

11.0 IMPLEMENTATION

11.1 General

The previous chapters have, collectively:

- Identified a number of environmental and storm sewer infrastructure problems;
- Defined existing environmental conditions within each of the 15 watersheds;
- Established the level of service for the separated storm trunk sewer system;
- Defined the study principle, goals and objectives,
- Described the Recommended Growth Option, together with the potential impacts that may result due to land use changes;
- Defined and evaluated Alternative Management Strategies to address existing and future development; and
- Described the Preferred Management Strategy

This chapter provides recommendations on how to implement the City of Hamilton Stormwater Master Plan. In summary, implementation of the Preferred Management Strategy will, as compared to existing conditions, result in:

- Improved water quality conditions;
- Protection of the level of service provided by the existing storm sewer system;
- Improved conditions for resident fisheries and wildlife;
- Reduced potential for erosion; and
- Enhanced groundwater supply

During the course of the study, we arrived at the conclusion that current development practices are not sustainable; we therefore need to change the way we do things if growth is to continue. Furthermore, restoration plans in existing urban and rural areas need to be implemented if the study objectives are to be met.

In this regard, a practical and implementable framework which introduces the changes needed in order to ensure a balance between the impacts associated with existing land uses and proposed development and the social, economic and environmental requirements must be presented if the objectives of the Stormwater Master Plan are to be achieved.

The question then becomes, how is change implemented for new development? And, how do we change our approach and find funding alternatives needed to restore/retrofit existing rural and urban areas?

Change in the context of this study refers to a number of items, including:

- Changing the mindset of consultants, the municipality, developers and agencies with respect to the current approach for undertaking stormwater management;
- The requirement to develop a progressive approach for integrating stormwater management measures into subdivision/site planning and design
- Revisiting/modifying existing municipal and agency policies and standards;
- Initiating pilot projects for stormwater management measures (e.g. green roofs, roof downspout disconnection; filtration systems, alternative municipal infrastructure systems);

- Considering alternative sources of funding for the proposed measures in order to ensure that the requirements as outlined are funded in a sustainable manner; and
- Consideration of incentives (credits) for progressive submissions.

This chapter describes the activities which must be undertaken if the Preferred Strategy is to be successfully implemented. In preparing the Implementation Plan, the following points were considered:

- Implementation must consider issues associated with the urbanizing areas and for existing land uses.
- The Implementation Plan must be flexible and realize that the approach to Watershed and Subwatershed planning will change as the knowledge base advances, that future studies will refine the findings from this study and that the natural environment is not a static system.
- Implementation must be consistent with the other components of the study, and recognize existing and proposed land uses.
- The success associated with implementing various steps will not only be dependent upon the development community, municipality and agencies, but will also be strongly dependent upon the support of residents within the watershed; and
- The Implementation Plan, as presented, is a starting point; it is fully expected that an Implementation Committee involving several City departments, the four Conservation Authorities and key stakeholders, will be formed and that this group will ensure that the Plan is advanced, implemented, updated and revised as appropriate.

This chapter will provide implementation considerations for each type of measure, policy review and implications, administration, direction for future studies and staffing requirements.

11.2 Stormwater Master Plan Implementation

The Master Plan, as presented, is consistent with the requirements of the Municipal Class Environmental Assessment process and the GRIDS process. The completion of this plan together with the Water/Wastewater and Transportation Master Plans was a cooperative effort involving staff from several departments within the City, staff from each of the four Conservation Authorities, special interest groups and representatives from the public.

The recommendations as provided in this chapter were presented and discussed with the above noted groups and, as such, do provide a framework for implementing the plan. However, as noted in the previous section, it is recommended that the appropriate administrative structure be put in place in order to guide and oversee the implementation of the Strategy.

In terms of administration, it is recommended that a two tiered committee structure be formed. The structure would include a Management Steering Committee (MSC) and a number of Working Groups (WGs).



The overall objective of the Management Steering Committee and Working Groups would be to “promote and facilitate cooperative and collaborative efforts and actions by all public agencies that have a role in watershed management.”

The objectives, general types of participants and frequency of meetings is summarized below for the Management Steering Committee and the Working Groups.

Management Steering Committee (MSC)

Objectives:

- Receive updates from the Working Groups
- Coordinate program planning and delivery
- Define funding alternatives and priorities
- Prepare progress reports on Implementation
- Prepare budget requests

Participants:

- Middle / Senior Management from municipality and agencies
- Council Members

Frequency of Meetings:

- Twice annually, one of which is prior to budget preparation

Working Groups (WGs)

Objective:

- Evaluate existing programs, policies, standards and recommend changes

Types of Groups:

- Public Works Group

- Development Review and Planning Group
- Rural / Agricultural Group

Participants:

- Municipality
- Agencies
- Development Groups
- Special Interest Groups
- Residents

Frequency of Meetings:

- As required, until program is up and running
- Twice annually thereafter

11.3 The Implementation Plan

11.3.1 General

The proposed measures which comprise the Preferred Strategy were presented in Chapter 10. The objective of this section is to outline the general steps that are required in order to implement each type of measure (i.e. source controls, rural measures).

Table 11.1 summarizes the types of different measures that form the Preferred Management Strategy. Also provided in the table are:

Key Next Steps: The key steps that need to be undertaken in order to continue the existing measure or to kick start a new program

Facilitator: The agency or group that will coordinate efforts to implement the measure

Contributor: The agency(ies) or groups(s) that will assist in implementing the measure by providing support in any number of ways, e.g., funding, labour, materials, technical expertise

Policy

Consideration: Existing or proposed policies, standards that need to be considered

Implementation

Mechanisms: Alternative methods for implementing the programs or measures

Time Frame: General timeframes; short (0-10 years), medium (11-20 years), and long (21-30 years) years, which reflect general prioritization for the steps needed to implement the measure.

Cost: Approximate cost of the measure assuming traditional funding sources (e.g. primarily municipal/provincial agency). It should be noted that the use of special interest groups and/or members of the public to implement several proposed measures and the pursuit of additional funding sources (e.g. provincial, federal, environmental foundations) may reduce funding requirements

Funding: Present source of funding for proposed measure

**Funding
Alternatives:** General funding alternatives

Comments: Any other information/consideration relevant to implementation

Table 11.1: Implementation Considerations

Type	Key Next Steps	Facilitators/Contributors	Policy/Standards Considerations	Implementation Mechanisms	Time Frame	Cost	Present Funding	Funding Alternatives	Considerations
Source Control Program for Existing Urban Areas	<ul style="list-style-type: none"> Review other Municipal Programs Prioritize program Undertake pilot project Define successes and shortcomings Define funding alternatives and requirements 	City, residents and business groups	<ul style="list-style-type: none"> Development of BMP standards Criteria and Guidelines for Infrastructure Design 	<ul style="list-style-type: none"> City to develop guidelines, brochures, how to manuals/guides 	Short, medium, long	\$35,000,000	<ul style="list-style-type: none"> none 	<ul style="list-style-type: none"> Municipal Homeowners Businesses Environmental foundations Federal 	<ul style="list-style-type: none"> The cost as shown is generally funded by the City's homeowners and businesses
Conveyance Control Programs for Existing Urban Areas	<ul style="list-style-type: none"> Review programs in other jurisdictions Define technical standards Undertake pilot projects Integrate into other programs Define funding requirements 	City	<ul style="list-style-type: none"> Incorporate into Engineering Guidelines, Stormwater Infrastructure Design 	<ul style="list-style-type: none"> Incorporate costs into ongoing road reconstruction programs 	Short, medium, long	\$32,000,000	<ul style="list-style-type: none"> Road reconstruction program 	<ul style="list-style-type: none"> Road reconstruction program 	
Retrofitting Existing Stormwater Management Facilities	<ul style="list-style-type: none"> Define funding alternatives Undertake detail design Implement proposed program 	City	<ul style="list-style-type: none"> Assess funding alternatives Prepare Guidelines for Landscaping 	<ul style="list-style-type: none"> Undertake design, construction of prioritized facilities 	Short, medium, long	\$19,140,000	<ul style="list-style-type: none"> Municipal Tax Base 	<ul style="list-style-type: none"> Cash in lieu Storm Sewer Tax Rate Municipal Tax Base Development Charges Federal 	
Stream Restoration Program	<ul style="list-style-type: none"> Undertake City wide stream restoration assessment Undertake detail design Implement proposed program 	City, Conservation Authorities	<ul style="list-style-type: none"> Assess funding alternatives Define process for private property works 	<ul style="list-style-type: none"> City to develop Terms of Reference City/CA's to coordinate implementation of program 	Short, medium, long	\$20,000,000 plus projects to be identified	<ul style="list-style-type: none"> Development Charges 	<ul style="list-style-type: none"> Development Charges Municipal Tax Base Storm Sewer Tax Rate 	<ul style="list-style-type: none"> Funding allocated in DC study for 45 sites Additional funding required for other areas
Best Management Practices for Proposed Developments	<ul style="list-style-type: none"> Undertake subwatershed studies Review recent approaches in other jurisdictions Promote integrated approaches Undertake pilot projects Use working groups to update/modify standards/policies Update funding requirements Consider incentives for progressive submissions 	City, Conservation Authorities, Consultants, Developers	<ul style="list-style-type: none"> Various engineering, planning, landscape architectural policies, standards 	<ul style="list-style-type: none"> City, CA to approve Terms of Reference for Subwatershed Studies City to update policies, standards 	Short, medium, long	See comment under considerations	<ul style="list-style-type: none"> Development Charges 	<ul style="list-style-type: none"> Development Charges 	<ul style="list-style-type: none"> A cost estimate has not been provided as the cost is generally attributed to proposed development through the Development Charges
Storm Sewer System Upgrades to offset Intensification	<ul style="list-style-type: none"> Determine feasibility of on-site storage for different types of proposed development proposals Coordinate potential City-wide source/conveyance program with Source Control program (see above) Develop approach for different types of proposed developments 	City	<ul style="list-style-type: none"> As per source control 	<ul style="list-style-type: none"> As per source control 	Short, medium, long	\$50,000,000 to \$100,000,000	<ul style="list-style-type: none"> Development Charges Road Reconstruction Programs 	<ul style="list-style-type: none"> Development Charges Road Reconstruction Programs 	<ul style="list-style-type: none"> Costs shown assume on-site measures or City-wide source/conveyance measures are not implemented
Rural Stewardship Program	<ul style="list-style-type: none"> Canvas landowners in target areas for support Implement demonstration projects in high priority areas 	City, Conservation Authorities, Landowners	<ul style="list-style-type: none"> Nutrient Management Act Clean Water Act Remedial Action Plan (Great Lakes Water Quality Agreement) 	<ul style="list-style-type: none"> CA's have mechanisms in place 	Short and medium	\$40,000,000	<ul style="list-style-type: none"> CA funding RAP funding Federal – Provincial funding 	<ul style="list-style-type: none"> Municipal funding 	<ul style="list-style-type: none"> Costs assume 50% funding by landowners; 50% by City / other partners

11.3.2 Source Control Measures

Source Control Measures are physical measures that are located at the beginning of a drainage system; generally on private property. Source controls can be installed within a variety of land uses including residential, commercial, industrial and institutional properties. Source control measures can be retrofit into existing areas and implemented in urbanizing areas.

Implementation of a variety of source control measures has become more common in the last decade. One of the key factors impacting the success of source control programs is the willingness to implement by landowners. In this regard, many municipalities have initiated pilot projects to define variables such as the landowners' awareness of the impacts from stormwater, their willingness to implement, and the importance of public funding to the adoption rates for each of the proposed measures. Other municipalities have developed programs involving how-to manuals, in-house assistance and financial programs in order to kick start the programs.

Existing efforts within the City to undertake a source control program have been limited. The primary group to implement this program would be the City. The groups that would be involved include Plant Capital and Planning, Strategic and Environmental Planning and Development Engineering. Other municipalities have had success in kick starting programs by involving local resident groups (particularly those who have experienced flooding) and businesses.

At the onset, the City will need to develop guidelines, brochures and how to manuals/guides in order to initiate programs. As the program progresses standards for individual Best Management Practices (e.g. downspout disconnection, green roofs) will be developed. The initial steps, as summarized below, would be initiated in the first few years of the program. Implementation would occur over the medium to long term.

The total cost of the program is estimated to be \$35,000,000. Experience from other jurisdictions has shown that the cost is split between the municipality, homeowners and businesses.

In summary, the proposed Source Control Program would involve the following steps:

- Review Source Control Programs that have been undertaken by other jurisdictions;
- Define the framework of the proposed program (based on the overall measures and uptake rates identified in this study; and prioritize key elements (e.g.: downspout disconnection, tree planting);
- Define the funding alternatives and requirements;
- Select a pilot area(s) and undertake a public education program; and
- Define the success and shortcomings and then modify / expand the program.

11.3.3 Conveyance Control Measures

Conveyance control measures are physical measures that are located within the road right-of-way where flows are concentrated and being conveyed. Conveyance measures include swales, ditches, culverts, catch basins, manholes and storm sewers.

The primary objective for this strategy is to incorporate infiltration measures into the design of the conveyance system. For existing or urbanizing areas this may include the incorporation of a perforated

pipe system into the design of the storm sewer system or enhanced use of grass swales or vegetated buffer strips in order to maximize infiltration opportunities.

Incorporation of conveyance control measures for urbanizing areas should be considered as part of the planning and design process.

For existing urban and rural areas, the opportunity to incorporate conveyance control measures will likely come as a result of redevelopment pressures (which require replacement of the infrastructure) or replacement due to the deteriorating condition of the infrastructure. In the latter case, replacement of the drainage infrastructure may well occur as part of the overall reconstruction of the roadway.

A number of municipalities (including Ottawa, Niagara-on-the-Lake, and Toronto) have undertaken studies and pilot projects in order to determine the feasibility and effectiveness of alternative conveyance systems. The results of several pilot projects have been published as part of the Stormwater Assessment Monitoring and Performance (SWAMP) program.

The primary groups within the city that would implement this program would be the Plant Capital and Planning, Strategic and Environmental Planning, Development Engineering, Design and Operation and Maintenance.

The initial steps, as summarized below, would involve review of projects in other municipalities, definition of technical standards and undertaking pilot projects. Design for systems to be constructed in tight (silts, clays) soils needs to be given consideration. The initial steps of the program would take place in the short term while implementation would occur over the medium to long term.

The total cost of the program is estimated at \$32,000,000. This cost is based on the assumption that infiltration systems would be incorporated into 15 percent of reconstruction or redevelopment projects.

In summary, the key initial steps would include:

- Review programs that have been undertaken in other jurisdictions;
- Define the technical requirements and the design standards that are needed for a variety of alternative conveyance systems;
- Define funding implications;
- Undertake pilot projects for various settings (i.e.: different soil types, urban and rural cross sections); and
- Integrate the alternative conveyance systems into other programs; particularly road reconstruction.

11.3.4 End of Pipe Measures

End of pipe measures include Best Management Practices that are installed at the end of the storm sewer system prior to discharging to the stream or river. Typical end of pipe measures which are used to treat stormwater include stormwater ponds (dry or wet), wetlands or infiltration basins.

A number of end of pipe facilities have been proposed for urbanizing areas within the existing urban boundary as part of the 2006 Development Charges Study. These measures, together with others, will be discussed in Section 11.3.6.

This study also prioritized retrofitting 29 existing stormwater management facilities to improve water quality and reduce downstream erosion (see section 10.4).

The steps in this program would involve defining funding alternatives, undertaking preliminary and detail design of the proposed facilities and implementing the program. This study met schedule B requirements under the Municipal Class Environmental Assessment process. The preliminary and detail design should continue the public consultation process in order that potential issues with respect to safety, West Nile Virus, construction implications and impact on property values are addressed.

The total cost to undertake this program is estimated at \$21,000,000. The present sources of funding include the Municipal Tax Base. A variety of potential funding alternatives (see also Section 11.5) exist. These include cash-in-lieu, development of a Storm Sewer Tax Rate and Development Charges. A few Federal programs (Green Municipal Fund and Great Lakes Renewal Fund) may also assist in funding.

The primary groups involved in this program would be Plant Capital and Planning, Strategic and Environmental Planning, Development Engineering, Design, Operation and Maintenance and Open Space Development and Parks Planning.

In summary, the key steps to undertake the End of Pipe program would include:

- Define funding requirements and alternatives
- Undertake preliminary and detail design of the proposed facilities
- Implement the proposed program

11.3.5 Stream Restoration Measures

Stream restoration measures are undertaken in order to restore degraded reaches as a result of hydrologic, water quality or erosive impacts associated with urbanization. The works may be undertaken in order to protect public property, infrastructure or safety, or to improve aquatic or terrestrial habitat.

The 2006 Development Charges Update Study identified a total of 53 projects that are required as a result of proposed development within the existing urban boundary. This study completed the Schedule B requirements for these projects. As noted in Section 10.5 the geographic extent of this study was limited to areas within, or downstream, of proposed development within the current Official Plan.

A review of existing information and discussions with City and Conservation Authority staff suggested that erosion problems do exist within other areas of the City. It is therefore recommended that a Stream Restoration Assessment study on a City-wide basis be undertaken. The primary objectives of this study would involve defining existing stream conditions, identifying areas of concern, prioritizing works and developing an implementation plan. The study should be undertaken under the Class Environmental Assessment process and include representatives from the City and Conservation Authorities. An outline of the proposed study is provided in Appendix E. The estimated cost is \$100,000.

The steps in this program would involve undertaking a City-wide study, undertaking preliminary and detail design of the proposed works and implementing the program. This study met Schedule B requirements for the projects identified in the 2006 Development Charges Update Study. The preliminary and detail design should continue the public consultation program in order to address potential issues with respect to land ownership, construction implications and design alternatives.

The total cost to undertake the program as identified in the 2006 Development Charges Update Study is estimated at \$20,000,000. The present source of funding for these works is Development Charges. Potential funding alternatives for other works that would be identified through the City-wide study include the Municipal Tax Base, Storm Sewer Tax Rate and Development Charges.

The primary groups involved in this program would be Strategic and Environmental Planning, Design, Open Space Development and Parks Planning and Operation and Maintenance.

In summary, the key steps to undertake the Stream Restoration program would include:

- Undertaking a City-wide Stream Restoration Assessment Study
- Identify funding alternatives
- Undertaking preliminary and detail design of the proposed projects
- Implementing the proposed program

11.3.6 Best Management Practices Program for Proposed Developments

The present focus for stormwater management for proposed developments is to construct a stormwater management facility to reduce flooding potential, reduce impacts associated with erosion and protect water quality. A wide range of source, conveyance and end of pipe Best Management Practices have been recommended (in this study) in order to address issues with respect to water balance, sewer capacity, basement, surface and watercourse flooding, erosion and water quality as a result of urbanization.

Successful implementation of this component of the study will require changing the mindset of consultants, the municipality, developers, and agencies with respect to the current approach and focus for undertaking stormwater management.

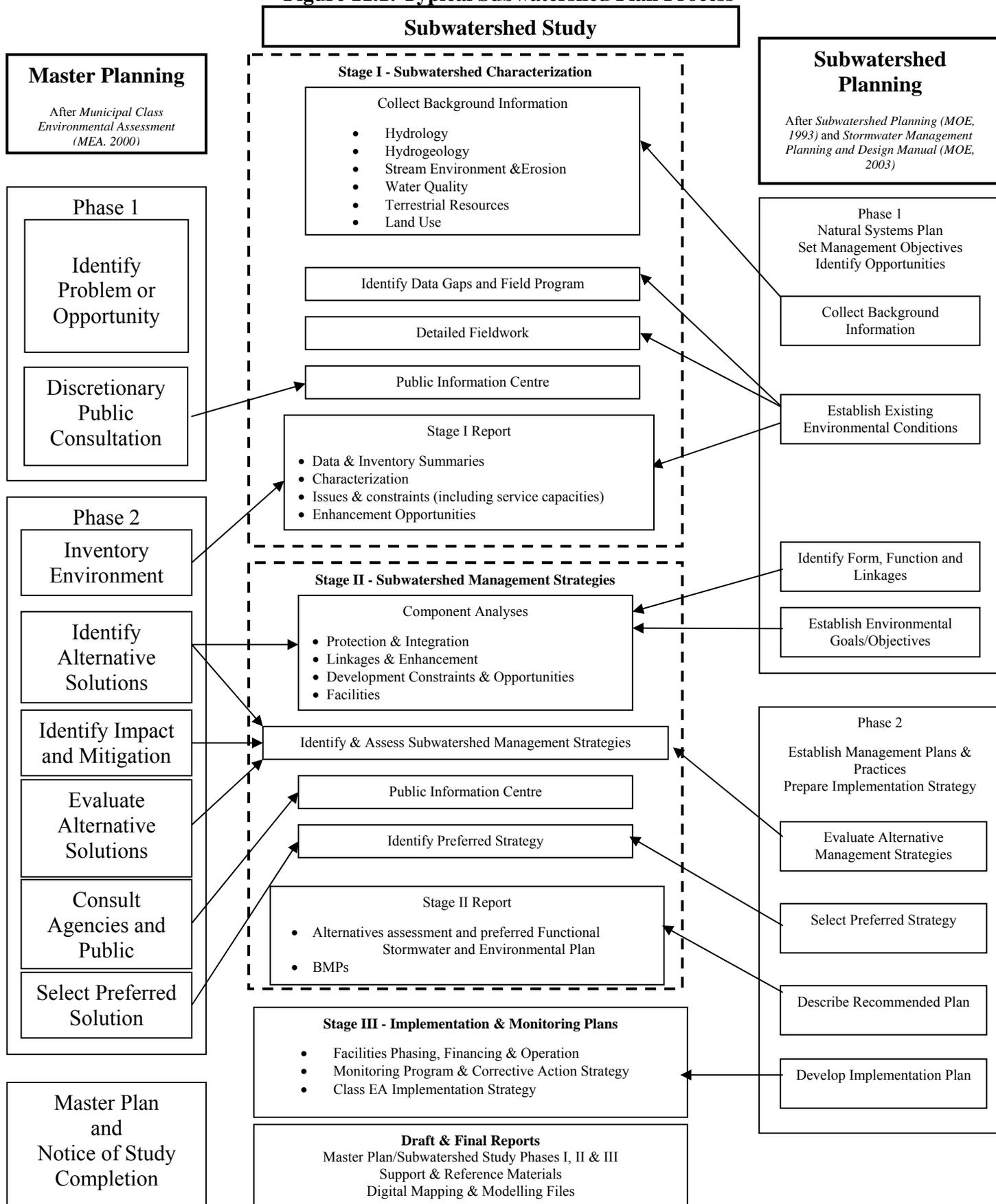
The initial steps in this program will involve:

- Undertaking subwatershed studies to refine the recommendations of this study, to address the impacts of urbanization and to determine the preferred approach
- Review recent approaches in other jurisdictions
- Promote a progressive approach for integrating stormwater management measures into subdivision/site planning and design;
- Using the Working Groups to update and modify current standards and policies
- Update funding approaches and requirements to reflect new approaches
- Consider incentives (credits) for progressive submissions

This study provides direction with respect to the proposed approach and focus for each of the 15 watersheds within the City (see Chapters 8 and 10). The City should continue with their current process of undertaking more detailed subwatershed studies. Typically, these studies are carried out in two phases as shown in Figure 11.1.

The primary groups that would participate in this program would be Plant Capital and Planning, Strategic and Environmental Planning, Development Engineering, Design, Operation and Maintenance and Open Space Development and Parks Planning.

Figure 11.1: Typical Subwatershed Plan Process



These studies, where possible, should be undertaken by the City and coordinated with the appropriate Conservation Authority. They should also, as is presently done, fulfill the first two phases of the Municipal Environmental Assessment process.

Recently, a number of progressive approaches for implementing stormwater have been undertaken in other jurisdictions. These include the installation of biofilters, sand filters, green roofs, and porous pavements as well as the concept of Low Impact Development.

Several municipalities have also undertaken progressive studies for integrating stormwater management measures into subdivision site planning and design. These approaches have resulted in cost and land savings and resulted in an integrated design based on planning, engineering and landscape architecture principles.

City staff should review these approaches, together with recent initiatives within the City in order to initiate the change in mindset.

The Working Groups and Management Steering Committee should coordinate program planning and delivery, update current standards and policies and update funding approaches and requirements to reflect changes as they occur.

Currently funding for these measures is dealt with through Development Charges. As noted above, it is likely that the current approach will likely have to be updated as new measures are incorporated into the development process.

11.3.7 Storm Trunk Sewer Upgrades

The Recommended Growth Option includes 26,500 units to be constructed as part of an intensification process identified within GRIDS. Three general alternatives for addressing the impacts of intensification on sewer system capacity were identified in Section 10.6. These include provision of on-site controls, undertaking source and conveyance control measures on a City-wide basis or upgrading existing infrastructure in order to accommodate the increase in flows associated with intensification.

The initial steps for this program will likely involve a review of recent intensification submissions to confirm the feasibility for different types of developments to provide on-site storage. The potential to offset impacts of proposed intensification by implementing a City-wide source and conveyance program should also be considered and could be coordinated with the source control program as discussed in Section 11.3.2. Once these steps have been completed, a coordinated program which provides guidelines and standards for each different type of proposed development should be developed. An update to the existing funding approach should also be undertaken.

The total cost to upgrade the existing storm trunk sewer system in order to offset impacts associated with intensification is estimated to be \$50,000,000 to \$100,000,000. This cost assumes that on-site measures or source/conveyance control programs are not implemented. Existing and proposed funding alternatives include Development Charges and Storm Sewer Infrastructure Programs.

11.3.8 Rural Stewardship Program

The focus of implementation of Rural BMP's on agricultural lands is on stewardship initiatives, building on the current efforts of the four conservation authorities: GRCA, NPCA, HCA and Conservation

Halton (CH). The recommended plan is to implement non-structural rural BMP's on 50% of the farms within the City. This would require that implementation of the existing programs be accelerated, through the addition of municipal funding.

Within the rural portions of the watersheds, there are a number of high priority areas for implementation as follows:

- Intensive Agricultural lands (about 40,000 ha): these are generally lands used for crops such as corn, soybeans, market gardening, nurseries, etc. Conservation Farming BMP's would be implemented on these lands, with 3 m buffer strips (each side) along all unclassified streams.
- Cold and warm water streams (120 km): these are the larger watercourses that provide important fish habitat. Rural BMP's to be implemented would include livestock fencing, stream buffers (minimum 15 m (each side)), and off-stream watering sites.

In addition, there are approximately 30,000 ha of agricultural land that is considered moderate priority areas for implementing rural BMP's. For the unclassified streams, 3m wide buffer strips, as recommended under the Nutrient Management Act would be recommended, combined with conservation farming BMP's

With approximately 80,000 ha of agricultural land within the City of Hamilton, significant environmental benefits can be achieved through the implementation of an agricultural stewardship program. The focus of the Rural BMP program is on non-structural measures, including livestock fencing, buffer strip plantings, conservation tillage practices, nutrient management, clean water diversion and farmyard runoff control.

All four conservation authorities are actively implementing agricultural stewardship programs by combining funding programs from Remedial Action Plans, federal, provincial and even corporate/non-government agencies to encourage farmers to change their agricultural practices. While regulatory measures are in place to address agricultural sources of pollution through the Nutrient Management Act, stewardship measures and incentive programs have proven to be the most effective approach. Despite the existence of many funding programs, available resources fall short of meeting the need. Water quality modeling showed significant reductions in nutrient, bacteria and suspended sediment concentrations and loadings, when rural BMP's were targeted at a 50% implementation rate, assuming \$10,000 per farm. The cost to implement these measures throughout Hamilton is in the order of \$40,000,000 assuming a 100% grant or \$20,000,000 assuming a 50% cost sharing with farmers.

11.4 Policy Considerations

11.4.1 General

The practices of land and resource development planning in Ontario are grounded within a formal policy and legislative framework. The Province provides the policy lead by defining areas of provincial interest and establishing planning standards and guidelines to be followed by municipalities and land resource development interests. Comprehensive policies and supporting legislation have been and continue to be put in place by the Province to guide development in a manner that protects, manages and allocates access to water and other natural resources for the shared and sustained benefit of all Ontarians. Those benefits are intended to encompass and integrate among environmental, economic and social interests.

Over the past five years, there has been an unprecedented introduction of new and amended provincial policy and legislation supportive of City of Hamilton Stormwater Master Plan directions and recommendations. Additional water resource protective policies and regulatory mechanisms are due out in 2007 under the proposed *Clean Water Act, 2005*.

The City of Hamilton, like their counterparts elsewhere throughout the Greater Toronto Area, are at varying stages in amending and updating their Official Plans to achieve conformity with these new directions. In doing so, they are required to consider watershed and inter-municipal servicing issues and opportunities. The land and resource development industries and interests also have to adjust to the new policies and requirements and find ways to lessen their impacts on the natural environment through more innovative design and improved practices.

The following sections highlight the primary policy and regulatory mechanisms and government roles that will be important to successful implementation of the Strategy. The focus of the review is on provincial policy as the City has recently completed two documents; Draft Criteria and Guidelines for Stormwater Infrastructure Design and Storm Drainage Policy which provide policy and standards with respect to the planning and design of stormwater infrastructure.

11.4.2 Federal Policy

The significance of Federal role in water management is less obvious and encompassing than that of the Province. A notable exception to this generalization, are the fisheries and aquatic habitat protection provisions and regulatory mechanisms under of the Federal *Fisheries Act*. Successful protection and management of the resident fisheries within each of the 15 watersheds in the face of ongoing development is, and will continue to be, critically linked to this legislation.

Under existing partnership agreements with DFO, each Conservation Authority acts as an initial review agency for any project that might alter or damage fish habitat contrary to provisions of 5.35 of the Fisheries Act. Conservation Authority staff determine whether the project is likely to result in “harmful alteration, disruption or destruction” of fish habitat and recommend mitigative measures to prevent or reduce such impacts. In the even that mitigation is not possible or is insufficient, staff will refer the project to DFO for further review and authorization.

11.4.3 Provincial Policy

Up until 2001 the primary Provincial policies directing and governing water quality and quantity management were directed at water takings, wastewater emissions and flood risk reduction. The main policy documents were the “Blue Book” or Water Management - Policies, Guidelines and Provincial Water Quality Objectives, 1994 and the Flood Plain Planning Policy Statement, 1988 which was subsequently incorporated into the Provincial Policy Statement, 2001.

Regulatory oversight for water was largely exercised through powers and provisions of the *Ontario Water Resources Act, Environmental Protection Act, Conservation Authorities Act*, and to a lesser extent the *Lakes and Rivers Improvement Act* and *Niagara Escarpment Planning Act*.

New and emerging policies and regulations are significantly expanding and strengthening provincial protection over water resources. They particularly focus on land use and the additional measures needed to safeguard water quality, conserve water resources and maintain natural hydrologic functions in the face of ongoing population and economic growth, widespread land-use change and the intensification of

business and commercial activities. Key water-related elements and impacts of these initiatives are highlighted here in order of their introduction by the Province.

- *Nutrient Management Act, 2002*
- *Sustainable Water and Sewage Systems Act, 2002*
- *Greenbelt Act, 2004*
- *OWRA Water Taking and Transfer Regulation, 2004*
- *2005 Provincial Policy Statement*
- *Places to Grow Act, 2005*
- *Clean Water Act (proposed), 2005*

Nutrient Management Act, 2002

The purpose of the *Nutrient Management Act, 2002* is “to provide for the management of materials containing nutrients in ways that will enhance protection of the natural environment and provide a sustainable future for agricultural operations and rural development”. The Act gives the Province powers over the siting, size and location of livestock production operations and over the storage, handling, transport and land application of manure and other prescribed materials including municipal sewage and industrial biosolids.

Requirements placed on farm operators, municipalities and/or others involved in nutrient production and nutrient management include the need to prepare nutrient management strategies and nutrient management plans, to participate in training, and, in some cases to obtain certification. Nutrient management plans must incorporate province-wide land-application standards that prescribe setbacks from watercourses and other sensitive features, restrict application on certain soils, limit the timing of application, and define the allowable application rates and appropriate application technologies.

The Act’s initial regulations generally apply only to large existing operations and new operations based on an “animal units” exceedance determination. As a result of strong concerns expressed by both farmers and environmental interests, current regulations, implementation protocols and funding strategies are under review. Recently announced changes, when fully implemented, are expected to extend the Act’s requirements to provide coverage of more and smaller farm operations and to provide additional government funding to assist farmers in preparing and implementing nutrient management plans. An experts’ committee has been established to advise the government on appropriate “science-based” nutrient management standards and best management practices that would determine where and how the regulations would apply. The intent is to have full application by early 2008.

Given that the watersheds are home to smaller animal operations, the pending changes surrounding the *Nutrient Management Act* should enhance the level of water resource protection being offered through this legislation. Proper regard for, and enforcement of, the amended regulations may be a critical element in the attainment of surface and groundwater quality objectives in several subwatersheds within the City of Hamilton.

Sustainable Water and Sewage Systems Act, 2002

The *Sustainable Water and Sewage Systems Act, 2002* was introduced by the Province to enact requirements and provide mechanisms for ensuring long term sustainability in the delivery of municipal water and sewage services. When it receives final proclamation, the Act will require all municipalities who provide water and/or wastewater services to the public (either directly or through some other entity)

to document the scope of services being provided and to determine the “full cost” associated with delivering those services. This report becomes the basis for the preparation of a “cost recovery plan” for submission to and approval by MOE. Full cost is defined as including “source protection costs, operating costs, financing costs, renewal and replacement costs and improvement costs”.

The Act gives municipalities the power to impose and collect the revenues necessary to recover services costs and requires that those revenues be maintained within a dedicated reserve account.

In the context of this study, rules for determining the categories and amounts of eligible source protection costs may have a large bearing on roles and responsibilities in implementing significant portions of the strategy and on how related water resource protection and restoration activities will be funded. Regulations defining the scope of source protection costs and the mechanisms for recovering costs through charges have not yet been produced. It is anticipated that this is not likely to happen until the new *Clean Water Act* is in place.

Greenbelt Act, 2004

The *Greenbelt Act, 2004* and the Greenbelt Plan, 2005 are cornerstones to the Greater Golden Horseshoe Growth Plan. They identify where urbanization should not occur in order that permanent protection is provided to the agricultural land base and to ecological features and functions. In the case of this study, the Greenbelt Plan includes lands within the Niagara Escarpment planning area and builds upon the current legislation that guides development and protection of those lands. The Greenbelt Plan also contains geographically specific policies that apply to the broader “protected countryside” which includes the agricultural and natural systems, parkland, open space and trails, and settlement areas.

OWRA Water Taking and Transfer Regulation, 2004

The current *Water Taking and Transfer Regulation* (O. Reg. 387/04) was enacted in December 2004. It establishes a number of new provisions intended to strengthen and clarify provincial powers over the issuance of water taking permits (PTTWs). The regulation:

- Identifies a broad range of environmental and other factors the PTTW Director must consider in assessing and approving applications for new or expanded water withdrawals. Protection of natural ecological functions, demonstration of the applicant’s commitment to conservation and efficient use, and recognition of the water needs of approved municipal growth are among the factors identified.
- Expands and clarifies consultation requirements to be undertaken by the Director and/or permit applicant prior to permit application and/or Ministry approval.
- Prohibits or restricts new or expanded surface and ground water withdrawals for certain purposes from watersheds identified “high use” or “medium use” due to year round or seasonal low water sensitivity.
- Commits the Director to address Ontario’s obligations under the Great Lakes Charter
- Prohibits any new diversions or transfers of water out of or between major drainage basins. The Great Lakes is considered as a single basin.
- Requires all permit holders to monitor and report actual water usage. The requirement to report is being phased in over three years according to water use sector.

O. Reg. 387/04 ensures that Conservation Authorities and the City of Hamilton have the opportunity to consider permit applications and input to permit decision-making. In releasing the regulation, the

Minister of Environment indicated the Province's intent to look at and potentially introduce water efficiency standards based on water use sectors.

2005 Provincial Policy Statement

The 2005 Provincial Policy Statement (PPS) embodies the full range of provincial policies that guide land and resource development planning throughout the province. Policies are organized under the broad headings of Building Strong Communities, Wise Use and Management of Resources, and Protecting Public Health and Safety. The PPS defines areas of provincial interest, establishes a vision for Ontario's land use planning system and provides important guidance over land and resource use practices and the development of major infrastructure such as transportation, water and wastewater servicing.

Reintroduction of the requirement that municipal and provincial decision-making on all planning and development matters "shall be consistent with" PPS policies should strengthen government commitments and enhance public trust over the delivery of land use planning.

In the area of water resources protection, the Policy Statement contains provincial directions and standards for the protection of human life, health and property from flooding and other natural and human-made hazards, for protection and restoration of water quality, for maintenance of hydrologic systems and ecological functions, for use of best practices in managing stormwater, for protection and restoration of vegetative cover and pervious area, and for the conservation, efficient and sustainable use of surface and groundwater.

Places to Grow Act, 2005

The Greater Golden Horseshoe Growth Plan established under the PTG Act offers a vision and directions for growth within the area out to the year 2031. It establishes population and employment growth projections to be used in the planning of water, sewage and transportation infrastructure and other services, identifies urban growth centres, and sets intensification targets as a means of encouraging more compact development, more efficient use of services, avoidance of urban sprawl and protection of open space. The Act and Plan also reinforce the principles of water conservation, demand management, inter-municipal infrastructure planning, full cost recovery for water and sewage services, and innovative approaches for managing stormwater.

For Hamilton, the GGH Growth Plan establishes important directions for the development of remaining greenfield lands within the City, and for ongoing and future redevelopment of existing urban core areas. These directions represent an opportunity to incorporate the integrated stormwater management practices being put forward in the Strategy. For the rural areas, the Plan reinforces water resource protection objectives and strategies contained in the Greenbelt Plan, and the Niagara Escarpment Planning Act

Clean Water Act, 2006

The proposed *Clean Water Act* received Royal Assent on October 19, 2006. The Act requires the establishment of watershed-scale source water protection plans (SWPP). A SWPP requires that potential sources of contamination be identified, that significant threats to water supplies be reduced or eliminated. Since municipalities are responsible for providing drinking water and land use planning, they will have a strong role in developing and implementing SWPP. The Act established 19 source protection regions in Ontario.

Source water protection plans (SWPPs) are to be developed by source protection committees, under the same structure as conservation authority boards, made up of members appointed by municipal councils. In many cases this will require coordination between multiple municipal jurisdictions. The source protection committee will prepare terms of references, the risk assessment report and the (SWPP). The SWPP will identify existing and potential future risks to drinking water quality within their wellhead protection zones and intake protection areas and implement specific measures to prevent and or mitigate adverse impacts.

Municipalities will have the tools to implement SWPP by developing policies to reduce risks posed by specific activities, requiring adherence to existing regulatory approvals, through Zoning By-Laws, Official Plan Amendments, education or voluntary initiatives.

Stormwater Management Planning and Design Manual (2003)

The Ministry of the Environment prepared the Stormwater Management and Design Manual in 2003. The manual provides:

- An overview as to the impacts of urbanization;
- An approach for undertaking integrated planning for stormwater management;
- Environmental Design Criteria;
- Design considerations for a variety of source, conveyance and end of pipe measures;
- Approaches for dealing with infill developments, including funding alternatives;
- Operation, Maintenance and Monitoring considerations; and
- Capital and operational cost estimates for a variety of measures

The manual provides both direction and support for the recommendations as provided in this, and future studies.

11.4.4 Municipal and Conservation Authority Policy

The pressure on municipalities to manage growth and development and manage resulting impacts on the natural environment has increased dramatically in keeping with Provincial initiatives transferring more responsibility to the local level. This added pressure is partially offset by clarification of Provincial priorities and interests and by the addition of increased powers municipalities will have to restrict certain forms of development and regulate unsustainable land use practices.

The City of Hamilton, together with the four Conservation Authorities, has expressed support for the watershed approach and have indicated that development decision-making be guided by findings and recommendations of watershed and subwatershed plans. In order to effectively implement the recommendations of this and other subsequent studies, the City will have to update/revisit current level Official Plan and lower level planning policies and development design standards. This is particularly so in relation to more effective stormwater management, the protection of open space and the limitation of impervious area creation. Current policies and standards do not encourage, and in many cases work against, the hierarchical and integrated approach deemed essential if the Strategy's objectives and targets are to be met. The changes required are consistent with the requirements and expectations created by recent and ongoing Provincial planning reforms.

Given the scope and overlap of planning activities and processes imposed by the new and emerging provincial requirements, the City will be challenged to work together and to collaborate with the four Conservation Authorities to seek out efficiencies and harmonize approaches in water management. This will require even greater cooperation in sharing information, ideas, resources, problems and successes.

Provided below are some approaches that could be incorporated into various municipal policies, documents and standards.

Official Plan

The strength and comprehensiveness of policies relating to water resources protection and restoration as outlined in municipal Official Plans (OPs) are a primary determinant of how informed and focused subsequent development decision-making and the application of municipal resources will be in delivering on the Strategy. The proposed Official Plan should:

- Express support for the Strategy goals, objectives, measurable parameters and targets;
- Endorse the principle of valuing and managing rainfall and snowmelt as a resource;
- Adopt the use of a comprehensive and integrated approach to minimizing and managing runoff (in relation to both quality and quantity impacts) within all new development and redevelopment undertakings. The approach should commence at the source or lot level and move outward as appropriate to encompass conveyance and end-of-pipe controls;
- Encourage development submissions and decisions that incorporate an ecosystem approach perspective drawn from the collective expertise of planners, engineers and landscape architects;
- Promote the implementation of programs and funding mechanisms for addressing water quality and quantity concerns associated with existing development and land use practices within urban and rural areas; and
- Commit to supporting and participating in the activities of the Management Committee and Working Groups that will guide and oversee Strategy implementation.

Subwatershed Plans, Secondary Plans, Plans of Subdivision, Site Plan

Planning and development policy guidance and decisions at the secondary plan, site plan and related levels should similarly reflect the updated Official Plan, Secondary Plan and Strategy directions and be guided by more site-specific objectives, targets and protective measures as recommended in subwatershed plans and environmental impact assessment reviews. Existing subwatershed plans should be reviewed and updated as necessary to conform to the stormwater management principles and approaches recommended in the Strategy.

Subwatershed plans should also be undertaken at the Secondary Planning Stage in order to develop strategies for growth areas identified through GRIDS and to address issues related to existing urban and rural lands.

Development Standards and By-Laws

The Strategy's hierarchical approach to stormwater management runs counter to most existing municipal development, construction standards and by-laws in the areas of managing rooftop drainage, exercising lot-level runoff control, and encouraging groundwater infiltration in stormwater conveyance systems. The required changes will require extensive consultation with the development industry, site planners,

municipal operations personnel and landowners. Funding support through local and senior governments for demonstration projects may provide an incentive for breaking down the expected barriers to change.

11.5 Funding

Section 11.3 presented the primary components which collectively form the Preferred Management Strategy. Also provided were cost estimates, present funding sources and potential funding alternatives.

One of the current hurdles to implementing studies of this type is a lack of funding, particularly for measures that are required in existing urban or rural areas. Several municipalities have recently undertaken studies to identify sources of funding. Presented below is a brief overview of several approaches that have been noted and could be considered further by the City. These approaches are in addition to approaches currently used by the City.

Storm Sewer User Fee

Several municipalities have recently enacted a Storm Sewer (or Stormwater) User Fee in order to fund the proposed measures. For example, the Town of Aurora has recently (2004) enacted a Flat Rate Storm Sewer Charge for existing residential, commercial/industrial and multi-residential units. The rates are \$55.40 per annum for residential properties and \$673.80 per property per annum for metered commercial/industrial and multi-residential properties.

Other municipalities are considering increasing the sewer and water rates to reflect the true cost of services, promote conservation practices and to fund environmental and stormwater initiatives.

Perpetual Maintenance Fee

A number of municipalities including the Town of Halton Hills, City of Brampton, and City of Vaughan have prepared stormwater documents or policies which include collection of a fee for operation and maintenance of stormwater management facilities to ensure the proper operation, longevity, and aesthetic functioning of the proposed stormwater control measure. Typically, the fee equals approximately 10 to 20 percent of the construction cost.

Cash-in-lieu Policy

A number of municipalities including Mississauga, Brampton, Vaughan, Toronto and Markham have established a Cash in lieu or Fee in Lieu policy. The general intent of the policy is to collect monies for smaller infill developments where implementation of proper stormwater measures may be limited. The funding is then used to construct works in other locations.

The MOE Stormwater Management Planning and Design Manual (Section 5.4) provides details of the approaches used by several municipalities. Typically, fees range between \$15,000 per hectare to in excess of 100,000 per hectare.

Provincial Funding Alternatives

There are a number of Federally funded agricultural stewardship programs including:

- Canada Ontario Farm Stewardship Program

- Greencover Canada
- Canada Ontario Water Supply Expansion Program
- Can-Adapt – Agricultural Environment Stewardship Initiative
- Habitat Stewardship Program

Together, these programs provide funding on a cost-shared basis, with the program covering 30 – 50 % to a maximum of \$5,000 - \$20,000 for a range of measures, including:

- Manure storage and handling facilities
- Farmyard runoff control
- Shelterbelts and windbreaks
- Farm waste management (storage and handling of hazardous materials)
- Riparian plantings and riparian management (including offstream watering sites)
- Water well management
- Erosion control – riparian lands and fragile lands
- Conservation farming practices – conservation tillage, strip cropping, equipment modifications, cover crops, integrated pest management, irrigation management)
- Ponds for agricultural purposes

These programs are delivered through local stewardship councils, with support from the Conservation Authorities and the local Soil and Crop Associations. All CA's within the City have access to these programs.

Several other important programs exist including:

- Canada – Ontario Agreement – Rural Water Quality Program: for example, GRCA has been implementing this program in several neighbouring municipalities and has signed MOU's with municipalities to provide additional local funding to this federal-provincial program.
- Hamilton – Halton Watershed Stewardship Program: a joint initiative between Conservation Halton and Hamilton Conservation Authority, sponsored through the Hamilton Harbour RAP (the Bay Area Restoration Council) that delivers agricultural stewardship programs to watersheds draining into the Hamilton RAP study area. Through this program, a stewardship and septic awareness questionnaire was delivered to over 4,000 landowners within the watersheds of the RAP.
- NPCA has a number of cost sharing programs with support from the Niagara RAP and the Niagara Water Quality Protection Strategy that target agricultural lands. Generally, grants are available from \$5,000 - \$12,000 representing 50 – 75 % of the project value and cover the range of projects lists under the federal programs above.

The level at which these programs are funded is generally insufficient to support a program of the magnitude outlined in this document. The recommended approach would be similar to the approach taken by GRCA for its Rural Water Quality Program, where the City would sign an MOU with a commitment of funding and the Conservation Authorities would implement the program with support from the existing federal and provincial programs.

General Programs

Several private sector and Federal programs do provide limited opportunities to fund projects. These programs include the Trillium Foundation as well as Provincial and Federal programs such as Municipal Green Enabling Fund and the Great Lakes Renewal Fund.

11.6 Staffing Requirements

As noted in Chapter 5, the MOUSE model has been used to determine flow rates, water levels and the associated level of service for approximately 4,000 storm sewers within the areas serviced by a separated storm sewer system. This model was also used in a similar manner for the areas within the City which are serviced by combined sewers.

It has also been recommended that the MOUSE model be used to address the impacts on the existing sewer system as a result of proposed developments including intensification. The model will also likely be used for future studies dealing with surface and/or basement flooding as a result of recent rainfall events.

Maintaining and updating the MOUSE model will require a considerable amount of time and will require proper technical skills and training. It is therefore recommended that one full-time staff be hired in order to address these requirements.

11.7 Future Studies

The City and the Conservation Authorities have been, and will continue to undertake, watershed and subwatershed studies. These studies may be undertaken in order to develop a plan in response to land use changes or to update the current environmental conditions and approach for environmental protection.

One of the objectives of this study was to provide direction for undertaking future studies including the type of proposed measures that should be considered. In this regard, meetings were held with City staff, Conservation Authorities, stakeholders and members of the public. Existing reports, documents and environmental baseline data was also reviewed.

As part of this study a series of Fact Sheets, one for each of the 15 watersheds, have been prepared.

The Fact Sheets may be to assist in the development of future studies.

In summary, the Fact Sheets provide direction for completing watershed or subwatershed studies under the following headings:

Existing Environmental Resources: an outline of the current environmental conditions within the watershed

Subwatershed Priorities and Environmental Protection Targets: a summary of the priorities and stormwater and environmental management targets that have been established for the watershed

Potential Best Management Practices: the recommended types of Best Management Practices to be implemented

Potential Study Requirements: a list of studies that need to be completed at the subsequent, more detailed, planning stage

The Fact Sheets are provided in Appendix C.

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