilton Conservation Authority (c), Mount Albion Conservation Area: Ecological Land Classification Report. Unpublished, 2013.

Hamilton-Halton Watershed Stewardship Program. Watershed Riparian Buffer Mapping & Analysis using GIS. Hamilton Conservation Authority, 2003.

Hamilton Harbour Remedial Action Plan. Hamilton Harbour Remedial Action Plan Beneficial Uses 2012 Fact Sheets. Hamilton Harbour Remedial Action Plan, 2012.

HHB Publications Ward Fact Sheets. Hamilton Historical Board. Available at: http://www.hamiltonhistoricalboard.ca/publications_wardfactsheets.html Accessed on November 16, 2012.

BIBLIOGRAPHY

Hutchinson Environmental Sciences Limited. Land Use and Water Quality Linkages in Red Hill Creek, Hamilton, ON. Hutchinson Environmental Sciences Limited, 2012.

Karrow, P.F., 1983, Quaternary Geology of the Hamilton-Cambridge Area. Southern Ontario: Ontario Geological Survey, Mines and Minerals Division, Open File Report 5429.

Larson, B.M., Riley J.L., Snell, E.A. and H.G. Godschalk. 1999. The Woodland Heritage of Southern Ontario. A Study of Ecological Change, Distribution and Significance. Federation of Ontario Naturalists, Don Mills, Ontario, Canada.

O'Connor, K. M. Remedial Action Plan for Hamilton Harbour: Stage 2 Update 2002. Hamilton Harbour RAP Stakeholder Forum, 2003.

Philips Engineering Limited. Davis Creek Subwatershed Study. Philips Engineering Limited, 2005.

Region of Hamilton Wentworth. Red Hill Creek Watershed Action Plan Compendium of Actions. Region of Hamilton Wentworth, 1998.

Region of Hamilton Wentworth. Red Hill Creek Watershed Action Plan First Generation Plan. Region of Hamilton Wentworth, 1998.

Region of Hamilton Wentworth. State of the Watershed Report. Region of Hamilton Wentworth, 1997.

Scott, W.B. and E.J. Crossman, Freshwater fishes of Canada. 1973.

Source Water Protection Halton-Hamilton Region, Preliminary Watershed Description Report: Hamilton Conservation Watersheds. Unpublished, January 2008.

Source Water Protection Halton-Hamilton Region, Draft Tier 1 Water Budget Report. Unpublished, November, 2008.

Source Water Protection Halton-Hamilton Region, Assessment Report Hamilton Region Source Protection Area. Unpublished, February, 2012.

The Tourism Company and The Rethink Group. A Joint Outdoor Tourism Marketing Strategy. Golden Horseshoe Conservation Authorities, December 1995.

Totten Sims Hubicki Associates. Hannon Creek Subwatershed North Glanbrook Industrial Business Park Master Drainage Plan. Totten Sims Hubicki Associates, 2010.

Watershed Planning & Engineering Division. A.C.T.! A Work Plan for Ancaster, Chedoke & Tiffany Creeks Stewardship Action Plans. Hamilton Conservation Authority, March 2007.

Watershed Planning & Engineering Division. Hamilton Waterfalls & Cascades, Edition 2. Hamilton Conservation Authority, November 2007.

Watershed Planning & Engineering Division. Aquatic Resource Monitoring Program Report. Hamilton Conservation Authority, 2009.

APPENDICES

APPENDIX A – MAP OF RED HILL CREEK WATERSEHD AND STEWARDSHIP ACTION PLAN DEVELOPMENT SCHEDULE

APPENDIX B – FISHERIES AND BENTHIC MACROINVERTEBRATE MONITORING – HANNON AND UPPER OTTAWA CREEKS

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APPENDIX G – DATA REFERENCES