

## Memorandum

**Date:** June 20, 2005

**To:** Members, Public Works, Environment & Infrastructure Committee  
City of Hamilton

**From:** Bruce Duncan, General Manager/CAO  
Joan Bell, Manager, Grants & Special Projects  
Hamilton Conservation Authority

**Re:** Waterfalls and Cascades of Hamilton- HCA Research and Inventory Report

---

### Background:

Please find enclosed a recent inventory of Hamilton waterfalls conducted by the HCA and a team of volunteer waterfall enthusiasts, City of Hamilton staff, Bruce Trail Association and Hamilton Naturalists' Club representatives. The research and findings, rankings, mapping and datasheet for each waterfall are published in a report entitled, Hamilton Waterfalls and Cascades: Research and Inventory Report, Hamilton Conservation Authority, May, 2005.

There are 65 waterfalls recorded to date, plus two in Smokey Hollow (Burlington). The City of Hamilton owns 23, HCA owns 16, Conservation Halton and other public agencies own five. The balance (21) is held by private landowners. Forty waterfalls, on both public and private land, are currently accessible by road or trail, 33 of which are accessible by or visible from the Bruce Trail.

The waterfalls are found in Flamborough (15), Ancaster (16), West Hamilton/Mountain (13), Stoney Creek (13) and East Hamilton/Mountain (7). Four criteria were established for evaluating the waterfalls; all were ranked A-excellent (18), B-good (30) and C-satisfactory (17). Of A & B-ranked waterfalls roughly 50% have year-round flow, and 50% seasonal flow.

**Proposal:**

Waterfalls enthusiasts believe Hamilton is and should be known as a “City of Waterfalls”. The City of Hamilton and Hamilton Conservation Authority own the majority of waterfalls and are well-positioned to take a leadership role in promoting and enhancing visitor access to waterfalls across the Niagara Escarpment. It is our intention today to bring Committee Members up-to-date regarding the waterfalls research undertaken by the HCA and to request Council’s support for the recommendations in the study.

In 2004/05, the Conservation Authority, with financial assistance from Human Resources and Skills Development Canada, spent \$27,885 plus overhead, to research and inventory Hamilton waterfalls creating a master list, ranking, mapping, and datasheet for each waterfall. The results are currently being presented to key partners including the City, Tourism Hamilton, the Bruce Trail Association and Hamilton Naturalists’ Club asking for their endorsement and willingness to play a role in improving waterfall access and visibility. The next step is to develop conceptual site plans and cost estimates for enhancing visitor access and amenities within individual and clusters of waterfalls.

Once HCA board approved the report, HCA began to implement some of the recommendations. Staff has completed a site plan to re-open Tiffany Falls (\$54,000); and is currently working on the Spencer-Logie-Sydenham and Chedoke clusters. Upgraded fencing is needed at Felker’s Falls to address an ongoing vandalism problem (±\$25,000). Work is also progressing on partnership-building, grant applications, and marketing activities such as website improvements and brochure reprinting. HCA will also take the lead to speak to private landowners and Conservation Halton. Tourism Hamilton has been asked to accelerate its outdoor tourism strategic planning and evaluate the opportunities for strengthening Hamilton’s image as a “City of Waterfalls”. The waterfalls are naturally grouped in clusters by creek system as shown in Appendix F in the report. In each cluster there is a variety of year-round and seasonal waterfalls, ranked A to C, with an indication of the feeder creek, ownership and road/trail access.

**CITY OWNED WATERFALLS**

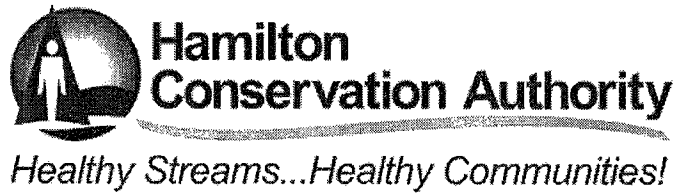
RANKING	A	B	C
Waterfall in open space and parklands	Westcliffe, Cliffview, Chedoke, Lower Chedoke, Albion, Little Davis,	Scenic, Princess, Mountview, Lower Westcliffe, Lower Cliffview, Denlow, Lower Princess (MTO) Buttermilk, Glover’s,	Sanitorium, Lower Sanitorium, Glendale, East Glover’s,
Waterfalls on road right-of-way		Mineral Springs, Hermitage, Billy Green	Little, Dewitt,

## **Recommendation:**

The Hamilton Conservation Authority and City of Hamilton have a track record of successful partnerships at Confederation Park, Westfield Heritage Village, and the Lafarge 2000 and Dofasco 2000 Trails. The HCA would like the City to join us in developing a capital works plan and cost estimate for improving access to Hamilton's waterfalls. To do this, the HCA is asking the committee to consider the following recommendations:

That the Public Works, Environment and Infrastructure Committee recommend that Council receive, with thanks, the Waterfalls and Cascades of Hamilton Research and Inventory Report, dated May 5, 2005, with instruction to staff to do the following:

1. Assign senior staff to work with the Hamilton Conservation Authority and Bruce Trail Association to examine the existing and potential linkages between the Bruce Trail, the waterfalls, and HCA and City-owned lands, in order to develop a plan for raising funds and phasing trail improvements.
2. Request City staff work jointly with HCA to complete concept site plans and cost estimates for the waterfall clusters, and include them in annual capital budget planning.
3. Ensure that the waterfalls research and inventory report is circulated and considered by relevant City departments, to address such issues as improving public transit to waterfalls and conservation areas, recognizing high priority for outdoor tourism strategic planning, integrating waterfall signage recommendations into City sign policy development, and adding sites to Hamilton Walks and other wellness initiatives.
4. Establish a timeline for HCA and City staff to return with a joint capital works plan, phasing and cost estimates for improving visitor facilities and waterfall access.



**WATERFALLS AND CASCADES  
OF  
HAMILTON**

**Research and Inventory  
Report**

**April 14, 2005**

## ACKNOWLEDGEMENTS

The following organizations and individuals have contributed to this project undertaken by the Hamilton Conservation Authority.

This report was researched and written by Nadeem Paracha, Project Planner (Waterfalls).

HCA employees, Joan Bell and Janet Wong supervised the project; and Doug Mallory and Richard Woodworth provided surveying and mapping assistance.

Human Resources and Skills Development Canada and the Hamilton Conservation Authority provided funding and logistical support. The City of Hamilton provided base data for mapping. Special thanks to Rosa Linschoten, city of Hamilton staff, for providing assistance with GIS mapping.

Joseph Hollick, Stephen D. Head, and Robert Nixon provided information and photographs about the waterfalls. Bill Crawford, waterfalls photographer, volunteered to assist with fieldwork and provided photographs. A special thanks to all.

We also wish to recognize the leaders in the community who worked hard to ensure escarpment lands and waterfalls were purchased and protected in public ownership many decades before now; to the Bruce Trail Association, whose trail links many of the waterfalls, and to the Hamilton Naturalists' Club for drawing attention to the "City of Waterfalls".

Please note: All photography used in this report and subsequent websites remain the property of the photographer unless arrangements have been made otherwise.

## **PROJECT ADVISORY TEAM**

Alexander Bell	Manager, Design and Development, HCA
Bill Crawford	Amateur Photographer
Glenda Slessor	Hamilton Naturalists' Club
Joan Bell	Manager, Grants & Special Projects, HCA
Joseph Hollick	Waterfalls Enthusiast & Photographer
Nadeem Paracha	Project Planner (Waterfalls), HCA
Peter McLaren	Trails Director, Iroquoia Club, Bruce Trail Association
Robert Nixon	Waterfalls Enthusiast
Robert Norman	Manager, Open Space Development, City of Hamilton
Stephen Head	Waterfalls Enthusiast
Steven Barnhart	Landscape Architect, Open Space Development, City of Hamilton

## EXECUTIVE SUMMARY

A Waterfalls Project Planner was hired by the Hamilton Conservation Authority on 5<sup>th</sup> July, 2004 with funding support from Human Resources and Skills Development Canada. The basic purpose of the project was to research and inventory the waterfalls in the City of Hamilton, and then evaluate and rank them from a visitors' perspective. With this data, the city, tourism partners and community can determine if it would be beneficial to Hamilton's image and tourism economy to promote Hamilton as the "City of Waterfalls".

The first task was to define a "waterfall" for Hamilton. The next part of the project was to build on existing waterfall lists and data. Sixty-five (65) waterfalls are featured in this report, with additional documentation for two in Burlington close to Waterdown. These waterfalls all fall within a 20km radius. There will be more. All of the waterfalls are on the Niagara Escarpment; 40 are accessible by road or trail, 33 of which are on or visible from the Bruce Trail. Forty-four are in public ownership; twenty-one are privately owned.

Using field work, photography, mapping, assessment records, and existing planning documents, a data sheet was developed for each waterfall. The exact location, height, width, stream, ownership, access, and facilities onsite or nearby, were documented. Geology, Flora and Fauna were sourced from the 2003 Natural Areas Inventory Project. Many literary documents were used to research the historical name and brief cultural history of the falls. More historical research will be needed.

A Project Advisory Team was assembled to help guide HCA staff. Key stakeholders, including the city, Bruce Trail Association, Hamilton Naturalists' Club, and waterfall enthusiasts and photographers were represented. They were involved in each phase of the project, helping ensure that the information in the report and appendices is as accurate as possible.

HCA staff developed an A, B, C ranking system based on four key criteria: Flow of water (50% weighting), Size (25%), Aesthetics of falls and surroundings (15%), and other facilities (10%). As a result there are 18 waterfalls considered Excellent, 30 considered Good and 17 considered Satisfactory.

A series of nineteen recommendations has been included in the report. These recommendations focus on the planning process and approvals, tourism potential, capital improvements, marketing & promotions, and private ownership.

This research and inventory report is a beginning. The conservation authority will meet with key stakeholders and in spring, 2005 start to develop conceptual site plans for high priority waterfall clusters in order to estimate the cost of improving access and viewing. This will enable both the city and conservation authority to plan next steps and begin raising funds for improvements, if they so wish. Tourism Hamilton will be asked to integrate the findings of this research into their tourism business planning in order to better establish a plan of action and economic potential for waterfall-related outdoor tourism in Hamilton.

Overall, the report recommends that the city, HCA, Tourism Hamilton and the Project Advisory Team work together to improve waterfall access and information for both residents and visitors, and promote and strengthen the image of Hamilton as the “City of Waterfalls”. When the scenic waterfalls are combined with the natural beauty and amenities of the Niagara Escarpment, Harbour, Lake Ontario, parklands and regional trails, there is no question that Hamilton has great potential as an outdoor tourism destination.



# TABLE OF CONTENTS

ACKNOWLEDGEMENTS

EXECUTIVE SUMMARY

A.	INTRODUCTION	1
B.	BACKGROUND	2
	1. Geology of the Niagara escarpment	
	2. Formation of Waterfalls	
	3. Classification of Waterfalls	
	4. Definition of a “Waterfall” in this study	
C.	APPROACH & METHODOLOGY	6
	1. Approach	
	2. Methodology	
D.	DISCUSSION & ISSUES	10
	1. Findings	
	2. Evaluation & Ranking from a Visitor Perspective	
	3. Issues	
E.	CONCLUSION	19
F.	RECOMMENDATIONS	21
	BIBLIOGRAPHY	25

APPENDICES

A List of Waterfalls in Hamilton

B Community Waterfall Maps

C Waterfalls Fact Sheets, - **No Copy**

D Natural Areas Inventory –Selected References

E Detailed Ranking by Flow, Size, Aesthetics and Other Aspects

F. Site Planning Clusters – Phase II

## A. INTRODUCTION

The City of Hamilton is the ninth largest city in Canada with a population of 490,268 (2001 census). Hamilton is located in Southern Ontario at the western tip of Lake Ontario. Hamilton is strategically located between Toronto and Niagara Falls, New York on the Queen Elizabeth Highway (QEW).

The City of Hamilton is a rare marriage of topography and human settlement, one of a handful of urban centers in North America that are tiered and encircle a bay large enough to serve as an international port. It is the area's unique natural architecture that has contributed in great measure to the formation of its distinct regional character and heritage. The City of Hamilton has a wealth of parks, long distance trails, historic sites, waterfront and scenic Niagara Escarpment. The Niagara Escarpment is designated as a World Biosphere Reserve; it encompasses farms, recreational areas, sweeping scenic views, clear cold streams, wetlands, rolling hills, deep caves, wildlife habitats, historic sites and a multitude of pristine waterfalls and cascades. The abundance of these natural features along the escarpment and in the city attracts eco-tourism and outdoor enthusiasts. They enjoy birding, cycling, hiking, camping, fishing, skiing and learning vacations for the whole family.

The City of Hamilton is blessed with waterfalls, so many in fact, that some believe Hamilton is a "City of Waterfalls". The purpose of the HCA's Waterfalls Project was to update the inventory of waterfalls with accurate maps and fact sheets, and then rank the waterfalls from a tourism perspective. This report will also give an overview, summary of research findings, and analysis and ranking of the waterfalls, based on research, field surveys and discussion with waterfall enthusiasts.

While assessing the waterfalls, many important questions came to mind, for example:

1. What is the potential of these waterfalls to be developed as tourism destinations?
2. Not all the waterfalls are perennial and many of them run dry. What criteria or evaluation method should be used to group them in various categories for visitors?
3. Some of the waterfalls are on private land. How can these waterfalls be made accessible for tourists without violating private property rights?

The research for this waterfalls project began with Joseph Hollick, Scott Ensminger and Stephen Head. In particular, Joseph Hollick's work was most helpful; his list of 44 waterfalls

with accurate street directions, criteria and classifications were the starting point for the project.

The work began with a literature search in publications, websites, and various lists. Field work, aerial photography and mapping techniques were used to accurately locate existing falls and previously undiscovered waterfalls along the Niagara Escarpment within the boundaries of the city of Hamilton. Once the exact location was determined, it was easier to determine and plot ownership boundaries, in terms of private or public land. The private landowners were sent letters of introduction and a request to enter their property to conduct a detailed waterfalls survey. Data sheets for each waterfall were derived and are included in the appendices. New waterfalls were located with the assessment records, contour and GIS mapping, and field surveys.

Recommendations and suggestions are provided in this report for consideration and discussion among the Hamilton Conservation Authority, the City of Hamilton, stakeholders, and the community. Phase II of this project will focus on conceptual site design and capital cost estimates for the development of the highest-ranked waterfall clusters.

## **B. BACKGROUND**

### **1. Geology of Niagara Escarpment**

The geological history of the Niagara Escarpment starts over 450 million years ago, when the interior of North America was frequently covered by shallow seas. Since North America was located further south for most of this time, the environment was quite tropical and animals like corals and other shelled organisms thrived in these seas. When they died their shells and skeletons accumulated as thick layers of sediment made mostly of mineral calcite (calcium carbonate). During some periods, large amounts of sand and clay sediments were washed off the land and accumulated as layers in the sea. Over time a layer cake-like accumulation of sediment built up, compacted, re-crystallized and turned to strong rocks known as limestone and dolostone. The layers of mud hardened to become a weak and crumbly rock called shale. When the sea finally left the interior of North America about 100 million years ago, these rocks were exposed to wind, rain, flowing water, frost and ice that began to break down (weather) and were carried (eroded) away by streams and glaciers.

The weak layers were broken down and carried away more quickly than the strong layers. When a thick strong layer has weak layers of rock beneath it, the weak layers are eroded first by water, then ice and wind leaving the strong layer unsupported. Eventually the overhanging rock breaks off and falls, forming a cliff or escarpment.

Beginning 25,000 years ago glaciation changed the Southern Ontario landscape again. First covering the area with hundreds of meters of ice, it scraped the bedrock and then deposited sand, gravel and large boulders, called erratics, over the country-side. The glacial phase ended approximately 10-13,000 years ago. With the retreat of the glaciers, the escarpment, creeks and their watersheds became habitat for many diverse plants and animals. The escarpment watersheds evolved into their present form as the glaciers melted away from Southern Ontario.

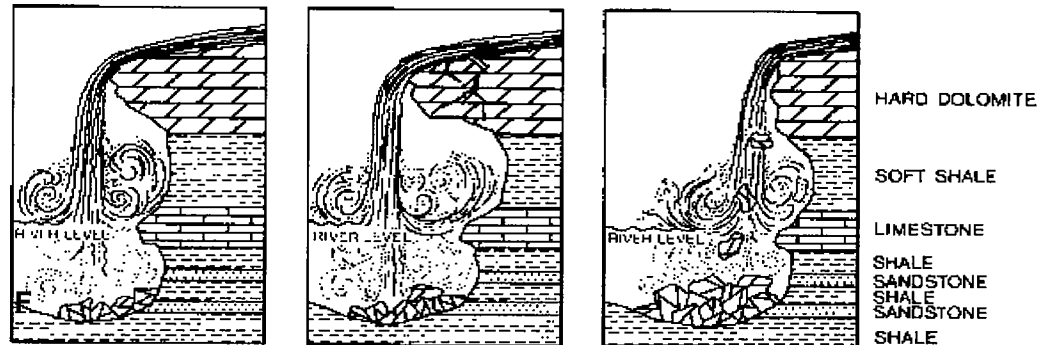
## **2. Formation of waterfalls:**

Hamilton area watersheds are drained by a system of wetlands, streams and ponds that ultimately flow into Burlington Bay and Lake Ontario. These systems flow over the Niagara Escarpment in order to reach the lake. The watersheds can be divided into three zones:

- (a) **The Headwater Zone:** This zone is the source and extends well upstream from the escarpment, into escarpment upland. In this zone, water from precipitation is retained in swamps and ponds and in porous sediments and soils as groundwater. The water leaks out from these natural reservoirs as small trickles and springs that gather into rivulets and then combine to form streams, creeks, larger creeks and rivers. The channel gradient in this zone is low.
- (b) **The Transfer Zone:** In this zone, the bedrock channels begin at the edge of the escarpment with steep gradients which decrease as the channels approach the valley floors. Where waters flow over erosion-resistant layers of bedrock, picturesque waterfalls are formed. A process called “sapping” maintains vertical face of these waterfalls (Fig 1). Sapping results from several factors which include the response of rocks underlying erosion-resistant rock layers to alternate periods of wetting and drying; these changing conditions alter the hardness of the underlying rocks. The end result is the undermining of the erosion-resistant

formations which then tumble off. Thus the verticality of the rock face at the falls is maintained.

- (c) **The Zone of Deposition:** This zone consists of flat areas that extend across the valley floors from the banks of the river to the valley slopes. These are flood plains.



**Figure one: Process of Sapping**

Source: Tovell, Guide to the geology of waterfalls.

### 3. Classification of waterfalls

There are several types of classifications for waterfalls. A few of them are as follows:

- (a) Classification based on **Size** of waterfall:
- **Ribbon** - The height is notably greater than its crest width; stream forms a thin “ribbon” of water
  - **Classical** – The height and crest width are nearly equal;
  - **Curtain** – The height is notably smaller than its crest width.
- (b) Classification based on **Shape** of waterfall:
- **Fan** – A formation created when a narrow cascade spreads out in a fan-like formation at the bottom of a waterfall;
  - **Staircase** – A waterfall which falls in a single stream over many small little edges, creating the image of a staircase;
  - **Slide** – A waterfall formed by steeply sloping rock cliff face down which a stream flows;

- **Overhanging ledge** - This type of waterfall is formed when the ledge over which the stream flows protrudes out from the rest of the cliff wall, creating an overhang;
- **Combination** – A waterfall which includes features of more than one type of waterfall. For example, a waterfall could cascade at the top and then plunge off a ledge halfway down.

(c) Classification based on **Rock Formation**:

- **Plunge** – A plunge fall occurs when water “plunges” over a cliff face created when a strong layer of horizontal bedrock is underlain by a weaker layer.
- **Ramp** - In Ontario, this form is found almost exclusively on the Niagara Escarpment. Unlike plunge waterfalls, ramp falls do not have a prominent, strong rock layer at the top. Each layer of bedrock is of similar resistance to erosion. This results in a ramp-like appearance, with the stream or river never really losing contact with the rock surface.
- **Cascade** – This type is a widely encountered waterfall form. The term is somewhat of a “catch-all”, because it encompasses a large number of falls in different locations in Ontario. The bedrock under a cascade waterfall tends to be more “irregular” than the ramp or plunge fall classifications.

This report has used a combination of classifications based on size and rock formation because it is more relevant to the geology of the Niagara Escarpment and the waterfalls in the City of Hamilton. However, the general area of waterfall classifications needs further work and will become more refined internationally as research by geologists and geomorphologists continues.

#### 4. Definition of a Waterfall in this Study

After research through books, tourism publications and websites, and meeting with waterfall regional waterfall enthusiasts, it became apparent there is no single definition or criteria used to identify a waterfall. Although all the waterfall research sources have mentioned height of the waterfall as one of the most important factors, there is no agreement on a set height that defines a waterfall vs. a rapid. After holding detailed discussions and meetings with senior staff and local waterfalls enthusiasts, the following general criteria has been used to identify a waterfall in the City of Hamilton:

- (a) The waterfall has to have a vertical drop of at least 3 meters (10ft) either as a vertical drop or cascade;
- (b) For a creek with more than one waterfall, the waterfalls were identified as separate waterfalls if they are not distinctly visible as one unit from a safe location;
- (c) If a waterfall is beside another waterfall but coming from two separate creeks or streams, they are listed as separate waterfalls;
- (d) The waterfall has to have some natural component to it and not be entirely man-made;
- (e) There must be water flowing over the waterfall at least in peak storm events, but preferably on an annual or seasonal basis;
- (f) The waterfall must be located within the urban boundaries of the City of Hamilton.

## C. APPROACH & METHODOLOGY

When the project was started, there was scattered information about waterfalls available in the form of books, websites, maps, photos and lists. The following reference material was reviewed to begin the research:

- Bell, J. et al (2003). *Cascades & Waterfalls of Hamilton*. Map brochure, description of 12 accessible waterfalls.
- Ensminger S. (1994). *Waterfalls of the Niagara Peninsula Ontario, Canada*. The Western New York Survey. New York.
- Harris M. (2004) *Waterfalls of Ontario.ca* Retrieved on 29<sup>th</sup> October, 2004.  
<http://www.start.ca/users/mharris/waterfalls/>
- Head S. (2004) *Hamilton: The City of Waterfalls*.
- Hollick, J. (2004). Master list and photographs, 44 waterfalls.
- Lawton, J. (no date) *Waterfalls: The Niagara Escarpment*. Ontario: Boston Mills Press.

The goal was to create a definitive list, description and ranking of waterfalls within the amalgamated City of Hamilton; confirm field data of existing waterfalls and research new ones.

## 1. Approach

The following methodical approach was followed throughout the project:

- Using existing reference material, mapping and field survey techniques to collect data on waterfalls;
- Gaining permission to access all private land to do field work; and
- Obtaining stakeholder input through meetings and discussion of key staff.

The anticipated outcomes include a report with waterfall ranking; together with an inventory with a datasheet per waterfall, photography and mapping.

## 2. Methodology

A variety of technology and tools were used. They include the following:

- Satellite Technology;
- Aerial Photography;
- GIS and topographic mapping at various scales;
- Review of assessment records;
- Field research;
- Natural Areas Inventory Database;
- Historical atlases and books.

### (a) Global Positioning System

Forty-four documented waterfalls were visited in the early summer, 2004. The Global Positioning System (GPS) device was used to record the North American Datum 83 (NAD 83) coordinates for each waterfall. The GPS device used was Garmin's eTrex; this device had a minimum spatial inaccuracy of 5 meters depending on the condition of the site. Five readings were taken on each site at each spot to reduce spatial inaccuracy. The coordinates of nearby major structures and intersections were also taken to confirm the location.

### (b) Mapping & Aerial Photography

The field coordinates were transferred to an Excel data sheet. The accuracy of waterfall sites was further checked on aerial photographs of the City of Hamilton using Geographic



Information System (GIS) software Arc Explorer. The corrected data was transferred to a shape file by GIS software Manifold System 6.00. The shape file was transferred to the Arc Explorer and TATUK (GIS software) for analysis. A Map showing all the waterfalls, trails, roads, and parks was generated with the help of Manifold System 6.00. Road access maps for various clusters of waterfalls were generated with the help of AutoCAD Map5.

**(c) Review of Assessment Records**

After determining the exact locations of the waterfalls on GIS, the next step was to obtain the ownership information. The Personal Identification Numbers (PIN) and Roll Numbers of waterfall sites and their access routes on private property were obtained from mapping and that information was sent to the Finance and Corporate Services Department, City of Hamilton for ownership information.

An effort was made to locate new waterfalls by using a layer of contours. The contours tend to fall closer together where there is a sudden change in elevation. All the major streams were analyzed on city aerial photographs by laying contours. Using this method, staff found four Hamilton waterfalls not yet documented.

**(d) Field Research**

All waterfalls were visited to survey the height, width, and distance and time from the nearest access point to the waterfalls, and to take photographs. The height and width of the waterfall were measured with measuring tape, and wherever it was too dangerous to climb the waterfall, a sextant was used to measure the angle. Once the length of the base was known, trigonometric calculations were used to determine the height. Because of the irregular shape and location of some waterfalls, it can be very difficult and dangerous to measure the exact height in the field. However, wherever it was possible, each and every ledge was measured from the topmost layer on the crest to the surface of the water at the base of the falls.

Data, such as major geological, ecological and aesthetic features, were recorded. The amenities such as parking spaces in parking lot, best lookouts and vistas, on-site facilities and nearby facilities, such as picnic tables, BBQ stands, benches, washrooms, convenience stores, restaurants and bus stops were also noted. Photographs of waterfalls were taken from various lookouts using a digital camera. In addition to this, Joseph Hollick, Sandy Bell, and Bill

Crawford have donated waterfall photographs to the Hamilton Conservation Authority for its photo library, website and publications.

In cases, where the waterfall sites were on private property, letters were sent to seek permission from the landowners to access the waterfalls. Generally, the response from the private landowners was good.

**(e) Natural Areas Inventory**

In 1990 and 1991, the Hamilton Naturalists' Club (HNC) conducted a biological inventory of over 80 natural areas in the City of Hamilton. A team of professional biologists identified flora and fauna and significant species in the area. The Natural Areas Inventory was updated by the HNC in 2001 and 2002 field seasons and documented in a final report, entitled *Nature Counts Project: Hamilton Natural Areas Inventory (2003)*.

The flora, fauna, geology and physiography in and around the waterfalls have been referenced in the individual data sheets in Appendix D. Relevant sections of the *Nature Counts Project* report have been placed in a separate binder for easy reference.

**(f) Historical books and atlases**

In the literature search and lists used, waterfalls often had multiple names. Historical atlases and books, interviews with librarians, curators and local historians were consulted to attempt to determine the most historical or commonly-used name for a waterfall and a bit about the local history and ownership through time. This information assisted the project team in recommending a preferred name for each waterfall. A brief statement of the cultural history, if known, was included in the data sheets, Appendix C. Vintage postcards of waterfalls in and around Hamilton, Ontario can also be visited on the following website:

<http://www.hamiltonpostcards.com/pages/waterfalls.html>.

## D. DISCUSSION & ISSUES

This report includes information on sixty-five (65) waterfalls. The complete list of waterfalls is in Appendix A. The list contains vital data such as North American Datum 1983 (NAD83) coordinates, height and width, feeder creek, ownership, and access to the waterfalls. Community maps showing all the waterfalls, trail linkages, conservation lands and city parks is shown in Appendix B. The detailed survey data is presented in a waterfall data sheet; one for each waterfall in Appendix C (C1-C65). Between July and February 2005, twenty-one new waterfalls were located, which suggests that there will most likely be more in the City of Hamilton that have not yet been documented.

The following findings will be of particular interest.

### 1. Findings:

- In the summer and fall of 2004, HCA staff confirmed 65 waterfalls in Hamilton, plus two in Smokey Hollow (Burlington) that met the definition of “waterfall”. As new waterfalls are found over the next year, they will be evaluated using the definition and data sheet template, and added to the next edition of the waterfalls inventory.
- Forty (40) of the waterfalls are accessible by roads or trails; the remaining twenty-five (25) waterfalls are currently inaccessible.
- Of the 65 waterfalls, forty-four (44) are on public land owned by the City of Hamilton, Hamilton Conservation Authority, Conservation Halton and the Royal Botanical Gardens. Twenty-one are on private land.

<b>Public Ownership</b>	<b>No. of Waterfalls</b>
City of Hamilton	24
Hamilton Conservation Authority	16
Conservation Halton	03
Royal Botanical Gardens	01
Total	44

**Table 1.0 Public Ownership**

- All are found on the Niagara Escarpment. Thirty-three (33) are on or within 50 meters of the Bruce Trail, 26 along the Main Trail and seven along the side trails;
- Of the 65 waterfalls, 18 are ranked excellent with flow all or most of the year; 30 are ranked good, leaving 17 as satisfactory;
- The number of the waterfalls by community is as follows:

<b>Name of Community</b>	<b>No. of Waterfalls</b>
Ancaster	16
Dundas	01
Flamborough	15
Glanbrook	00
Hamilton - East	07
Hamilton – West	13
Stoney Creek	13
Total	65

**Table 2.0 Waterfalls by community**

- Waterfalls can also be sorted by watershed

<b>Watershed</b>	<b>No. of waterfalls</b>
Battlefield Creek	03
Borer's Creek	02
Bronte Creek	01
Chedoke Creek	07
Felker's Creek	02
Grindstone Creek	04
Red Hill Creek	03
Spencer Creek	24

Stoney Creek	02
Unknown creeks	17
<b>Total</b>	<b>65</b>

**Table 3.0 Waterfalls by watershed**

### **Interesting Facts**

- Based on the research to date, the City of Hamilton has the most waterfalls in any urban municipality on the Niagara Escarpment and in Ontario;
- Tew’s Falls is the highest waterfall in the city with a height of 41meters (135 ft);
- Webster’s Falls is the widest waterfall with a total width of 28 meters (92 ft), with the highest volume of water flowing over it;
- There are seven (7) waterfalls in the city-owned Chedoke Golf Course and Chedoke Radial Trail; and thirteen (13) between Hwy. 403/Iroquoia Heights CA and the terminus of the Radial Trail, just west of Queen St. South.
- All the waterfalls are within a 20km radius from the intersection of Highway 403 and Main Street and there are 41 waterfalls within a 10km radius from the same intersection.
- Ten waterfalls have been featured on Vintage Post Cards dating back to the early 1900’s. The ten waterfalls are: Horseshoe Falls (Devil’s Punch Bowl Falls), Albion Falls, Sanatorium Falls, Chedoke Falls, Borer’s Falls, Stutt’s Falls (Darnley Cascade), Webster’s Falls, Hopkins Falls (Tew’s Falls), Washboard Falls and Waterdown Falls (Great Falls).

## **2. Evaluation & Ranking From a Visitor Perspective**

It is very important to evaluate these waterfalls and place them in a definite ranking system.

This ranking will serve two main purposes:

- **Define Tourism Potential:** Tourists and residents are interested in the best waterfalls. The ranking system will provide ready information of Hamilton's best waterfalls in terms of availability of water, size, aesthetics and accessibility;
- **Set Development & Funding Priorities:** The ranking system will help prioritize the best waterfalls for site planning, development and funding.

The four factors used to evaluate and rank the waterfalls are water, size, aesthetics and other (see detailed evaluation in Appendix D). Each factor was weighted in order to recognize the overall importance of one factor over another for tourism potential and further site development priorities.

- (a) **Water:** The flow of water was determined to be the most important factor in evaluating a waterfall. The quantity of water flowing over the waterfall depends on the flow in the feeder creeks; most of the creeks in Hamilton are seasonal. The waterfalls have been scaled A, B & C, representing year round, seasonal or peak storm flow. In ranking the waterfalls, this factor is given a weighting of 50%.
- (b) **Size:** The second important factor in evaluating a waterfall is its size, most importantly, the height. Research from various surveys, articles and waterfall websites indicates that a height of more than 15 meters is considered most appealing to tourists. In ranking the waterfalls, this factor is given a weighting of 25%.
- (c) **Aesthetics:** The third factor contributing to a good waterfall is aesthetics. The aesthetics is further divided into two components i.e. shape of waterfall and rock formation, and landscape features, vistas and scenery around the waterfall. This factor is given a weighting of 15%.
- (d) **Other:** The other factors i.e. ownership, accessibility, on-site and nearby facilities do not contribute directly to the natural attributes of a waterfall. These factors can be developed with time and availability of funding. Therefore, this factor was given the lower weighting of 10%.

The waterfalls identified in this report were ranked using the four criteria – water, size, aesthetics and other. They were ranked as A, B or C.

A is Excellent: To get this classification, a waterfall must have a year round flow of water with the exception of the Devil's Punch Bowl Falls which scored higher for its size, aesthetics and other amenities, in spite of seasonal flow.

B is Good: A waterfall should have a good combination of all four factors.

C is Satisfactory: The waterfall is just fulfilling the basic criteria of a waterfall with a lower score on all the factors.

In summary: There are 18 Excellent waterfalls; 30 Good waterfalls and 17 Satisfactory waterfalls. The detailed ranking for each factor or criteria is referenced in Appendix E.

The Summary Ranking of Hamilton Waterfalls follows below as Table 4.

<b>Ranking Summary</b>					
<b>Name</b>	<b>Water</b>	<b>Size</b>	<b>Aesthetics</b>	<b>Other</b>	<b>Final</b>
Albion Falls	A	A	A	B	A
Chedoke Falls	A	A	B	B	A
Cliffview Falls	A	B	B	A	A
Darnley Cascade	A	B	A	B	A
Devil's Punchbowl Falls	B	A	A	A	A
Felker's Falls	A	A	A	A	A
Great Falls	A	B	A	A	A
Little Davis Falls	A	B	A	A	A
Lower Chedoke Falls	A	A	A	B	A
Lower Mill Falls	A	B	B	A	A
Mill Falls	A	B	A	A	A
Progreston Falls	A	A	A	C	A
Sherman Falls	A	A	A	B	A
Steven's Falls	A	B	A	B	A
Tew's Falls	A	A	A	A	A
Tiffany Falls	A	A	A	A	A
Webster's Falls	A	A	A	A	A
Westcliffe Falls	A	B	B	A	A
<b>TOTAL</b>					<b>18</b>

Baby Webster Falls	B	B	B	A	B
Billy Green Falls	B	A	A	B	B
Borer's Falls	B	A	A	B	B
Buttermilk Falls	B	A	A	B	B
Canterbury Falls	B	B	A	B	B
Denlow Falls	B	A	B	B	B
Dundas Falls	A	B	B	B	B
Filman Falls	B	B	A	B	B
Grindstone Cascade	A	C	A	A	B
Glover's Falls	B	B	B	B	B
Hermitage Cascade	A	C	A	A	B
Jones Road Falls	B	B	B	C	B
Lower Cliffview Falls	A	B	B	A	B
Lower Princess Falls	B	B	B	B	B
Lower Punchbowl Falls	B	B	B	B	B
Lower Sydenham	B	C	C	B	B
Lower Tews Falls	A	B	A	B	B
Lower Westcliffe Falls	A	C	B	A	B
Middle Sydenham Falls	B	B	A	B	B
Mineral Springs Falls	A	C	A	B	B
Mountview Falls	B	B	C	A	B
Princess Falls	B	B	B	A	B
Scenic Falls	B	A	B	B	B
Stephanie Falls	A	B	A	C	B
Sydenham Falls	B	B	A	B	B
Upper Grindstone Falls	B		C	B	B
Vinemount Middle Falls	B	B	B	C	B
Vinemount East Falls	B	C	B	C	B
Vinemount West Falls	B	B	B	C	B
Washboard Falls	A	B	A	C	B
<b>TOTAL</b>					<b>30</b>
Boundary Falls	C	B	B	B	C
Dewitt Falls	C	B	B	C	C



East Glover's Falls	C	B	B	B	C
Erland Falls	C	B	B	C	C
Fruitland Falls	C	B	B	C	C
Glendale Falls	C	C	C	B	C
Heritage Falls	C	B	A	A	C
Little Canterbury	C	B	A	B	C
Little Falls	C	B	B	A	C
Lower Borer's Falls	B	C	C	C	C
Lower Fruitland Falls	C	B	B	C	C
Lower Sanatorium Falls	C	C	B	A	C
Old Dundas Rd. Falls	C	B	A	B	C
Ridge Falls	C	B	B	C	C
Upper Filman Falls	B	C	C	C	C
Upper Sanatorium Falls	C	B	B	A	C
Wall Falls	C	C	B	C	C
<b>TOTAL</b>					<b>17</b>

**Table 4.0 Summary of Waterfall Ranking**

### 3. Issues

#### (a) Ownership:

- (i) Private Ownership: A number of waterfalls are located on private land, so the HCA is required to respect the privacy of the landowner and their legal right to prohibit access. Permission was sought to allow staff to field survey the waterfalls. Landowner names will not appear in the report, lists or maps. Private landowners will be asked if they wish to allow public access to the waterfalls on their land.

Some landowners have already given permission to the Bruce Trail Association (BTA) to access their land for hiking. A key example of this is Sherman Falls in the Dundas Valley. HCA staff will discuss with the BTA the nature of the landowner agreement, its legality and liabilities, and determine if a similar approach might be used for waterfall-viewing.

(ii) Public Ownership – Hamilton Conservation Authority: The HCA will, on completion of this report, begin the site concept design and costing for waterfall clusters. Priority will be given to waterfall clusters with high ranking.

(iii) Public Ownership- Conservation Halton Conservation Halton owns a Resource Management Area on Grindstone Creek, known as Smokey Hollow. On this public land are five waterfalls, three in Hamilton and two i.e. Snake Falls and Lower Snake Falls, in Burlington. HCA staff will meet with Conservation Halton to review this report and request a site plan and costing for this waterfall cluster.

(iv) Public Ownership – City of Hamilton: HCA staff met with city staff to review findings and begin discussion regarding a course of action with the city as a partner in this project. Because the City of Hamilton owns 24 waterfalls, it is important for the City to become partners with the Conservation Authority and the community to ensure waterfall accessibility is improved and tourism potential realized. The city will need to take the lead to improve access and lookout facilities on their own lands. The Chedoke cluster of waterfalls is a high priority.

#### **(b) Safety and Risk Management**

Because the waterfalls involve steep elevations, there are issues of public safety, liability, due diligence and risk management. Awareness will increase as this report is published and results are posted on websites. HCA and City of Hamilton staff will need to determine appropriate signage and necessary steps to insure public safety.

#### **(c) Naming of Waterfalls**

Every effort was made to recognize and use given names. Staff researched historical names and used them where possible. Where no name exists, the Waterfalls Project Team, including representatives from the Conservation Authority, City of Hamilton, Bruce Trail Association, and waterfall enthusiasts and photographers have chosen and agreed to working names related to the waterfall's history, geographical location or special features.

In 2006, application will be made to the Ontario Geographic Names Board, an agency administered by the Ontario Ministry of Natural Resources to verify the chosen names, if no name is confirmed by that time. The most relevant section of the legislation under which an application would be made, is as follows:

Section 1.2.4 No Known Name

Where no name is known to exist for a geographical entity, the Board gives consideration to:

- (a) the restoration of a name established in the historical or traditional record; and,
- (b) the adoption of a name which:
  - (i) is descriptive of the geographical entity;
  - (ii) commemorates an historical event or tradition directly associated with the geographical entity; or,
  - (iii) commemorates a person.

**(d) Development Controls and Approvals**

Prior to proceeding with the capital development of any site plans related to waterfalls in this report, all property owners will need to obtain Niagara Escarpment development approval as well as HCA, municipal, provincial, and federal permits.

**(e) Public Environmental Impact**

Awareness of Hamilton waterfalls is increasing, and with that increased curiosity comes some concern for the environmental impact of random footpaths in sensitive natural areas, increased potential for vandalism, littering and garbage. The partners in this project will need to address this issue to minimize negative impact both in the short and long term.

