MID-SPENCER/GREENSVILLE RURAL SETTLEMENT AREA SUBWATERSHED STUDY

April 2016

Prepared for:

The City of Hamilton

Hamilton

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1 INTRODUCTION

1.1 General

The City of Hamilton initiated this study for the Greenville Rural Settlement Area (RSA) and surrounding Mid-Spencer Creek Subwatershed.

The Greensville RSA and Mid-Spencer Subwatershed are located in the former Town of Flamborough and the City of Hamilton. Residents in the Greensville RSA and the subwatershed area currently serviced by private septic systems and groundwater sourced municipal commercial, private communal or individual wells.

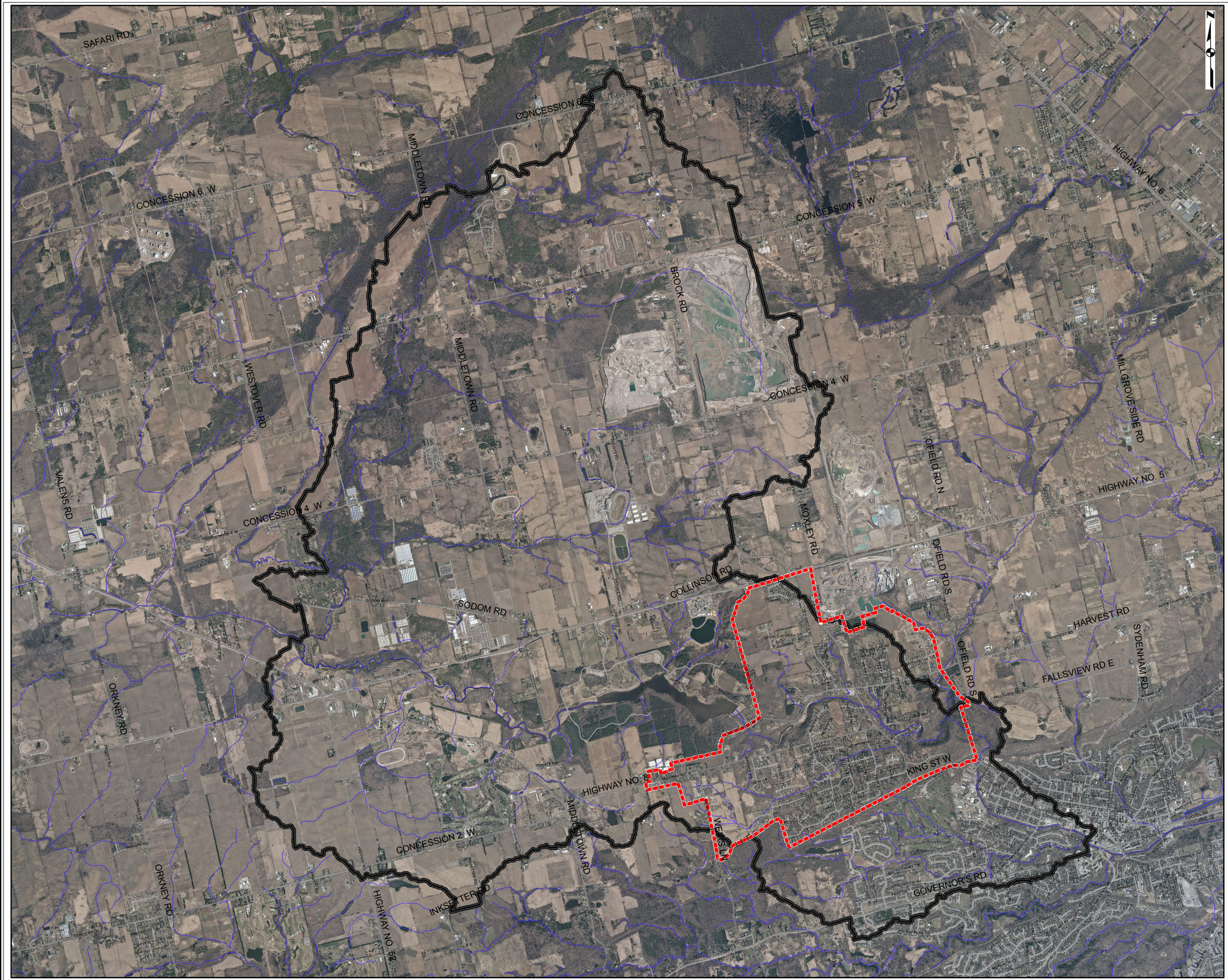
A Secondary Plan was prepared for Greensville in 1992 and the land use policies and guidelines for development are outlined in Official Plan Amendment 13 (OPA 13) to the Official Plan for the Town of Flamborough. The Secondary Plan sets out requirements for stormwater drainage and hydrogeology studies to be completed prior to new development within the Greensville Settlement Area.

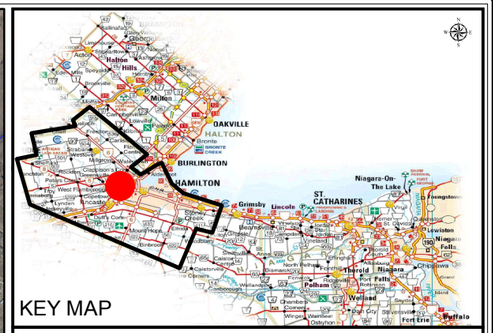
The Secondary Plan outlines the requirement for a Comprehensive Servicing Study that is to be undertaken to "provide guidelines to determine the extent and density of residential development that can be sustained without degradation of the quality or quantity of ground or surface waters within and outside the Secondary Plan Boundary". One of the objectives of this study is to define existing environmental conditions and to determine the potential impact of proposed development within the Greensville RSA.

As defined in the Secondary Plan, the Terms of Reference for this study were developed by the City of Hamilton (former Regional Municipality of Hamilton-Wentworth), in consultation with the Ministries of the Environment and of Natural Resources (MOE and MNR), the Niagara Escarpment Commission (NEC) and the Hamilton Conservation Authority (HCA). Designates from these agencies will provide representation on the Technical Advisory Committee (TAC).

1.2 Study Area

There are two distinct study areas for this project, the Greensville RSA and the greater Mid-Spencer Creek Subwatershed. Both are located within the Spencer Creek watershed, a majority of which is located within the western portion of the City of Hamilton (**Figure 1.2.1**). Per the Mid-Spencer Subwatershed Study Teams of Reference, detailed studies were conducted within the RSA, because the RSA is the only area of development interest within the subwatershed. The remainder of the subwatershed received more general level of study detail.





Legend

- Rural Settlement Area
- Mid-Spencer Creek Subwatershed Boundary

NOTES:

0 0.5 1 2
Kilometers

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GREENSVILLE SUBWATERSHED STUDY

Study Areas

FIGURE: 1.2.1

DATE: February 2016

The Mid-Spencer Creek is generally bounded by Governor's Road to the south, Westover Road to the west, Sixth Concession Road to the north and Brock Road to the east. The Mid-Spencer Creek drains an area of approximately 56.4km2. The dominant land use is rural, with the exception of the Greensville RSA and the former Town of Dundas which is located in the southern part of the Subwatershed.

The Greensville RSA, located on the Niagara Escarpment **(Figure 1.2.2)** , is generally bounded by the CN Railway to the south, Middletown Road to the west, Dundas Street East (Highway 5) to the north and Ofield Road South to the east. Presently, there are approximately 900 residences located within the RSA. The Greensville RSA covers an area of approximately 655 ha.

BASE MAP LEGEND

ROADS
- Expressway
- Provincial Highway
- County or Regional
- Local Municipal

BOUNDARIES
- County or Regional Municipality
- Township, Local and Area Municipality
- Former Township

OTHER
- Railway
- Abandoned Railway
- Contour (10m Interval)
- Lot and Concession Boundary

THE NIAGARA ESCARPMENT PLAN 2005
APPROVED and ORDERED June 1, 2005
O.C. # 912/2005

Amendment Consolidated to 2015

Vector Base Map Data supplied by the Ontario Ministry of Natural Resources, Natural Resources & Values Information System (NRVIS) 1:10 000 Database.

Map Compiled and Produced by the Geographic Information Systems (GIS) Department of the Niagara Escarpment Commission, Ministry of Natural Resources.

Ontario

LEGEND
- Escarpment Natural Area
- Escarpment Protection Area
- Escarpment Rural Area
- Mineral Resource Extraction Area
- Escarpment Recreation Area
- Urban Area
- Minor Urban Centre
- Public Land (in Parks and Open Space System)
- Special Policy Area
- Policy Amendments to the Niagara Escarpment Plan

NOTE: The Niagara Escarpment Plan designation boundaries shown on this map are approximate and subject to confirmation through site inspection and the application of the "Interpretation of Boundaries" section of the Niagara Escarpment Plan.

SCALE 1:50000

Miles 1 0.5 0 1 2 3

Kilometres 1 0.5 0 1 2 3 4

Niagara Escarpment Plan
MAP 2

CITY OF HAMILTON

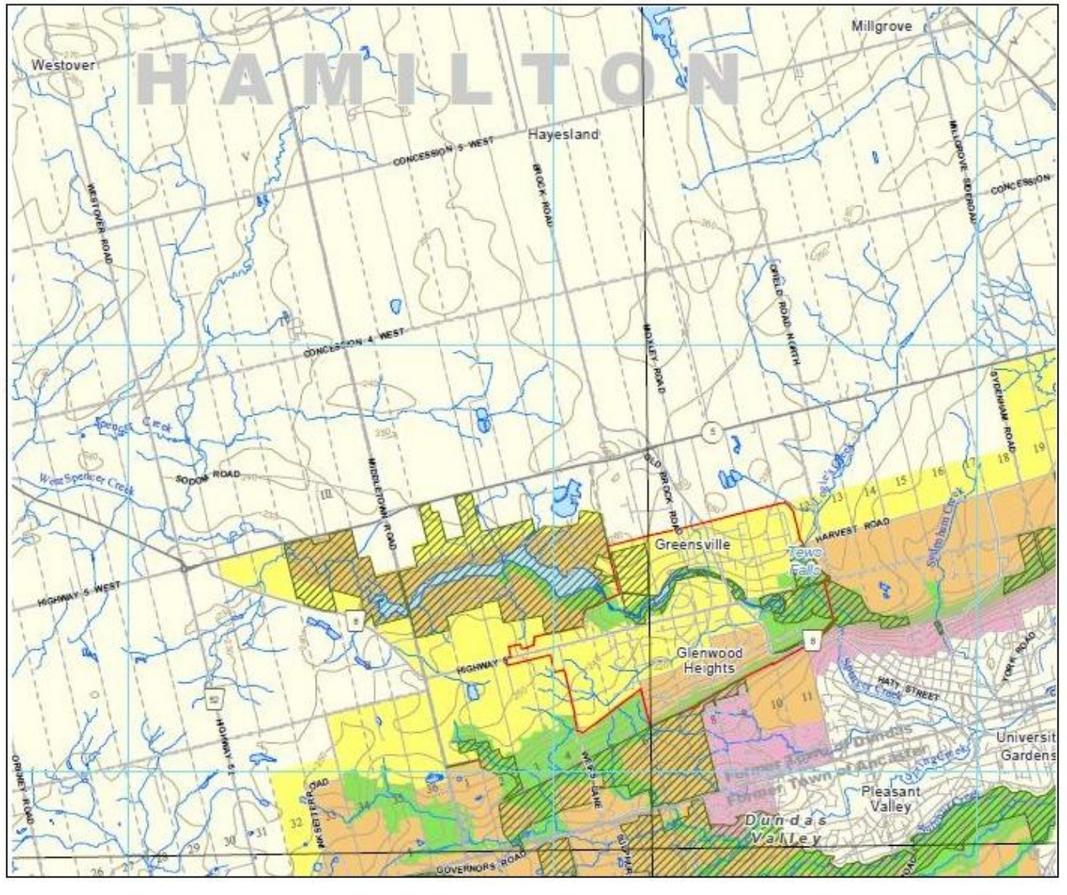

Figure 1.2.2: Niagara Escarpment Plan (figure amended from NEP maps)

1.3 Study Goal, Objective and Key Tasks

Goals are defined as broad aims associated with the conservation or restoration of natural features and processes within the Mid-Spencer/Greensville Subwatershed Study Area. Goals are not as specific as objectives. Goals reflect the environmental priorities within the study area and reflect important issues identified during the definition of existing conditions.

Objectives are qualitative components necessary to meet environmental goals. Objectives can relate to specific technical principles, and can be specific to geographical areas within a subwatershed or can be watershed-wide. Issues or important components identified during the definition of existing conditions should inform the development of objectives.

The proceeding subsections outline the goals and objectives of the Mid-Spencer/Greensville Subwatershed Study.

1.3.1 Study Goal

The study goal is defined as:

"to protect, maintain and enhance the ecological processes, functions and significant natural features of the area, providing a framework through which future growth may be established and undertaken in a manner which is environmentally sound and socially and economically sustainable."

1.3.2 Study Objective

The objective of the study is to provide a basis for the protection, maintenance and enhancement of surface water and groundwater quantity and quality. The resulting plan will provide recommendations as to where and how future development activity can safely occur so as to minimize flood risks, stream erosion, degradation of water quality and negative impacts on natural systems, including groundwater. Recommendations may also identify opportunities for ecological enhancement where deemed integral to the function of the plan.

1.3.3 Key Tasks

The study will be carried out in three stages. The key tasks to be undertaken for each stage are outlined below.

<u>STAGE I – SUBWATERSHED CHARACTERIZATION</u>

- Define existing environmental conditions
- Identify and evaluate natural features and functions of the study area and their potential interrelationships with other natural features

- Summarize constraints and opportunities

STAGE II – DEVELOP AND EVALUATE SUBWATERSHED MANAGEMENT STRATEGIES

- Identify alternative Subwatershed Management Strategies
- Establish criteria to evaluate the alternative strategies
- Select a Preferred Subwatershed Management Strategy

STAGE III – DEVELOP AND IMPLEMENTATION AND MONITORING PLAN

- Develop an Implementation and Monitoring Plan to ensure the long term integrity of the Preferred Subwatershed Management Strategy

1.4 Subwatershed Planning

The process of Subwatershed Planning has evolved over the last 20 years (**Figure 1.4.1**). The typical Subwatershed Plan of the 1980's, which was commonly termed "Master Drainage Plan", was primarily concerned with two issues; flooding and erosion. In the latter part of the 1980s the plan evolved and typically dealt with the above issues as well as water quality and occasionally aquatic resources.

Presently, Subwatershed Plans deal with a number of issues including:

- flooding;
- erosion;
- water quality;
- the water budget (i.e., groundwater, baseflow and peak flows);
- terrestrial and aquatic habitat;
- woodlands, including woodlots and forests;
- wetlands;
- Areas of Natural and Scientific Interest;
- Environmentally Sensitive Areas;
- aesthetics; and
- recreation.

Furthermore, the plans are ecosystem based, with the potential interaction between each of the environmental features being strongly considered.

Integration of the Land Use Planning Process with Water Resource Management Planning has also evolved over the last 20 years. Whereas the common practice in the mid eighties involved

the development of Official, Secondary and Draft Plans with nominal consideration of environmental consequences; present practice considers the two planning processes in unison.

The Subwatershed Plan, in this manner, becomes an integral part of the overall planning process, and if successfully completed should provide:

- a solid foundation such that the environmental features will be protected, enhanced or restored under present conditions, and as land use changes occur; and
- an environmentally sound framework within which those involved in planning and decision-making can evaluate the consequences of current and post-development scenarios in the context of the entire subwatershed.

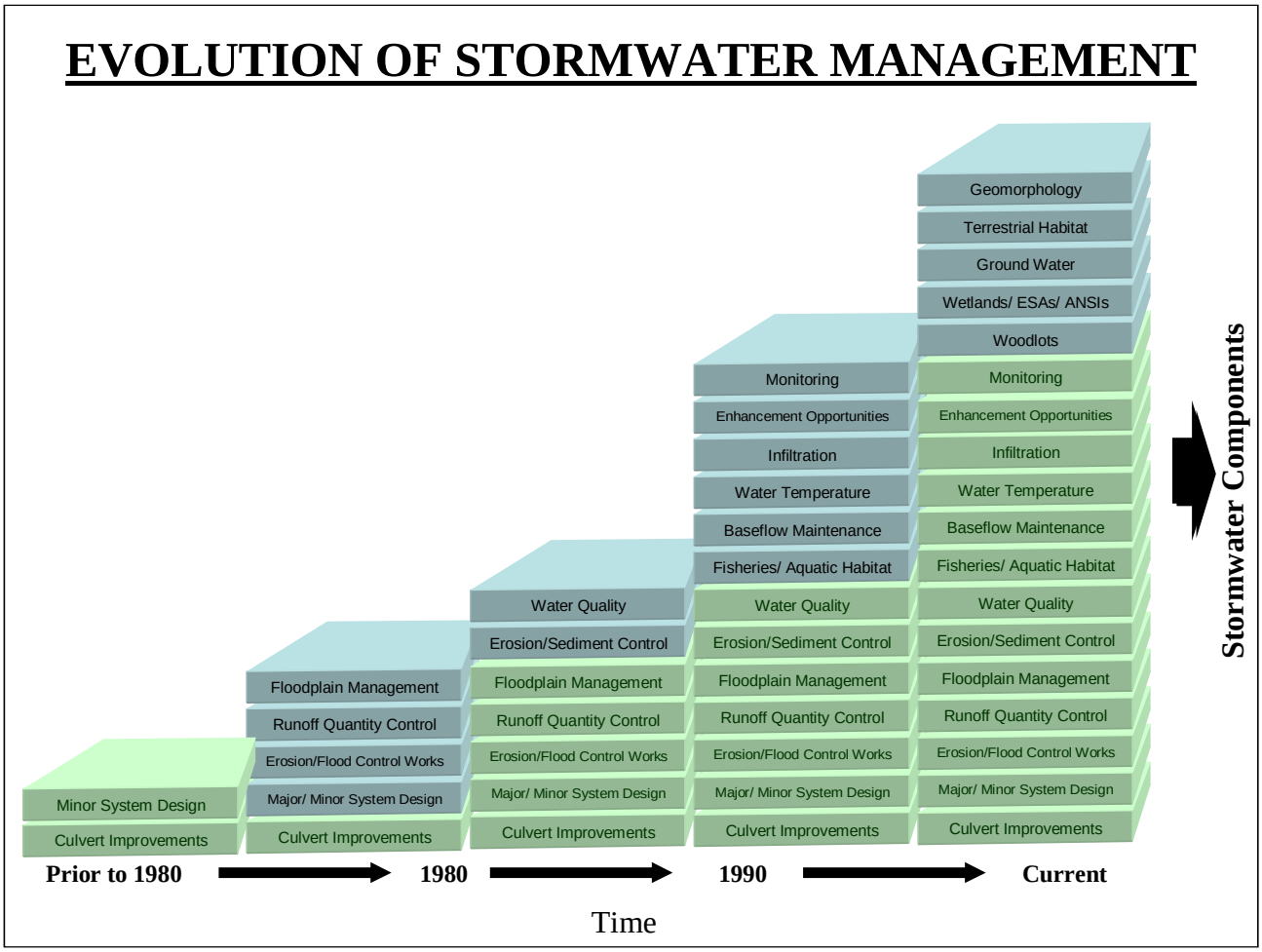

Figure 1.4.1: Evolution of Stormwater Management

1.5 The Class Environmental Assessment Process

The Environmental Assessment Act was legislated by the Province of Ontario in 1980 to ensure that an Environmental Assessment is conducted prior to the onset of development and development related (servicing) projects. Depending on the individual project or Master Plan to be completed there are different processes that municipalities must follow in order to meet Ontario's Environmental Assessment requirements

This report provides a strategy for implementing a large number of projects of a similar nature with differences being primarily due to site specific conditions. For this reason, the Municipal Class Environmental Assessment process, as described by the Municipal Engineers Association (2006) will be followed (see **Figure 1.5.1**).

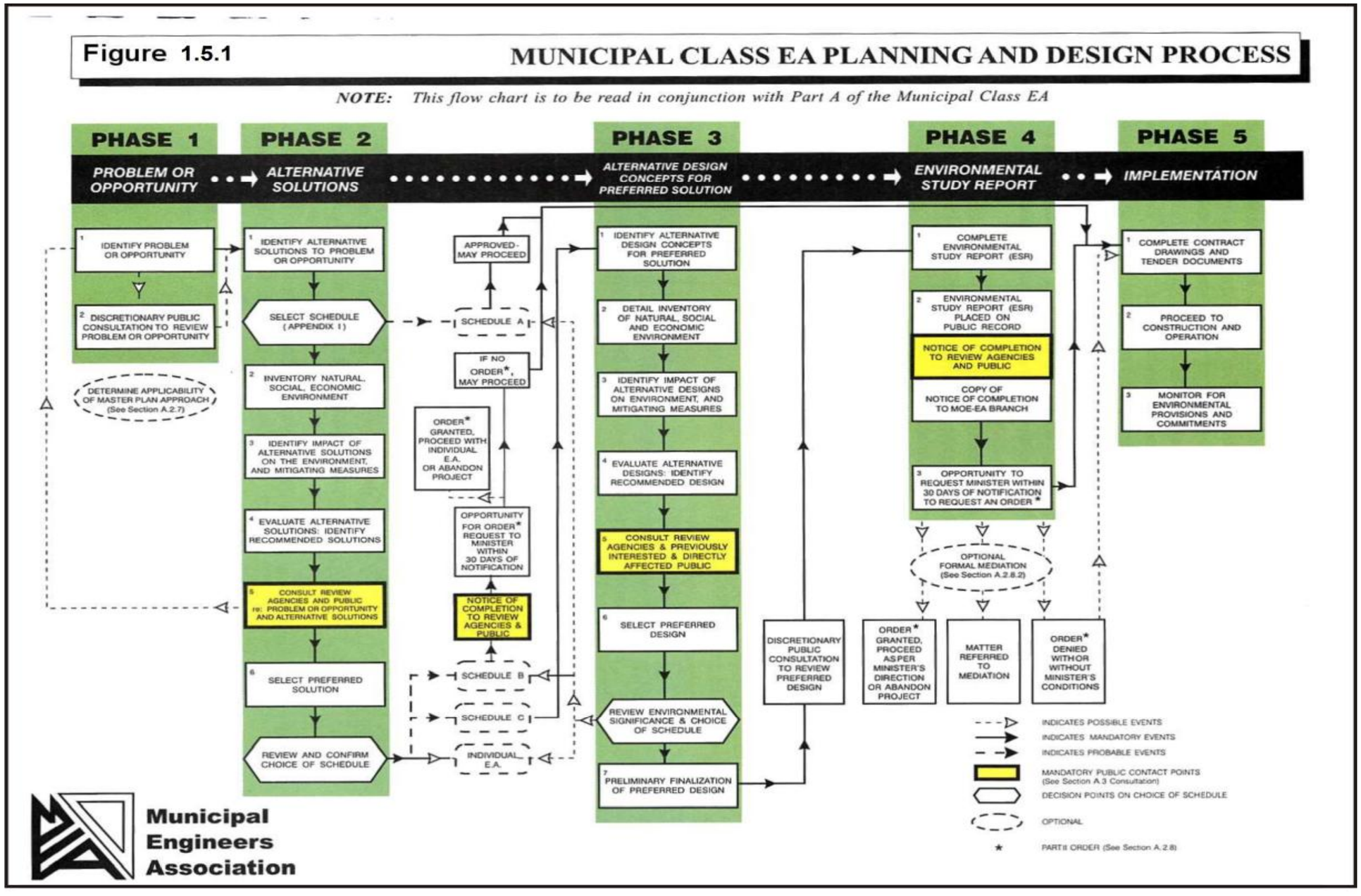

Figure 1.5.1: Municipal Class EA Planning and Design Process

Class Environmental Assessments (Class EA) are prepared for approval by the Minister of the Environment. A Class EA is an approved planning document that defines groups of projects and activities and the environmental assessment (EA) process which the proponent commits to for each project undertaking. Provided the process is followed, projects and activities included under the Class EA do not require formal review and approval under the EA act. In this fashion the Class EA process expedites the environmental assessment of smaller recurring projects.

The Municipal Class Environmental Assessment Master Planning process to be followed is illustrated in **Figure 1.5.1**, and may involve up to five phases of assessment. These phases include:

- **Phase 1**: Establish the Problem or Opportunity
- **Phase 2**: Identify and Assess Alternative Solutions to the Problem, and Select a Preferred Alternative
- **Phase 3**: Identify and Assess Alternative Design Concepts for the Preferred Solution, and Select a Preferred Design Concept.
- **Phase 4**: Prepare an Environmental Study Report
- **Phase 5**: Process with Design and Implementation.

Public and agency consultation is also an important and necessary component of the five phases.

In partial fulfillment of Ontario's Environmental Assessment requirements, a Master Plan must address at least the first two phases of the Class Environmental Assessment process. Depending on the type of Master Plan to be completed, Phases 3 and 4 may also be required.

The Municipal Engineers Association's Class EA document also classifies projects as Schedules A, B or C depending on their level of environmental impact and public concern. Any project identified in this Master Plan must be classified as to their level of complexity which will in turn decide which Schedule process needs to be followed.

- **Schedule 'A'** projects are generally routine maintenance and upgrade projects; they do not have big environmental impacts or need public input. Schedule 'A' projects are all so routine that they are generally pre-approved without any further public consultation.

- **Schedule 'B'** projects have more environmental impact and do have public implications. Examples would be stormwater ponds, river crossings, expansion of water or sewage plants beyond up to their rated capacity, new or expanded outfalls and intakes, and the like. Schedule 'B' projects require completion of Phases 1 and 2 of the Class EA process.

- **Schedule 'C'** projects have the most major public and environmental impacts. Examples would be storage tanks and tunnels with disinfection, anything involving chemical treatment or expansion beyond a water or sewage plants rated capacity. Schedule 'C'

projects require completion of Phases 1 through 4 of the Class EA process, before proceeding to Phase 5 implementation.

The Municipal Engineers Association's Class EA document also identifies four different approaches to completing Master Plans corresponding to different levels of assessment. Regardless of the approach selected, all Master Plans must follow at least the first two phases of the Class Environmental Assessment process.

- **Approach 1**, the most common approach, is to follow Phases 1 and 2 as defined above, then use the Master Plan as a basis for future investigations of site specific Schedule 'B' and 'C' projects. Any Schedule 'B' and 'C' projects that need specific Phase 2 work and Phases 3 and 4 work, usually have this Phase 2, 3 and 4 deferred until the actual project is implemented.

- **Approach 2**, is to complete all of the work necessary for Schedule 'B' site specific projects at the time they are identified. Using this approach, a municipality would identify everything it needed in the first five years and would complete all the site specific work required, including public consultation to meet Class EA requirements. The Master Plan in such cases has to be completed with enough detail so that the public in site specific locations can be reasonably informed, and so that the approving government Agencies (Conservation Authorities, Natural Resources, Federal Department of Fisheries and Oceans, Transportation Canada etc.) can be satisfied that their concerns will be addressed before construction commences.

- **Approach 3**, is to complete the requirements of Schedule 'B' and Schedule 'C' at the Master Plan stage.

- **Approach 4**, is to integrate approvals under the EA and Planning Acts. For example, the preparation of new or amended Official Plans could be undertaken simultaneously with Master Plans for water, wastewater and transportation, and approval for both sought through the same process.

The City has selected Approach 1 for undertaking this Master Plan.

2 PROBLEM AND OPPORTUNITY IDENTIFICATION

2.1 General

Urban areas may degrade the environment in many ways. Degradation may occur at the onset as lands are stripped during the construction process. This commonly results in excessive sediment loads being discharged to the receiving bodies of water.

As development of an area progresses, pollutant loadings from the urban area become significant. Common sources of pollutants include heavy metals from automobiles and air emissions, nutrients from fertilizers, bacterial contamination from human (combined sewer overflows) or animal (stormwater runoff) wastes and toxic contaminants from a variety of residential, commercial and industrial sources. **Table 2.1.1** shows concentrations of selected constituents of stormwater runoff (City of Toronto) compared to the Provincial Water Quality Objectives (PWQO) (Aquafor, 1993).

Table 2.1.1: Comparison of Urban Stormwater Runoff Concentrations with Various Water Quality Criteria

Parameter	Units	PWQO	Observed Concentrations
E. Coli	CNT/100ml	100	100-160,000
Suspended Solids	mg/L	-	87-188
Total Phosphorus	mg/L	0.02	0.3-0.7
Phenolics	mg/L	0.001	0.014-0.019
Lead	mg/L	0.025	0.038-0.055
Copper	mg/L	0.005	0.045-0.46
Zinc	mg/L	0.030	0.14-0.26
Cadmium	mg/L	0.0002	0.001-0.024

The pollutants, when conveyed to the receiving bodies of water, impact the environment in many ways. The particulate (settleable) and dissolved contaminants stress aquatic ecosystems by depleting oxygen, raising ambient water temperature, covering habitat or through the bioaccumulation or bioconcentration of contaminants in the tissues of various aquatic species.

Urban development of the lands draining to the streams also results in a transformation of the hydrologic characteristics within the subwatershed (see **Figure 2.1.1**). Large amounts of

previously permeable soils, which allowed rainwater to soak into the ground, are covered with impervious materials such as concentrate and asphalt. Rainfall events that previously contributed little or no runoff to the stream now cause flow to occur in the channel. Consequently, the amount of water draining to the stream increases significantly in volume.

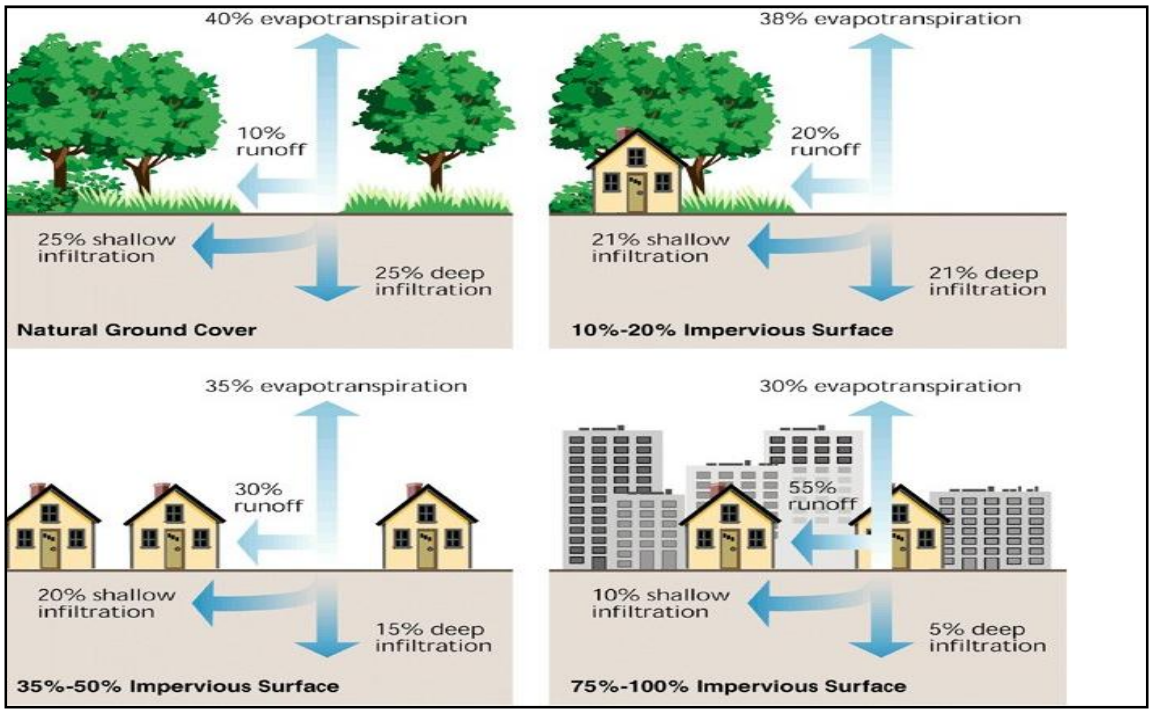

Figure 2.1.1: The Impact of Conventional Urbanization on the Hydrologic Cycle

Commensurate with the increase in the amount of runoff is a decrease in the amount of water that infiltrates into the ground. This may result in an adverse impact to existing wells due to the resultant drop in the water table.

Rural areas may also degrade the environment as a result of increased bacterial, nutrient and suspended solids loadings from farms, golf courses and nurseries.

As a result existing land uses, together with proposed land use changes, a number of potential environmental problems have been identified. These include:

1. Degraded water quality
2. Adverse effects on human and animal health
3. Loss and degradation of fish and wildlife habitat
4. Surface flooding and erosion
5. Reduction in groundwater recharge

3 STUDY AREA AND BACKGROUND

3.1 Study Area

There are two distinct study areas for this project, the Greensville RSA and the Mid-Spencer Creek Subwatershed. Both are located within the Spencer Creek watershed, a majority of which is located within the western portion of the City of Hamilton (**Figure 1.2.1**).

The Mid-Spencer Creek is generally bounded by Governor's Road to the south, Westover Road to the west, Sixth Concession Road to the north and Brock Road to the east. The Mid-Spencer Creek drains an area of approximately 56.4km2. The dominant land use is rural, with the exception of the Greensville RSA and the former Town of Dundas which is located in the southern part of the Subwatershed.

The Greensville RSA is generally bounded by CN Railway to the south, Middletown Road to the west, Dundas Street East (Highway 5) to the north and Ofield Road South to the east. Presently, there are approximately 900 residences located within the RSA. The Greensville RSA covers an area of approximately 712 ha.

3.2 Existing Land Use – Rural Settlement Area

The southern limit of the Rural Settlement Area (RSA) is located adjacent to the Niagara Escarpment. The Mid-Spencer Creek flows through the RSA. The Spencer Creek Wilderness Area is located in the eastern part of the RSA.

Within the RSA there are approximately 900 residences together with limited commercial lands located along Crooks Hollow Road.

3.3 Proposed Land Use – Rural Settlement Area

The Greensville Secondary Plan (OPA 13) defined land use policies and guidelines for the Rural Settlement Area. Some of the key statements within the Greensville Secondary plan include:

Policy No.	**Statement**
B.11.1.1.1	The predominant land use of newly developable areas shall be single detached dwellings. Related community facilities such as parks, schools

and libraries shall be provided as required on lands designated appropriately.

B.11.1.1.2 Development shall generally occur through the subdivision process. Infilling of a minor nature may also be permitted through consent.

B.11.1.10.1 In order to provide guidelines for the extent and density of residential development that can be sustained without unacceptable degradation of the ground and surface waters, development phasing is based on the need to proceed slowly and cautiously and the need to monitor the impact of new development on existing wells in accordance with Sections B.11.1.9.4, B.11.1.9.5, B.11.1.9.6, B.11.1.9.7. In this regard, a maximum of twelve (12) lots in plans of subdivision shall be draft approved and registered in each of the major development areas as shown on Schedule 'B-16.3'. The draft approved "Van Every Gardens" subdivision, located in Major Development Area C, shall be excluded from the twelve (12) lot limit. Information gathered during the monitoring of the initial twelve (12) lots (Phase 1) in each of the Major Development Areas will be used to provide guidelines for lot sizes and subdivision design for Phase 2.

Before a second phase of an additional maximum twelve (12) lots shall be draft approved in each of the 3 Major Development Areas, the Ministry of the Environment and Regional Health Services Department shall be satisfied that there are no outstanding problems related to the servicing or impacts on surface or ground water area created by Phase 1 and, that Phase 2 can proceed without causing any unacceptable impacts on the ground and surface waters. The modification or delay of development on one of the Major Development Areas shall not preclude Phase 2 from proceeding in other Development Areas. Phase 3 of development shall not occur unitl after the Comprehensive Servicing Study referred to in Subsection B.11.1.2.1 has been completed and approved by the Regional Municipality of Hamilton-Wentworth in consultation with the Ministry of Environment, the Town of Flomborough, the Niagara Escarpment Commission, the Ministry of Natural Resources and the Hamilton Region Conservation Authority.

In addition to the phases of development in the Major Development Areas, a maximum of five (5) dewellings per year from the date of approval of this Amendment shall be permitted on new lots created by consent or plan of subdivision throughout the Greensville Rural Settlement Area.

Figure 3.3.1, taken from the Greensville Secondary Plan (Volume 2: Map 8b) illustrates the three primary areas (A, B, C) that are designated for development.

Figure 3.3.2, taken from the Greensville Secondary Plan, illustrates the areas which have subsequently been approved for development or which remain to be developed. This figure also includes a revised extent of the RSA in the Highway 5 and Moxley Road area.

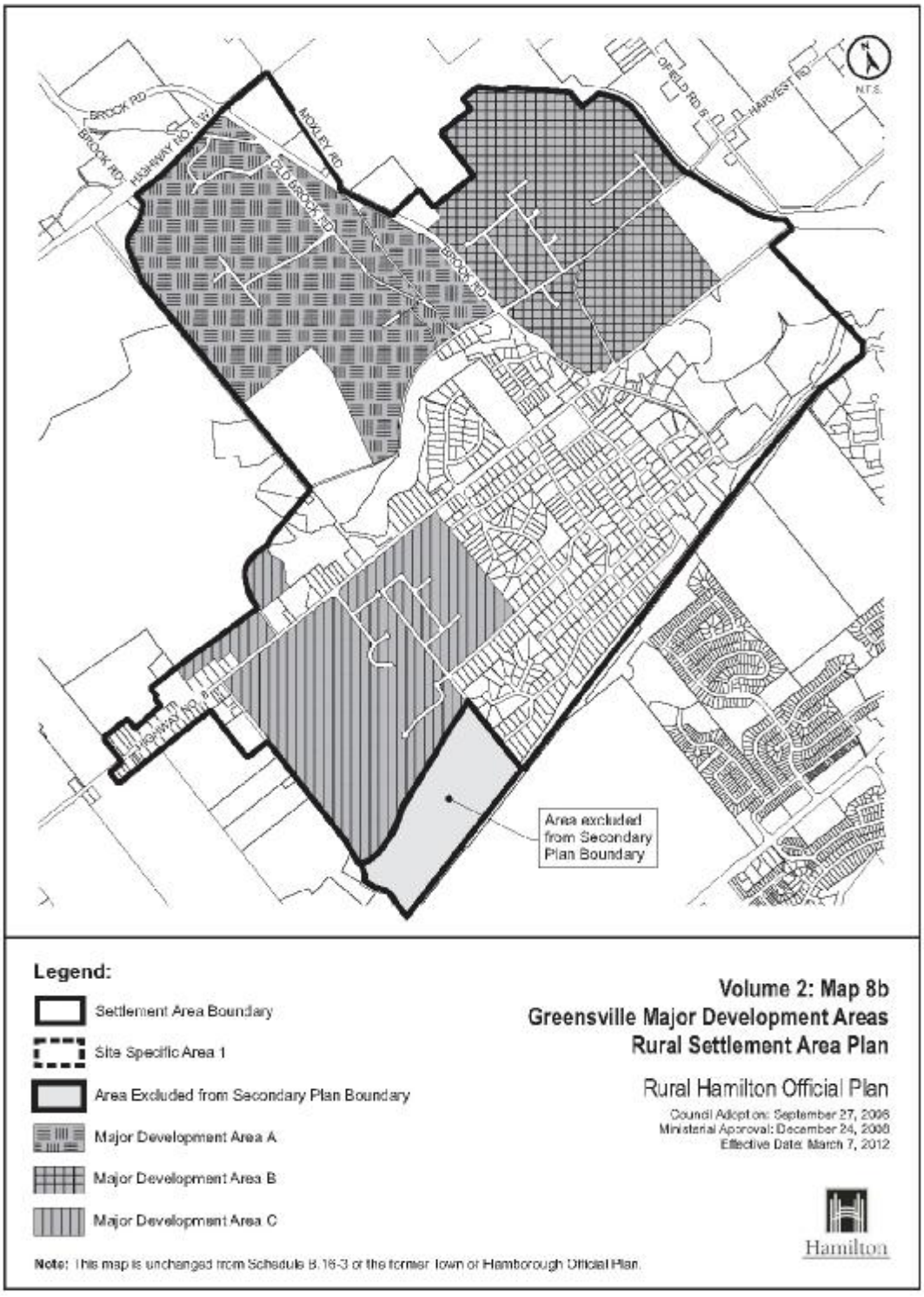

Figure 3.3.1: Greensville Secondary Plan illustrating areas designated for development

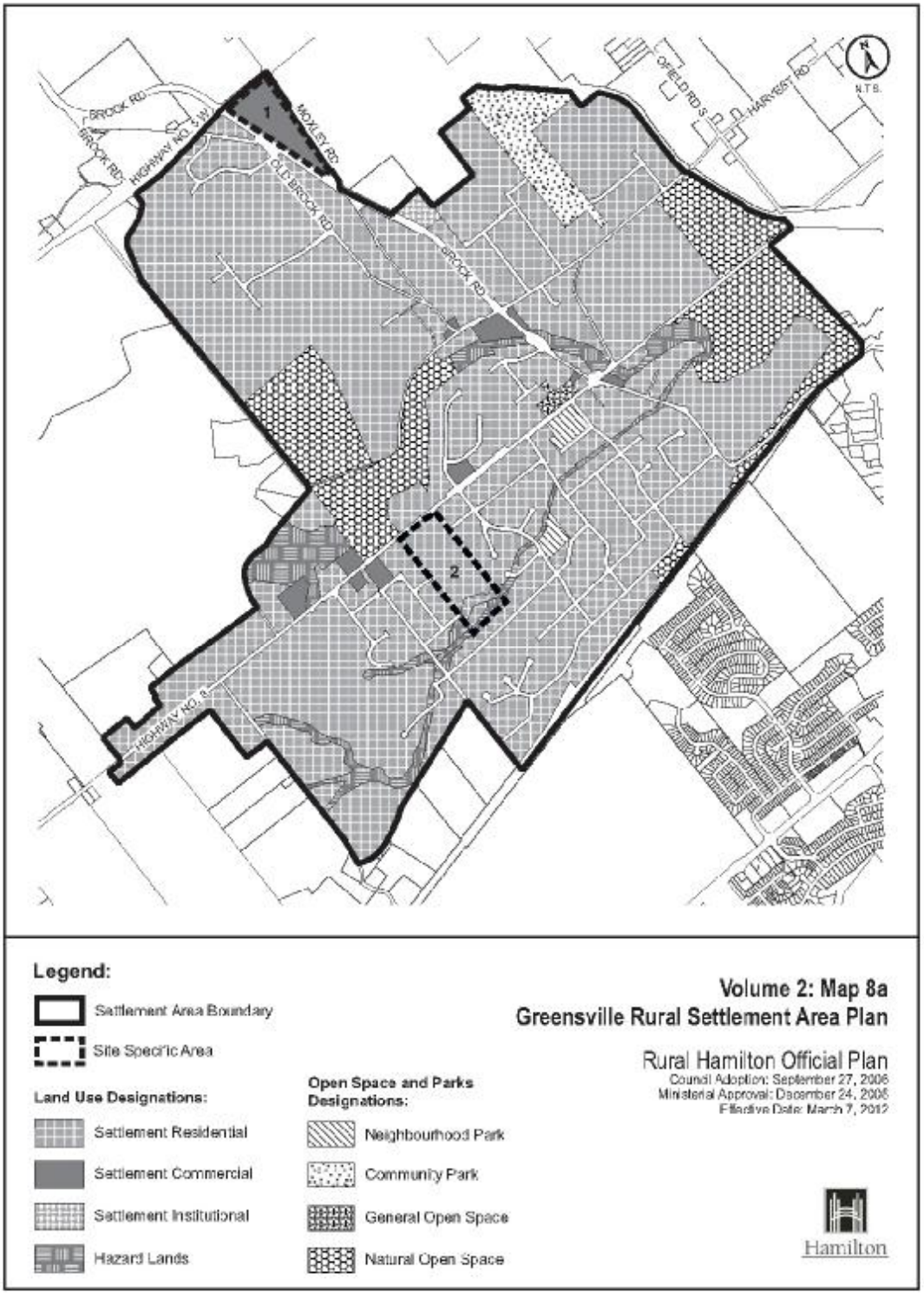

Figure 3.3.2: Greensville Secondary Plan illustrating areas approved for development