

WELCOME TO THE PUBLIC OPEN HOUSE for City of Kitchener Integrated Stormwater Management Master Plan



Public Open House
Wednesday June 24th, 2015
Conestoga Room, Kitchener City Hall
200 King St. West
6-8 p.m.



WELCOME TO THE PUBLIC OPEN HOUSE for City of Kitchener Integrated Stormwater Management Master Plan

The City of Kitchener has initiated the development of an Integrated Stormwater Management Master Plan (ISWM-MP) that follows the Municipal Class Environmental Assessment Process for Master plans.

The long range planning will enable the City of Kitchener to identify opportunities and be proactive in addressing stormwater issues before they become a problem.

Tonight's meeting format and purpose

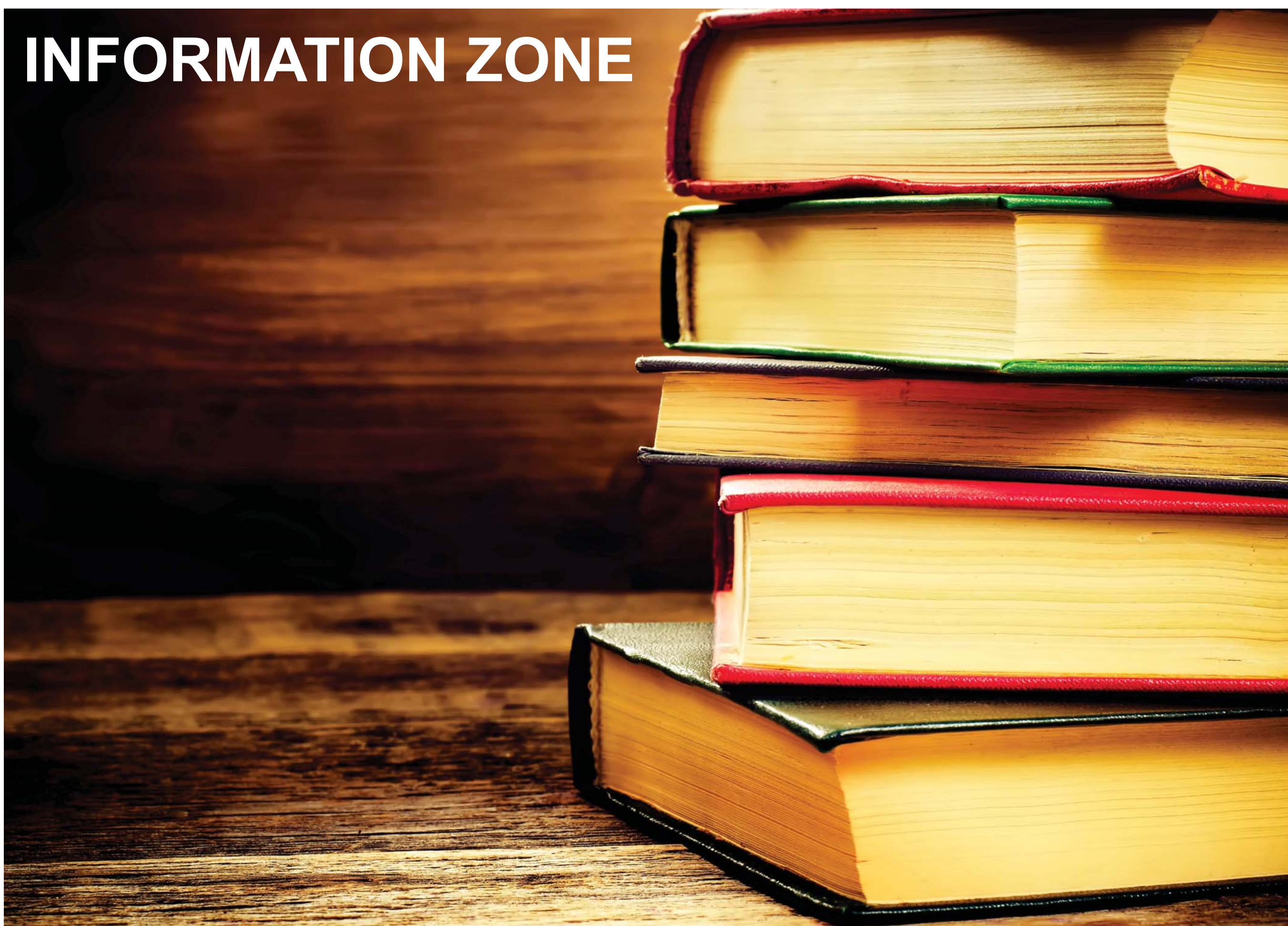
Tonight's meeting has been separated into two equally important zones for you to explore:

The **INFORMATION ZONE** provides an opportunity for you to review the current environmental, stormwater, and municipal infrastructure assets within the city's boundary.

The **INTERACTIVE ZONE** provides an opportunity for you to:

- share your knowledge and experience
- provide your personal vision for the city, and
- identify any stormwater issues within your neighbourhood

INFORMATION ZONE



INTERACTIVE ZONE



City of Kitchener Integrated Stormwater Management Master Plan

- Study Process & Timeline -

Study process

Where are we in the study process and **when** will you see us next?

WE ARE HERE
June 24, 2015

NEXT OPEN HOUSE
Fall 2015

STUDY COMPLETION
Early 2016

STAGE 1

- Review background information & identify data gaps
 - Define existing conditions
- Identify the problem and opportunity
- Identify study goals and objectives
- Develop long list of alternatives

STAGE 2

- Fulfill data gaps (field work)
- Complete social marketing research
- Develop and evaluate alternative management strategies
 - Develop short list
- Selection of preferred alternatives

STAGE 3

- Describe preferred stormwater management strategy
- Develop implementation plan



This study is being conducted in accordance with the requirements for Master Plans under Approach #2 of the Act, which is an approved process that fulfills all of the Class EA requirements for Schedule B projects and identifies any Schedule C projects for future studies.

City of Kitchener Integrated Stormwater Management Master Plan

- Problem Statement, Study Goals & Objectives -

Problem statement

The city last completed a Master Stormwater Management (SWM) Plan in 2001, which resulted in the development of the SWM policy (I-1135). When completed, the plan and policy were generally considered 'state-of-the-art'; however, since that time, the field of stormwater management has evolved.

A review completed in 2013, found that 2001 policy does not adequately capture or represent:

- Key policy, guidelines, regulations and acts after 2001
- City of Kitchener Stormwater Charges By-law and Credit Policy (2010-113, as amended by 2011-153, as amended by 2012-036)

The current Integrated Stormwater Management Master Plan (ISWM-MP) was initiated in order to update the 2001 SWM policy study and serves as a decision support tool as well as a methodology for the prioritization of works. The master plan will also serve as a transparent community process by which the city can establish stormwater management guidelines and policies for the next 15 years.



Study goals and objectives:

The City of Kitchener ISWM-MP considers flood and erosion control, groundwater and surface water quality management, environment management and infrastructure, all in an integrated manner. In addition, the ISWM-MP integrates existing policies, regulations, acts and guidelines and where appropriate will develop new policies to aid in implementation of the preferred alternative(s).

Water quality

- Improve surface and groundwater quality
- Maintain or enhance the quality of drinking water sources

Water quantity

- Minimize the threat to life and property from flooding
- Preserve the hydrologic cycle and maintain or enhance groundwater supplies through infiltration

Erosion control

- Reduce the impacts of excessive erosion on aquatic and terrestrial habitat and property
- Identify stream erosion issues and integrate within a master planning process

Natural environment

- Protect, enhance and restore natural features and identified ecological restoration areas (ERA)
- Improve warmwater, coolwater and coldwater fisheries if appropriate

Water resource sustainability

- Integrate the management of stormwater, wastewater and drinking water
- Improve infrastructure resiliency and climate change adaptation

Infrastructure

- Provide a level of service to ensure infrastructure functions effectively
- Encourage the implementation of innovative solutions to mitigate the impacts of stormwater runoff

Policy and implementation

- Reflect regulation developed or amended after 2001
- Fill gaps in existing stormwater planning documents
- Integration of asset management plans for stormwater, which includes long-range financial forecast and planning direction

Community

- Improve stormwater education resources and programs
- Enhance the enrolment in the stormwater credit program



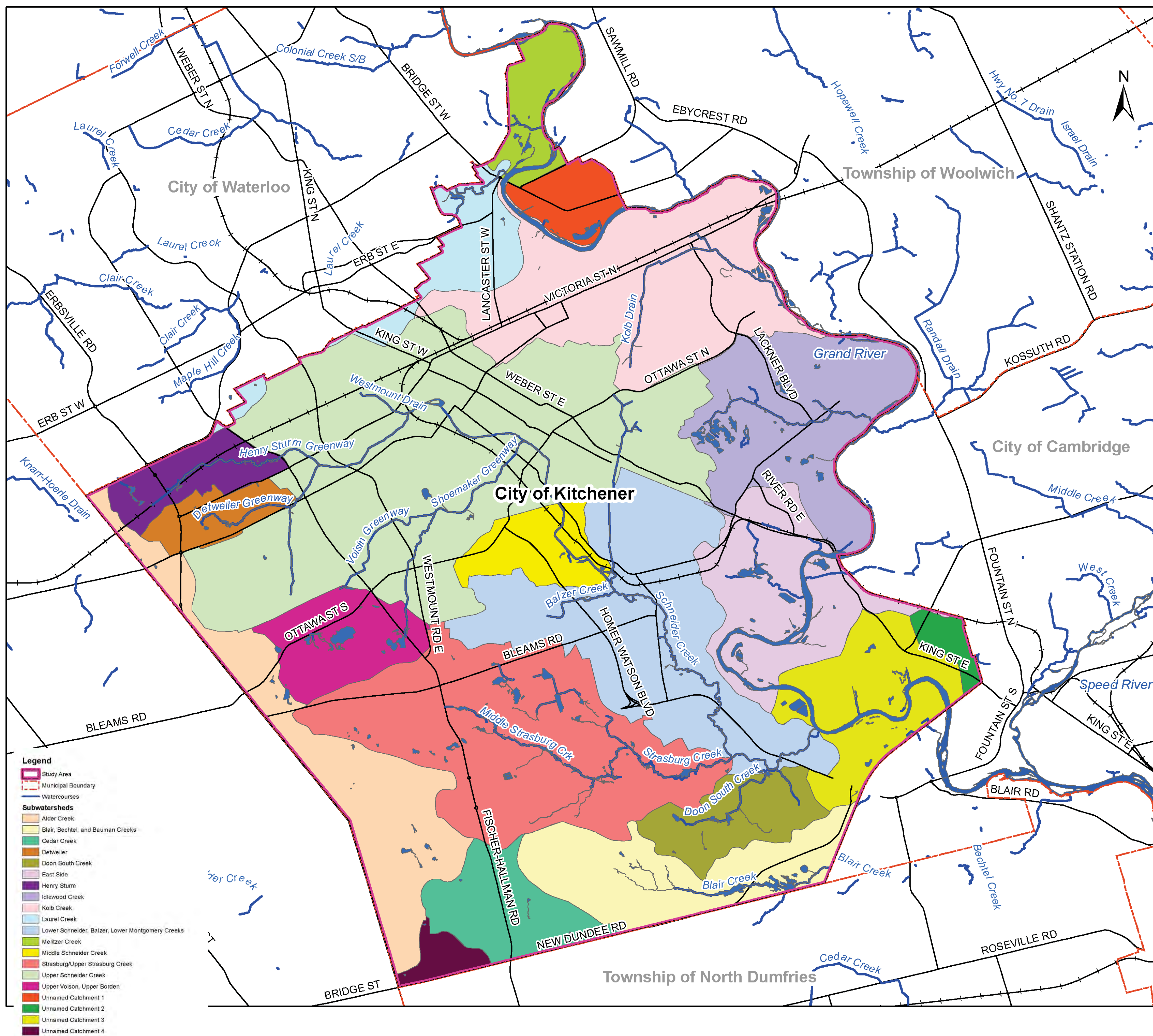
City of Kitchener Integrated Stormwater Management Master Plan

- Baseline Study & Existing Conditions -

Baseline study & existing conditions

The existing conditions of the study area have been characterized through a background review and field investigations and are summarized in an **existing conditions report**, which describes the existing environmental, surface and groundwater, wastewater and stormwater conditions and assets.

The existing conditions report can be viewed at:
www.kitchener.ca/stormwatermasterplan



The following elements of the study area were evaluated and reported:

Element	Definition & how it relates to stormwater
Land use	Land surface type from natural to developed areas. The type of land use influences how stormwater travels throughout our cities and natural areas.
Physiography, geology & surficial soils	The characteristics of the ground including soils, bedrock, etc which influences how stormwater is cycled back into the ground.
Hydrogeology	The movement of groundwater in soils and bedrock storage areas (known as aquifers, which supply much of Kitchener's drinking water).
Hydrology	The movement and distribution of water around the Earth (i.e Hydrologic cycle) Issues such as climate change can impact hydrologic cycles causing more intense weather events.
Fluvial geomorphology	A stream's response to natural and human induced changes which can cause instream erosion and flooding. Increases in stream flow as a result of stormwater can cause more flooding, erosion and damage aquatic habitats.
Aquatic ecology	The ecosystems and relationships between the animals which live in our waterbodies and their environment. Stormwater from urban areas can damage aquatic habitats by reducing water quality.
Natural heritage	The study of plants, animals and the ecosystems (i.e wetlands, boreal forest, etc) and geological formations (mountains, valleys, etc) which they depend on. Mismanagement of stormwater can damage ecosystems such as wetlands and shoreline habitats.
Stormwater management infrastructure	Systems which are constructed to manage stormwater from urban areas in order to improve water quality and control flooding.
Water supply & wastewater	The proper management of wastewater and stormwater helps keep our drinking water sources (i.e. aquifers, rivers and lakes) clean and well stocked.

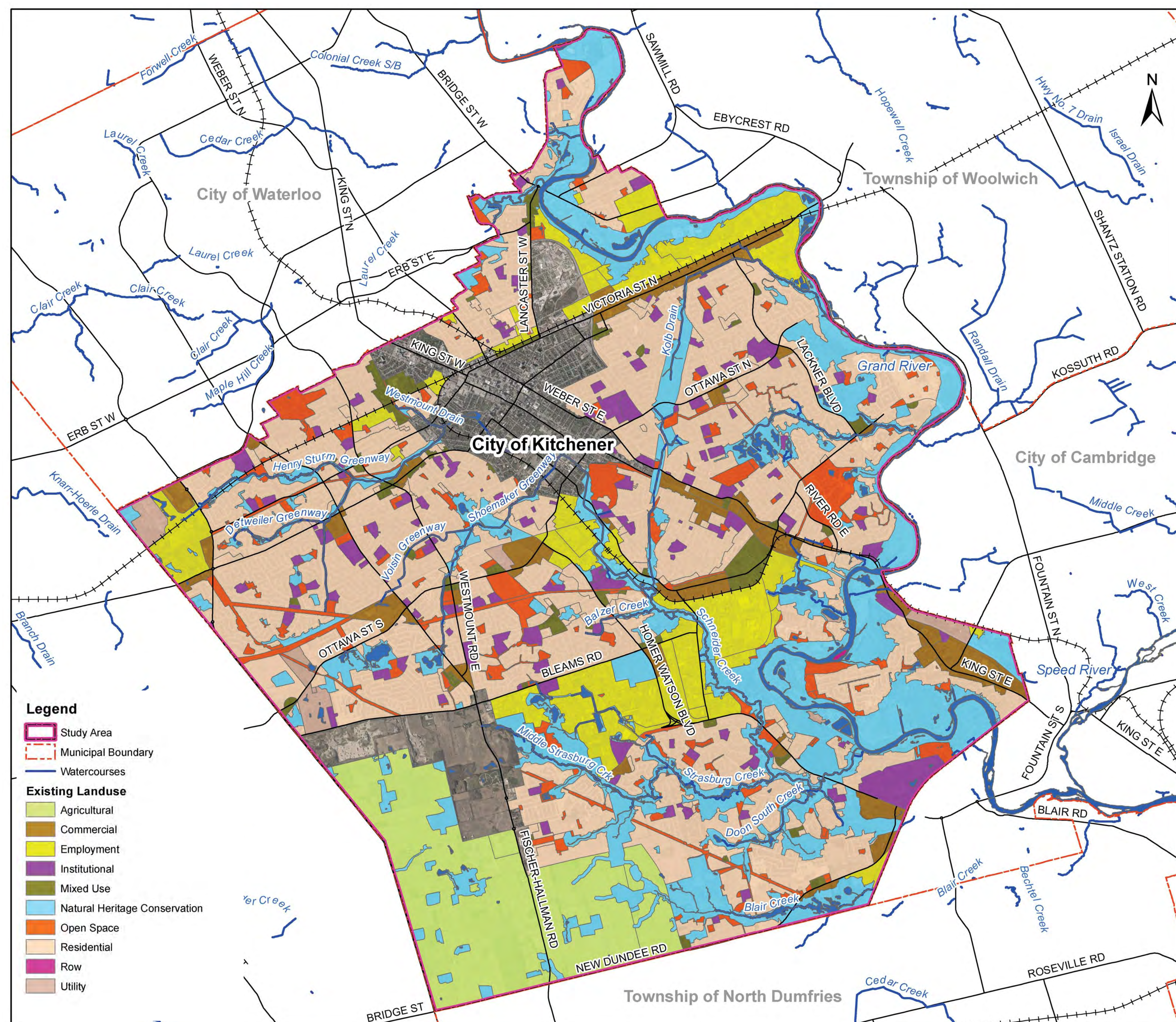


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- Land Use -

Existing land use:

The City of Kitchener covers 139 square kms and is characterized by a mixture of land-use types. The city's primary land-use is residential. The city has five (5) major areas of employment lands as well as an older downtown core, which has a mixture of many different land-uses. Generally, the lands in the southwest of the city are the only remaining agricultural lands. Existing land uses within the City of Kitchener are illustrated below.



Proposed development and intensification areas:

The population of the City of Kitchener is expected to increase by 70,000 residents by the year 2031. To address this anticipated growth, the city has completed the Kitchener Growth Management Plan (KGMP), which prioritizes development areas and identified capital projects within the city.

The anticipated development and intensification provides an opportunity for improved stormwater controls, particularly in previously developed areas.

City of Kitchener Integrated Stormwater Management Master Plan

- Stream Systems and Erosion -

Impacts to local streams and rivers

Stormwater is water that flows across the land surfaces and is routed into drainage systems which includes our streams and rivers. As stormwater flow from our developed areas increase, so do the risks associated with flooding and erosion.



North Strasburg Creek - concrete lined



Creek levels swell during significant rain events

Existing knowledge and conditions

Over the past 10 years, the City of Kitchener has undertaken assessments of its streams to understand their conditions, identify erosion and flooding issues, and determine the extent of restoration effort which may be required. Stream walks were conducted in 2005 and 2009.

The conditions of City of Kitchener streams are as follows:

- 23% are either channelized or concrete-lined
- 70% remain natural; and
- 7% have been rehabilitated by the city.



Rehabilitated channel in Kitchener



Do you have any information about your local streams, including areas of erosion and flooding?

Go to the **interactive zone** and share your feedback with the city.

ISWM-MP: 2015 stream system understanding and erosion assessment

As part of the ISWM-MP, the city will be completing a more detailed inventory of the streams within the City of Kitchener. The primary deliverable will be a comprehensive inventory and documentation of erosion sites. The sites will be prioritized using methods which are consistent with a master planning approach and previous city-wide stream assessments.

This process will help achieve several of the study goals including **water quality**, **water quantity**, **erosion control** and protection of the **natural environment**.

Erosion Assessment Prioritization Criteria

Component	Criteria
1. Erosion & Risk (70%)	Erosion Index (35%)
	Public Health and Safety (35%)
2. Environmental (30%)	Riparian Buffer (15%)
	Aquatic Habitat (15%)

City of Kitchener Integrated Stormwater Management Master Plan

- Water Quality & Instream Conditions -

How stormwater affects water quality?

When stormwater is untreated, runoff carries oils and grease, pesticides, fertilizers, and other chemicals off roads, lawns, and buildings which go directly into our natural areas, such as creeks, lakes, and wetlands. The lack of stormwater management can have significant impacts on instream conditions.

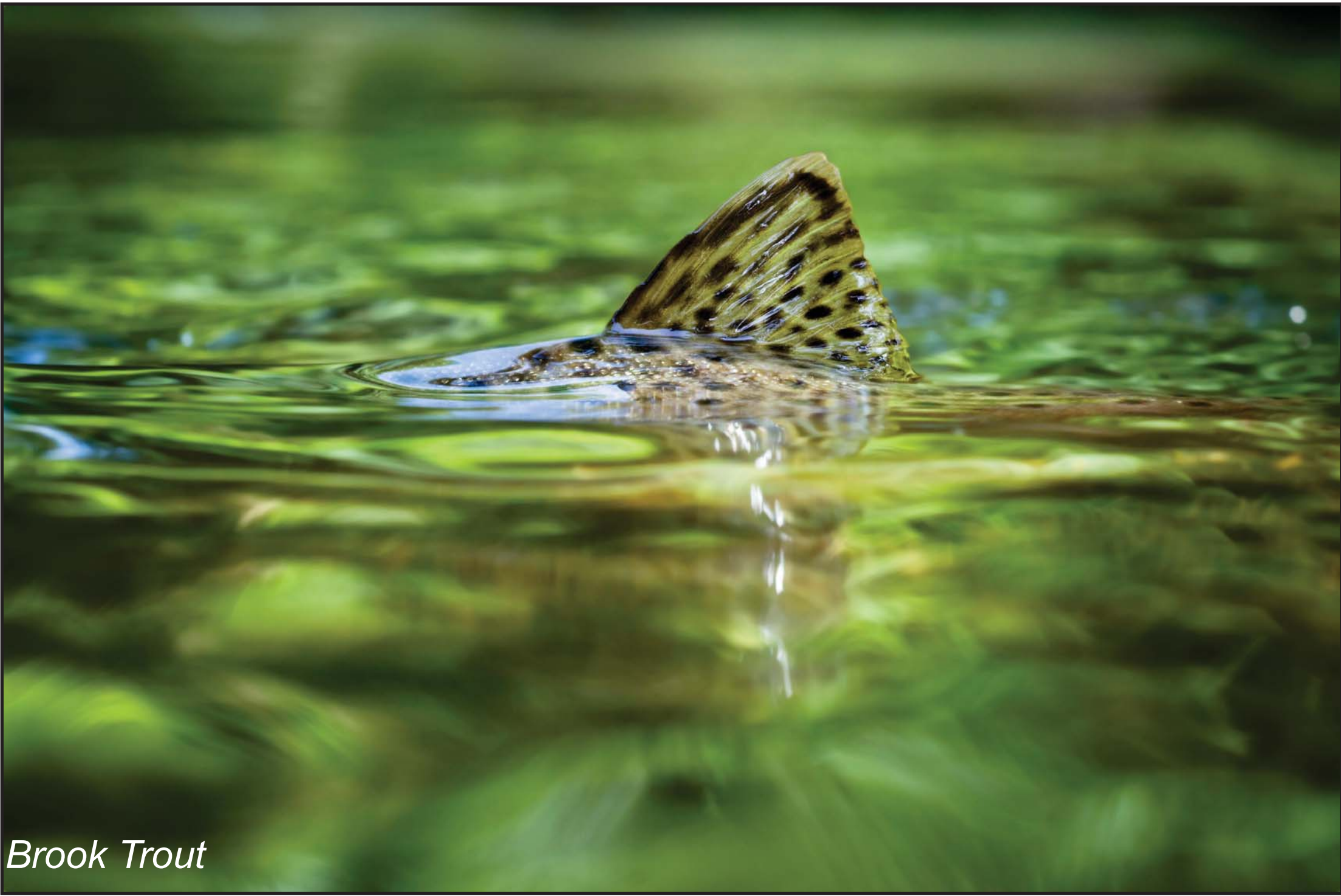
Do you have any thoughts or feedback regarding the impacts that stormwater may have on your local streams?



Go to the **interactive zone** and tell us about it.



Trout species are common to Kitchener's coldwater streams



Brook Trout

Water quality & instream habitat

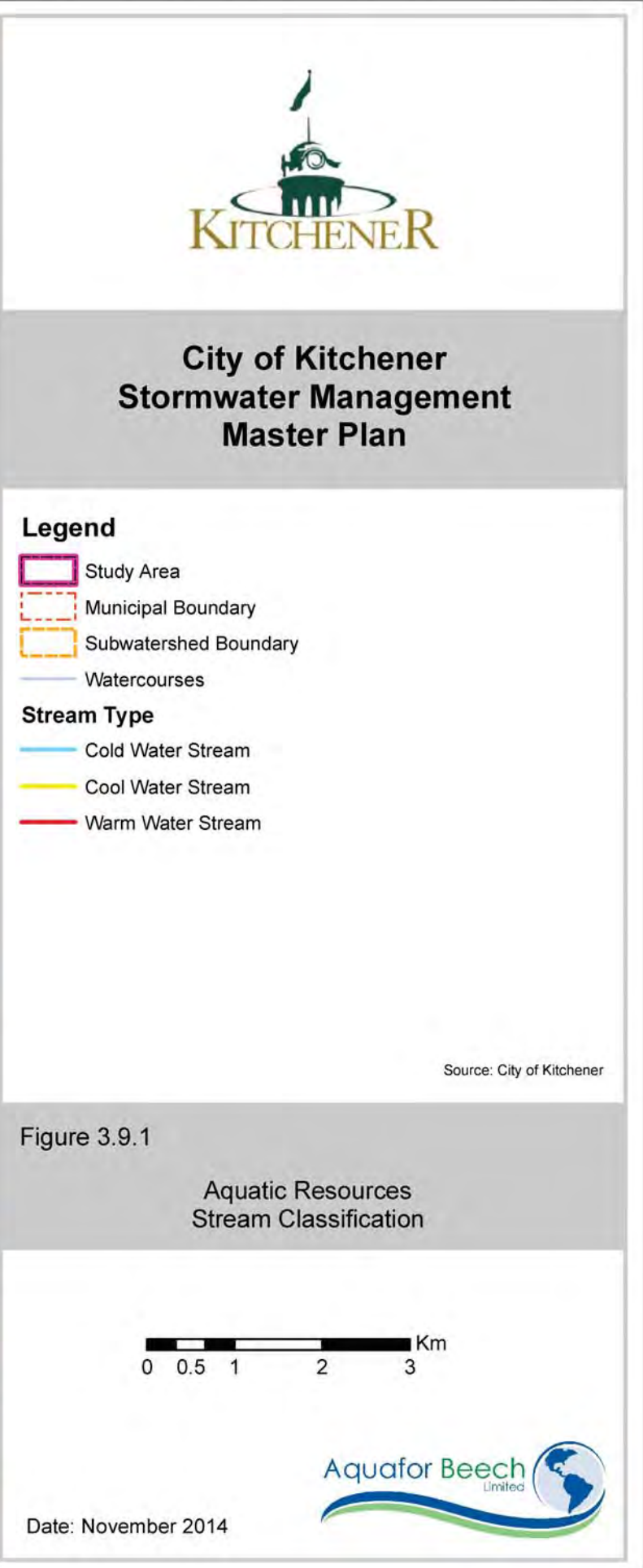
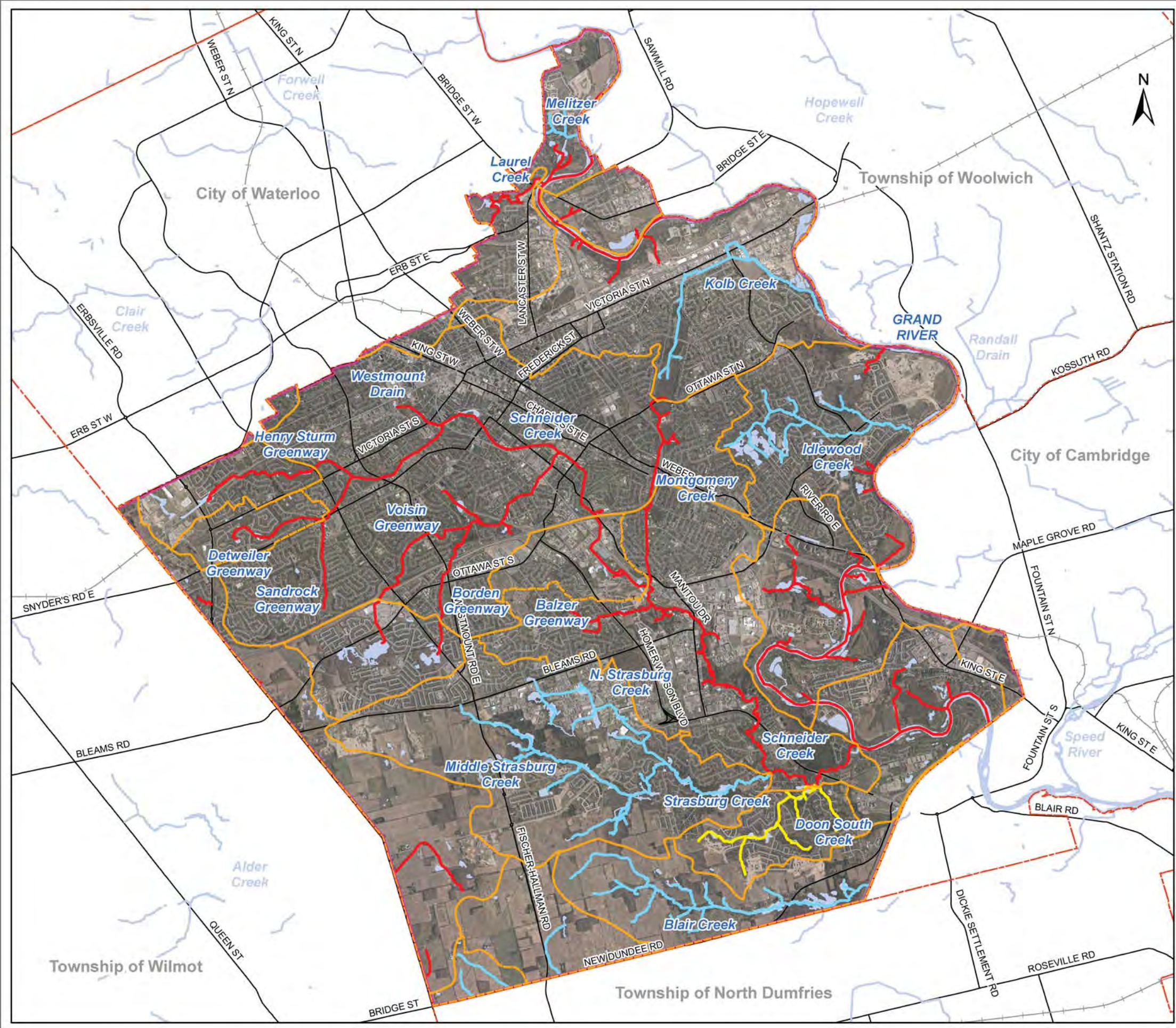
A city-wide monitoring plan was developed and initiated in 2002 to provide a process for evaluating the effectiveness of the city's SWM system. The monitoring program focused on surface water quality (chemical and bacteriological) and invertebrates and fish community sampling to identify and monitor instream conditions.

Results of the audit program have demonstrated that the city's streams are host to a large variety of benthic macroinvertebrate (i.e. bugs) and fish communities as aquatic habitats range from warmwater to coldwater (See map below).

A goal of the ISWM-MP will be to improve instream conditions from both a water quantity and quality perspective.

Subwatershed	2015 Water Quality Score
Henry Sturm Greenway	Marginal to Good
Idlewood Creek	Fair to Good
Kolb Creek	Poor to Marginal
Lower Schneider, Balzer, Lower Montgomery Creeks	Marginal to Fair
Middle Schneider Creek	Poor to Fair
Strasburg/Upper Strasburg Creek	Marginal to Fair
UpperSchneiderCreek	Poor to Fair
UpperVoisin,UpperBorden	Poor
UpperBlairCreek	Fair to Good

Instream Water Quality Ranking (Best-Worst):
Excellent, Good, Fair, Marginal, Poor



City of Kitchener Integrated Stormwater Management Master Plan

- Natural Heritage -

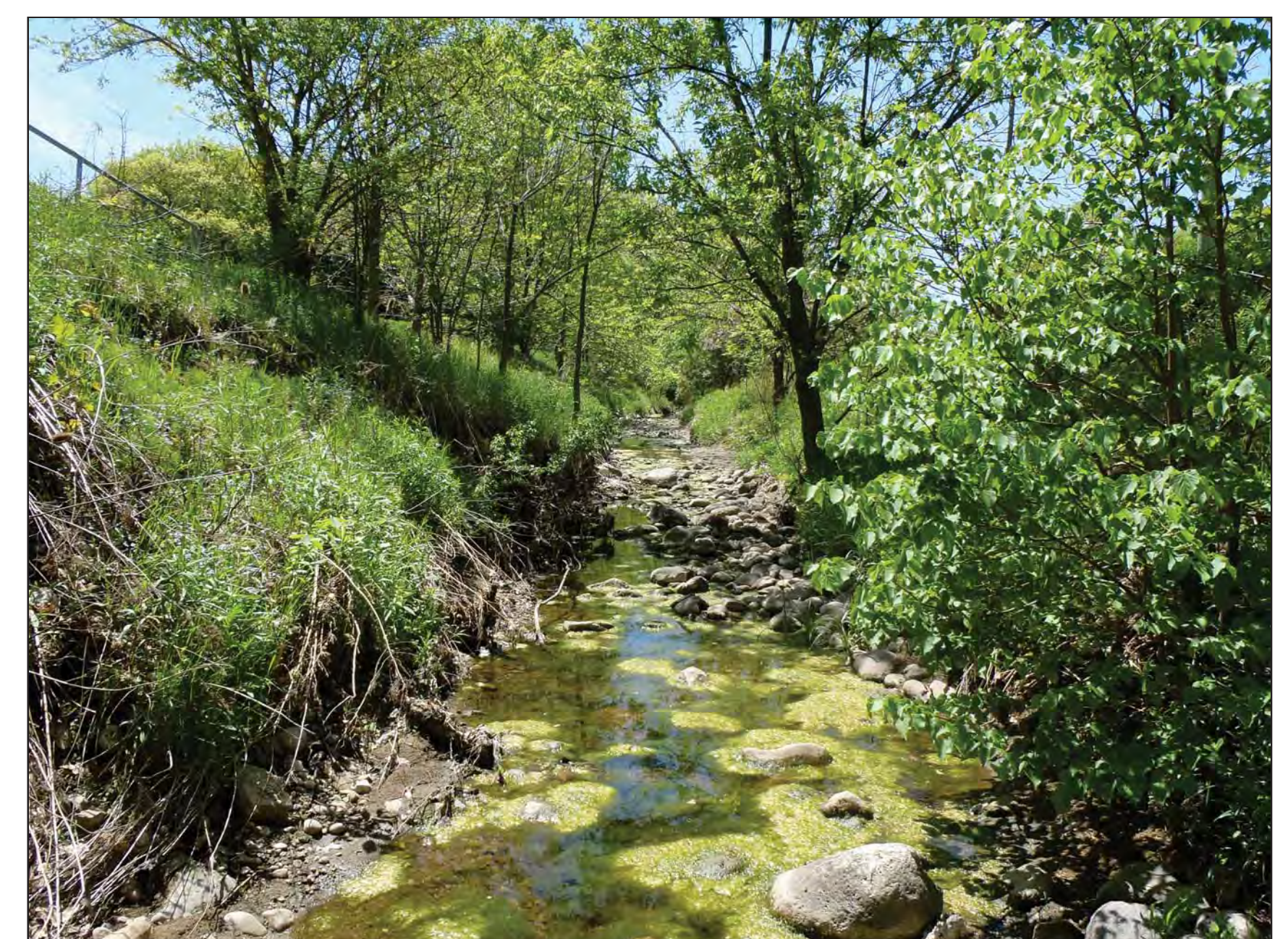
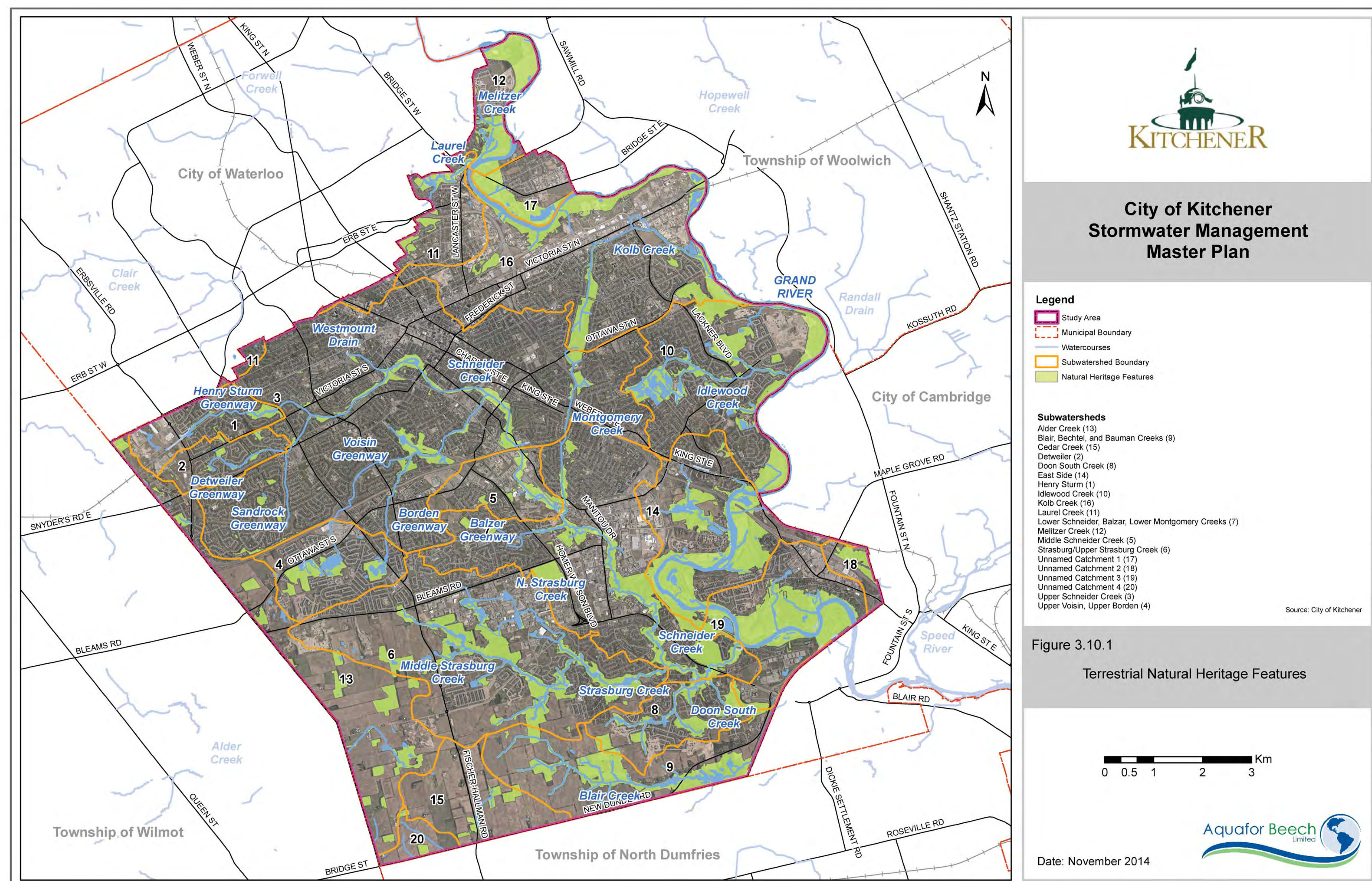
Natural heritage

The City of Kitchener Natural Heritage System (NHS) Background Report (2012) identifies the city's natural heritage features and provides recommendations for their protection, maintenance, enhancement, and/or restoration. The city's NHS is shown below.

Many of these features and areas are located adjacent to the city's watercourses, natural areas and SWM facilities. Where applicable, the preferred SWM approach developed as part of this Master Plan will integrate and support the NHS including identified ecological restoration areas (ERA).



A SWM pond adjacent to a NHS feature in the Huron Business Park



City of Kitchener Integrated Stormwater Management Master Plan

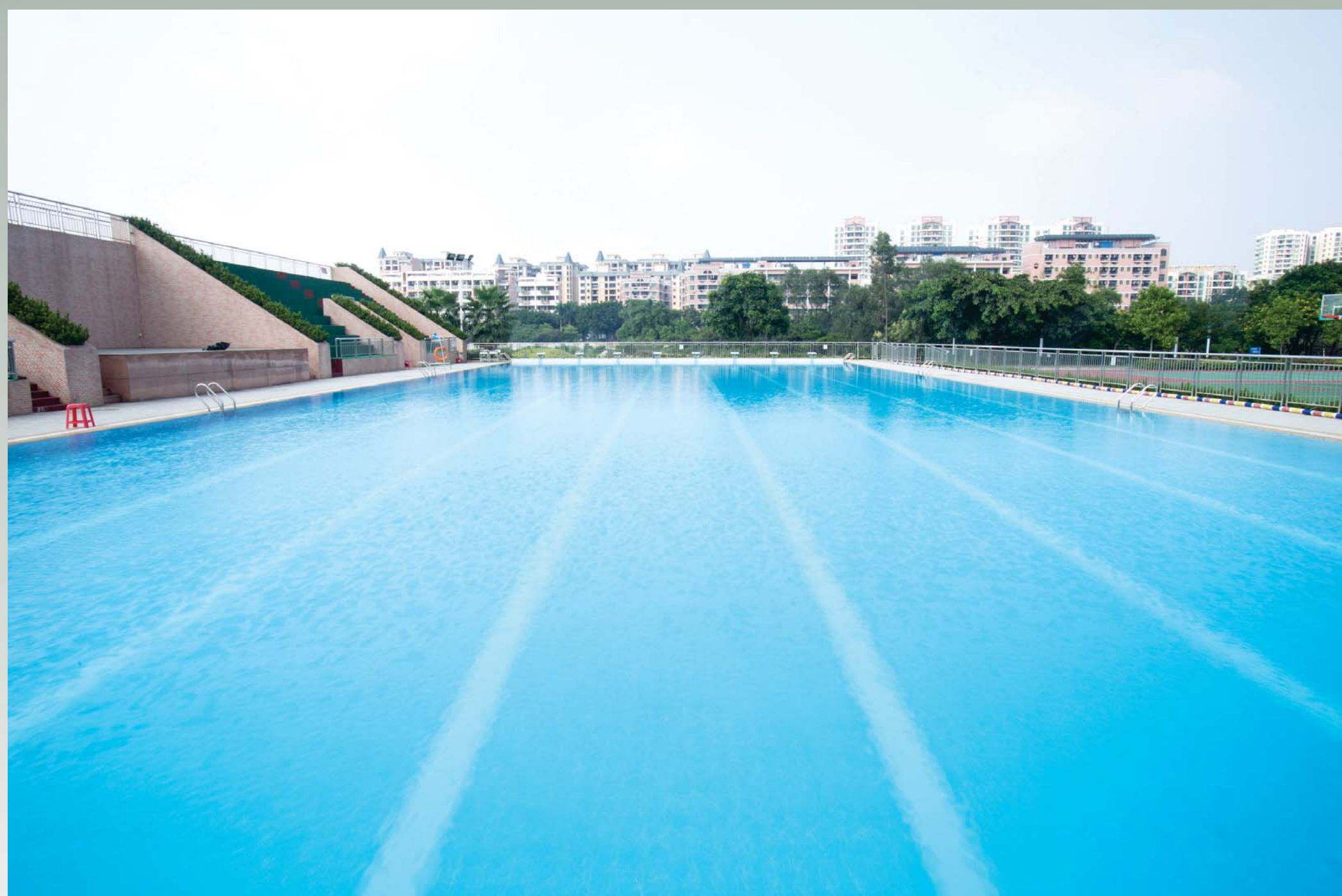
- Kitchener Residents Managing Stormwater-

A step in the right direction

The City of Kitchener created a separate stormwater utility to fund operation, maintenance and capital projects for stormwater management through the establishment of a stormwater charge based on impervious areas. A corresponding credit policy was also created.

Since its establishment in 2011, the city has issued more than 4,000 credits as part of its credit program for rain gardens, rain barrels, cistern & permeable pavements.

This treats the equivalent of 19 Olympic size swimming pools every time it rains!



x19

Examples of SWM on private property



Do you have any suggestions on how Kitchener residents can better manage stormwater better?



Go to the **interactive zone** and share them with us.

City of Kitchener Integrated Stormwater Management Master Plan

- Existing Stormwater Management Infrastructure -

Stormwater management infrastructure:

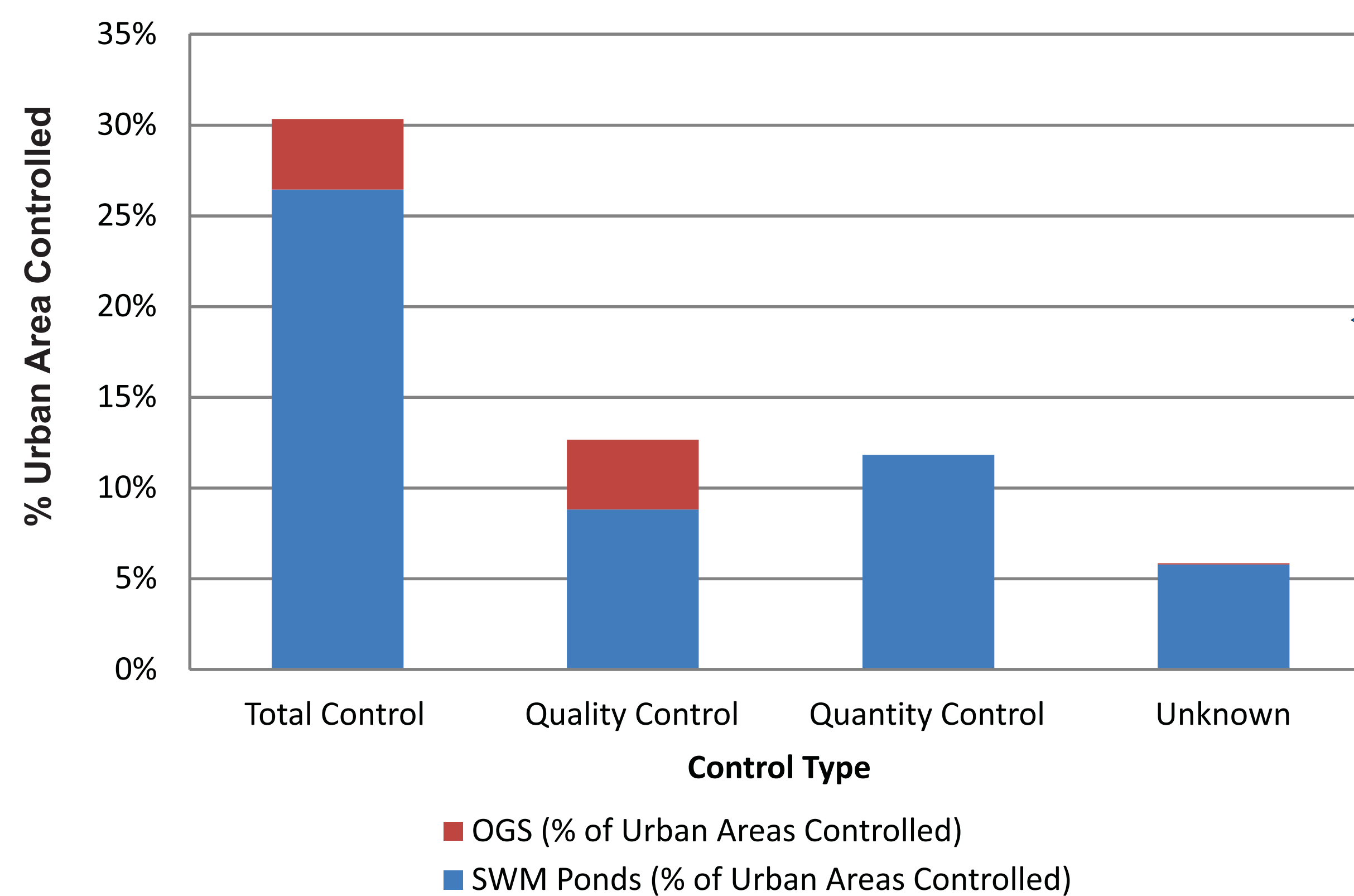
Municipal stormwater management (SWM) infrastructure includes all SWM facilities (dry ponds, wet ponds, wetlands, and hybrid facilities), oil & grit separators (OGS), holding tanks, exfiltration systems, storm pipe networks (manholes, catch basins & leads) and outfalls responsible for the capture, conveyance, and control (water quality and quantity) of stormwater runoff.

The City of Kitchener's existing SWM infrastructure includes:

- 140 active SWM facilities;
- 120km of watercourses;
- 700km of storm sewers;
- 12,000 catch basins.



Percentage of the City of Kitchener Controlled by SWM Assets



Areas of Kitchener with SWM

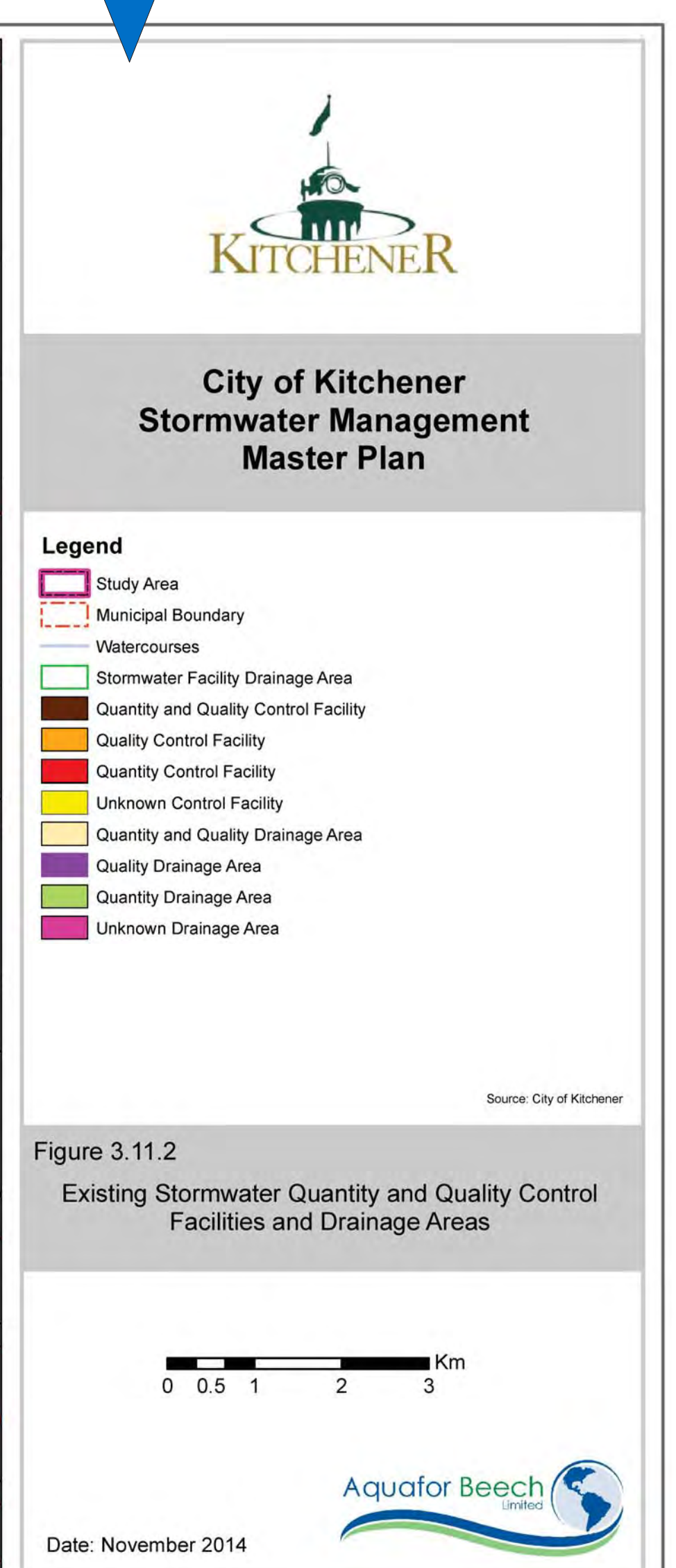
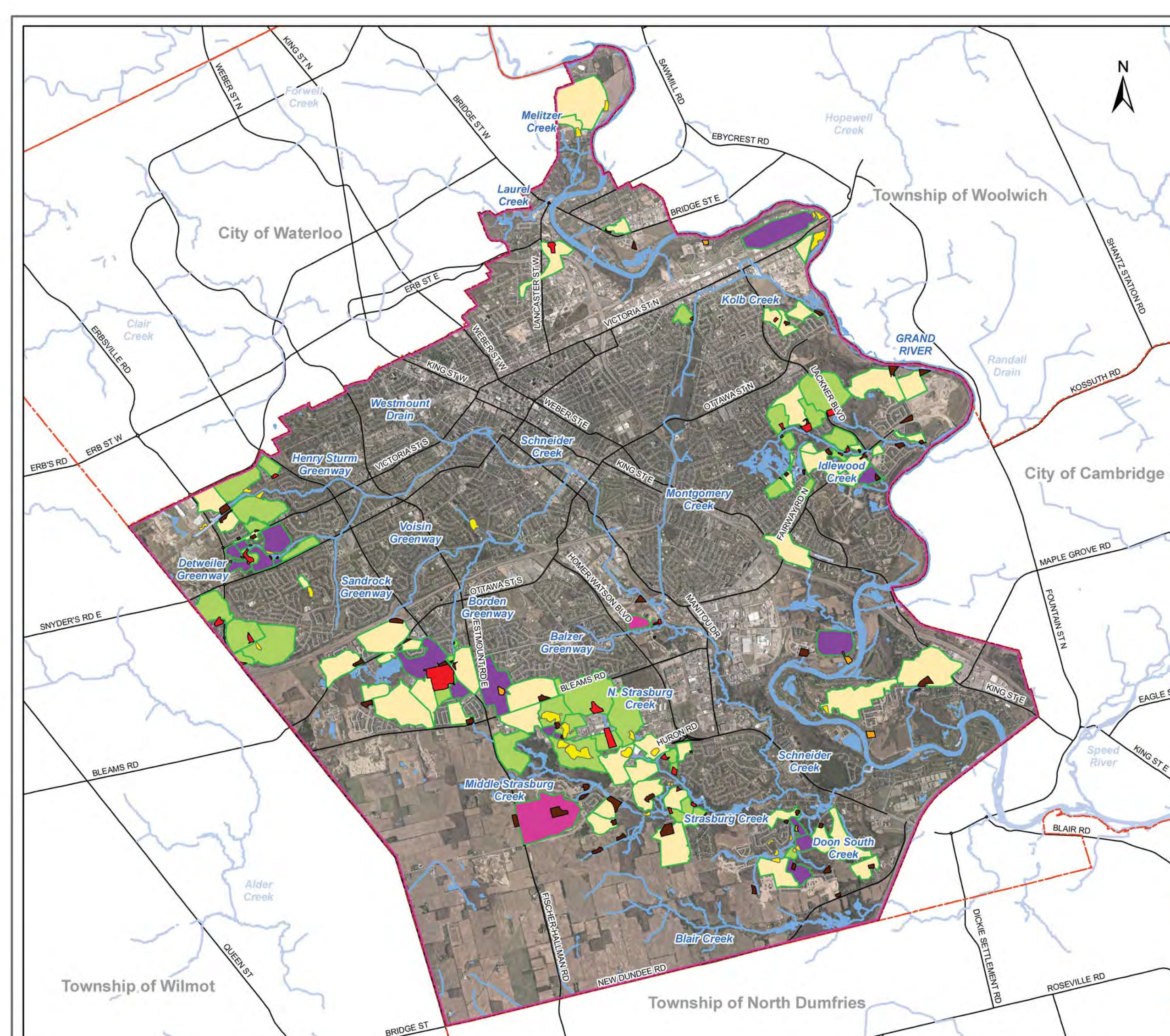
Currently less than 30% of the existing urban areas of the city are controlled by SWM facilities.

The majority of areas controlled by SWM facilities correspond to newer development areas outside the urban core.

Key objective

A key objective of this study is to implement SWM controls into areas of the city developed without SWM facilities, including:

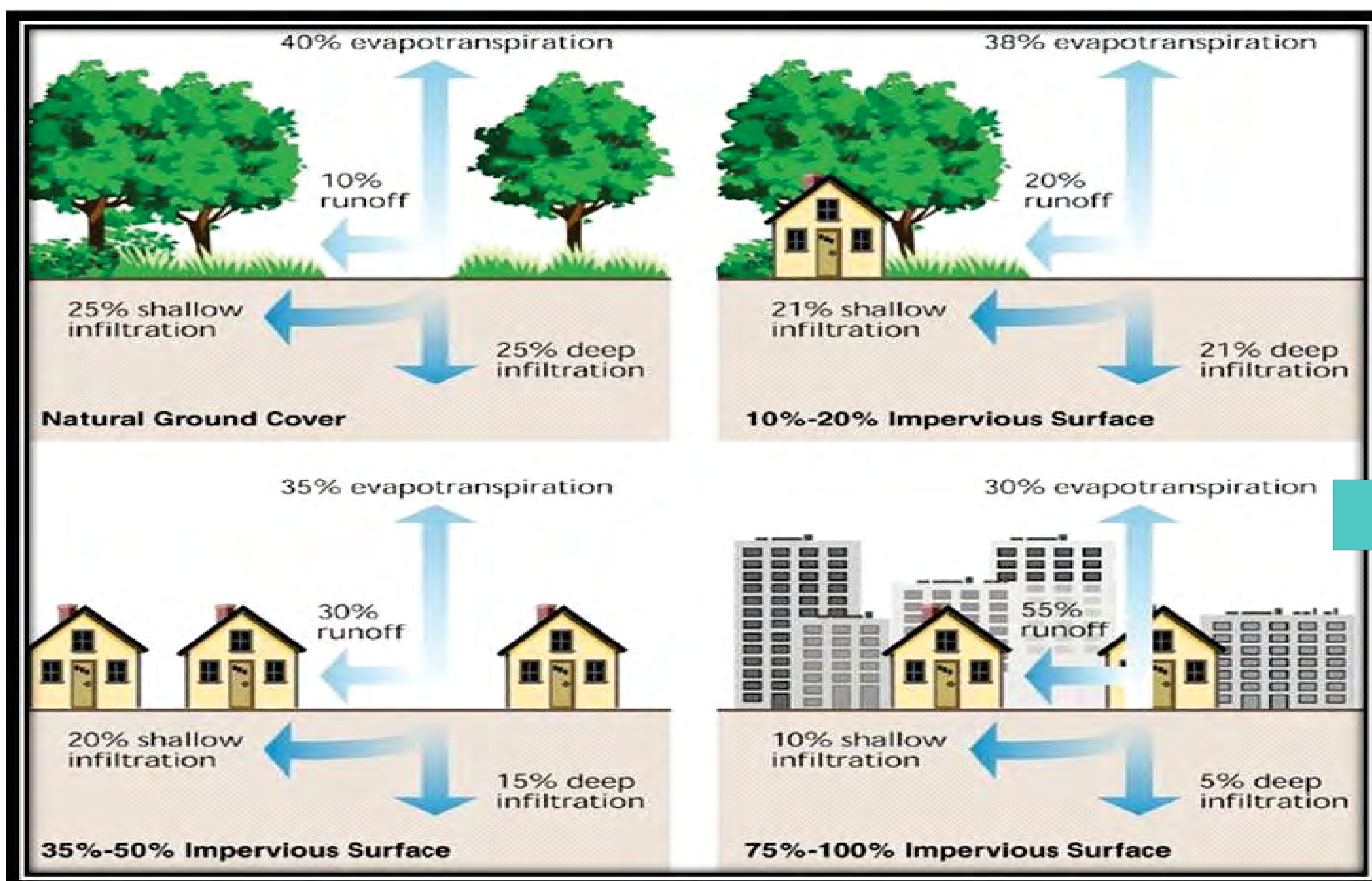
- Older neighbourhoods, and
- The existing urban core.



City of Kitchener Integrated Stormwater Management Master Plan

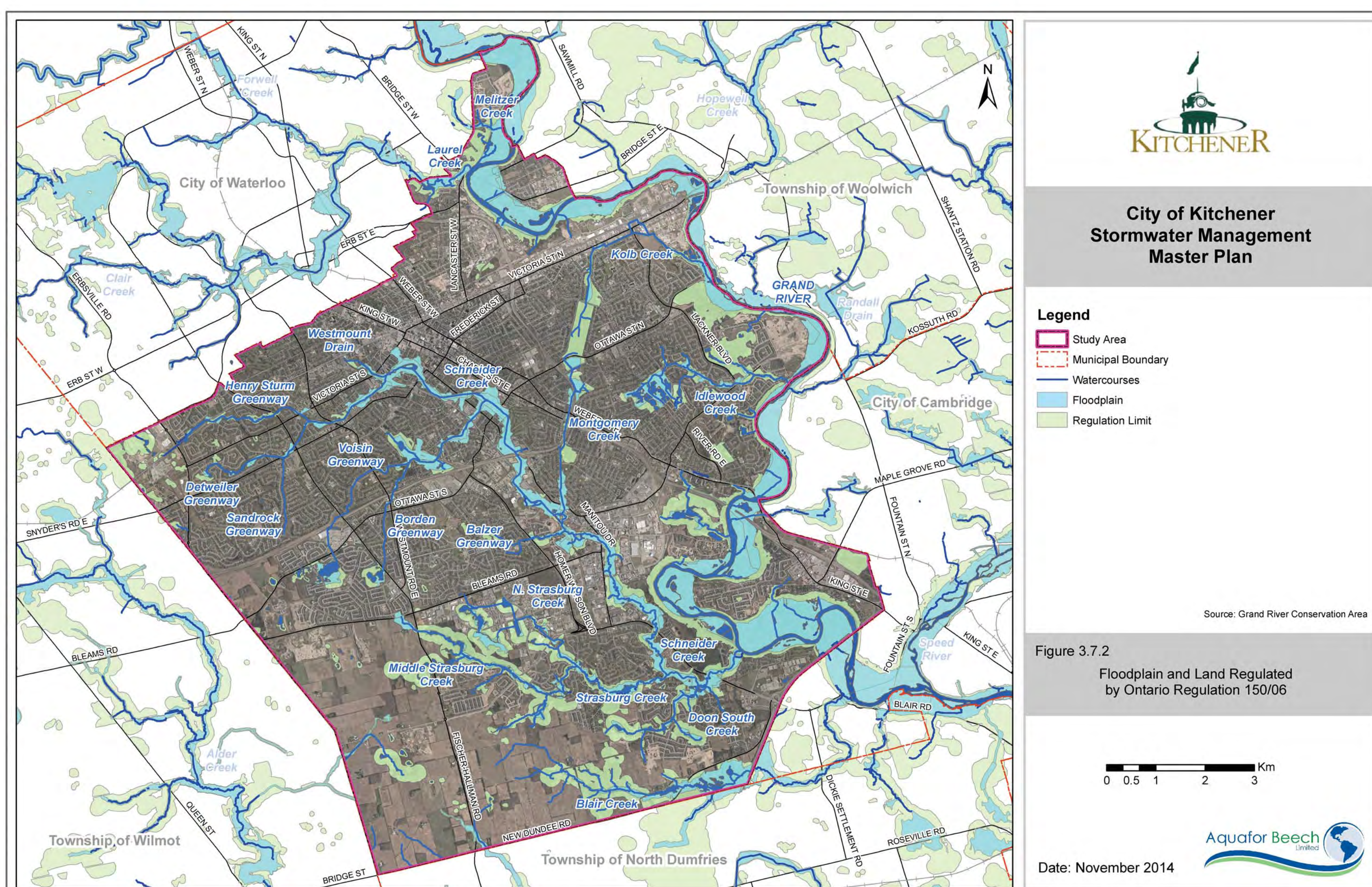
- Comprehensive Storm Sewer Modelling & Drainage Assessment-

A comprehensive computer model is currently under development for the existing storm sewer system (network of pipes under the ground), specifically the trunk sewer network (>600mm). The computer model will assist the city in developing a better understanding of urban flooding risks, existing storm sewer capacity and will be used to evaluate predicted climate change impacts.



Urban flooding

As cities expand the amount of "permeable" or "porous" areas are reduced and replaced by hard surfaces that do not absorb stormwater. With less "porous" areas available, the risks of flooding may increase as a result of more stormwater runoff. Runoff is simply rainfall which flows across the land surface before entering the storm sewers or creeks.



Do you know of an urban flooding issue in your neighbourhood?

Go to the **interactive zone** and share your knowledge with the city to help inform the computer model.

Riverine flooding

When surface runoff entering local stream exceeds the channel's capacity, water overflows the stream banks, spilling into the surrounding low lying areas, known as the floodplain. This is riverine flooding. The existing floodplain and regulation limits within the city are displayed above.

City of Kitchener Integrated Stormwater Management Master Plan

- Integration of Stormwater, Wastewater and Drinking Water -

Wastewater in Kitchener

As the Grand River flows into Kitchener, water quality is greatly influenced by the local wastewater treatment plants (WWTP).

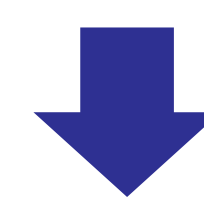
Kitchener has one of the largest WWTP in the region, which also discharges to the Grand River - **a drinking water source**.

Urban stormwater runoff has an impact on the ability of the WWTP to discharge to the Grand River. Stormwater pollutants that are released to the Grand River must be reduced.



Water resource sustainability

A study goal is to integrate the management of *stormwater, wastewater and drinking water in the City of Kitchener, by linking goals for water quality, quantity, infrastructure and the environment*.



Water supply

Kitchener is served by a combination of 24 groundwater wells and the surface water intake at the Grand River (Hidden Valley Intake).

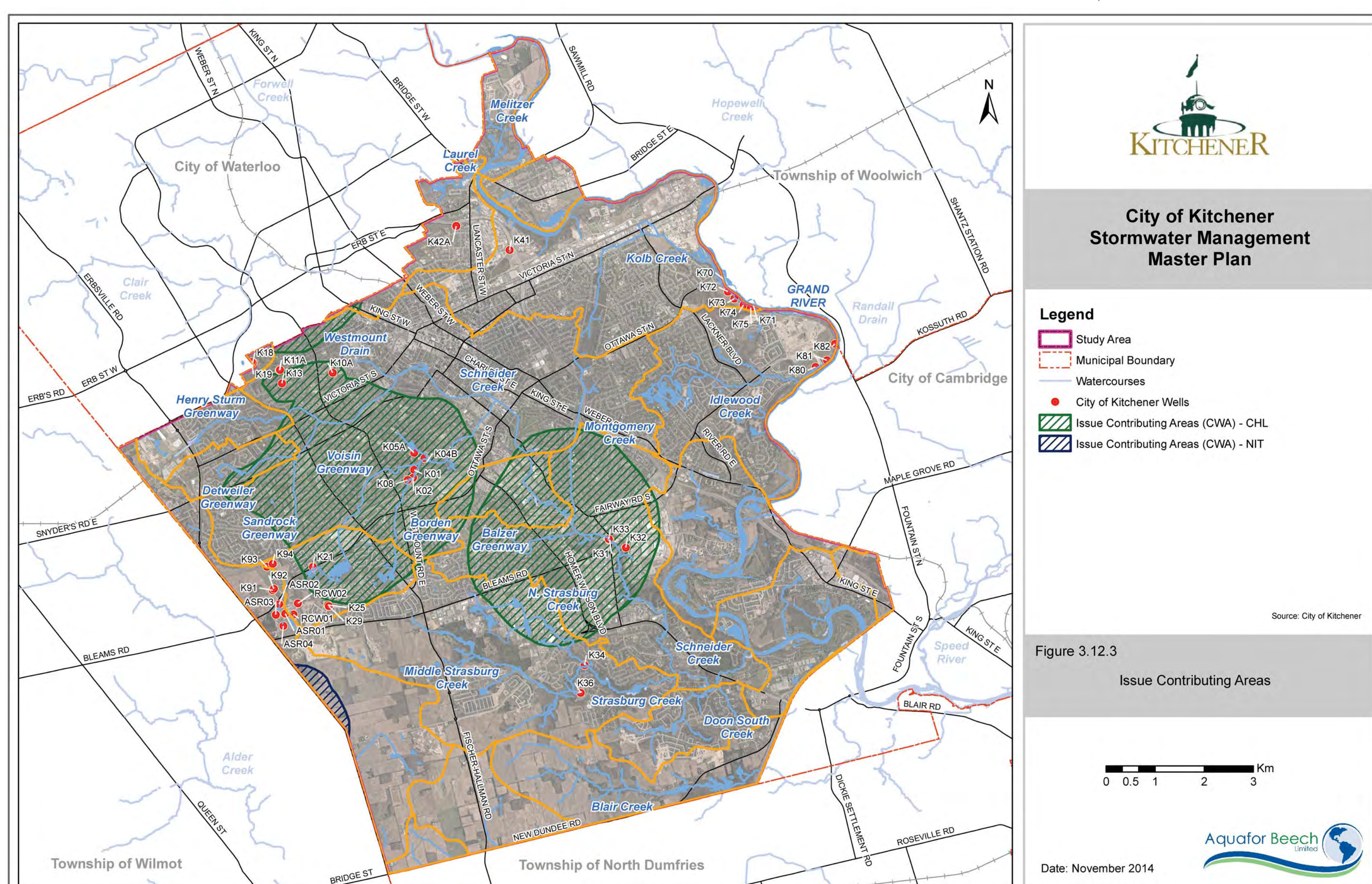
Stormwater & Issue Contributing Areas (ICAs)

Drinking water threats were identified for four (4) wells in Kitchener relating to impacts from chlorides (CHL) and nitrates (NIT). To protect these drinking water sources issue contributing areas (ICA) have been developed. Within these areas activities that may direct chlorides and nitrates to groundwater must be managed.

This may include the infiltration of stormwater runoff in ICAs.



Infiltrating SWM Facilities
Top - Parking lot bioretention facility
Right - Demonstration of permeable asphalt



City of Kitchener Integrated Stormwater Management Master Plan

- Alternatives -

Alternatives

Next steps - the following long list of alternative stormwater management measures and practices will be evaluated using four primary criteria: **1) physical & natural environment, 2) social & cultural, 3) economic, and 4) technical & engineering criteria.**

The results of this evaluation shall be presented to the public at the next public open house

Source control measures

Source controls are physical measures that retain runoff and encourage the infiltration of water into the ground. Source control measures can include techniques such as green roofs, permeable pavement, soakaway pits, rain garden (bioretention), rainwater harvesting and downspout disconnection etc.



Disconnected downspout



Green roof



Rain garden

Conveyance control measures

Conveyance controls are linear stormwater transport systems that are generally located adjacent to roadways. They encourage infiltration of water into the ground, improve water quality and reduce runoff. They can include traditional curb and gutter systems and techniques such as bioswales, grassed channels and subsurface perforated pipe systems.



Bioswale



Perforated pipe system



Grassed swale

End-of pipe measures

This option involves addressing SWM using conventional stormwater facilities at the end of the storm sewer system. These facilities are utilized for erosion, water quantity and quality control. They include wet ponds, dry ponds, wetlands and hybrid facilities, subsurface storage tanks and superpipes.



Wet pond



Hybrid



Wetland

City of Kitchener Integrated Stormwater Management Master Plan

- Alternatives -

Environmental restoration

In stream practices, outfall restoration, riparian plantings, and open space re-vegetation improves the function of stream corridors. They improve water quality, slow runoff, moderate stream temperatures, reduce erosion and improve aquatic and terrestrial habitat conditions.



Channel restoration



Outfall restoration



Re-vegetation

Pollution prevention measures

These are methods that have the intent to improve operation and maintenance of privately and publicly owned land, buildings, and infrastructure that will reduce pollution generation. Certain municipal programs such as road salt management, street sweeping and parks maintenance activities (use of herbicides and pesticides) are known to improve water quality.



PIV valve to contain spills



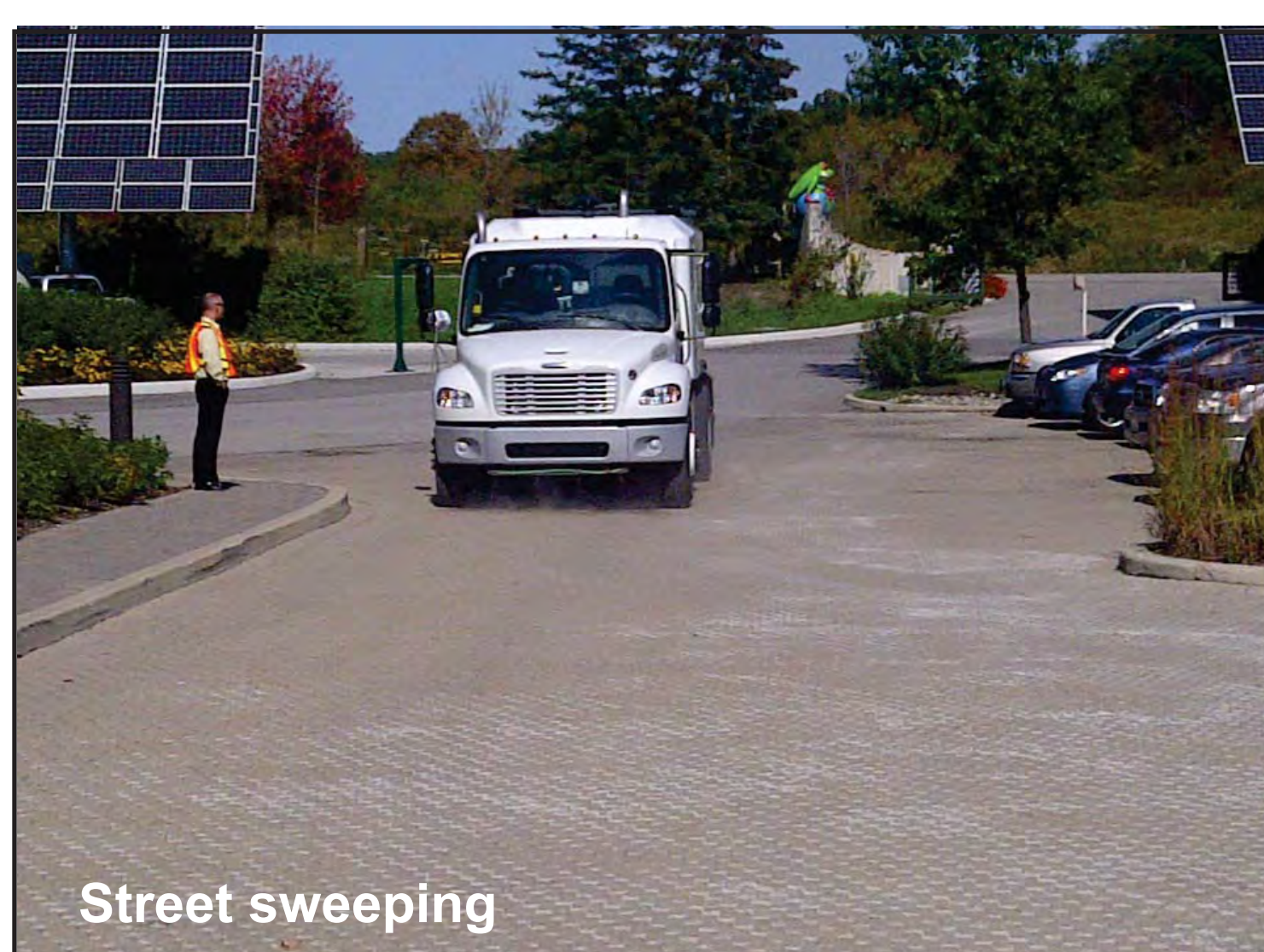
Excess salt application



No dumping signage

Operation and maintenance

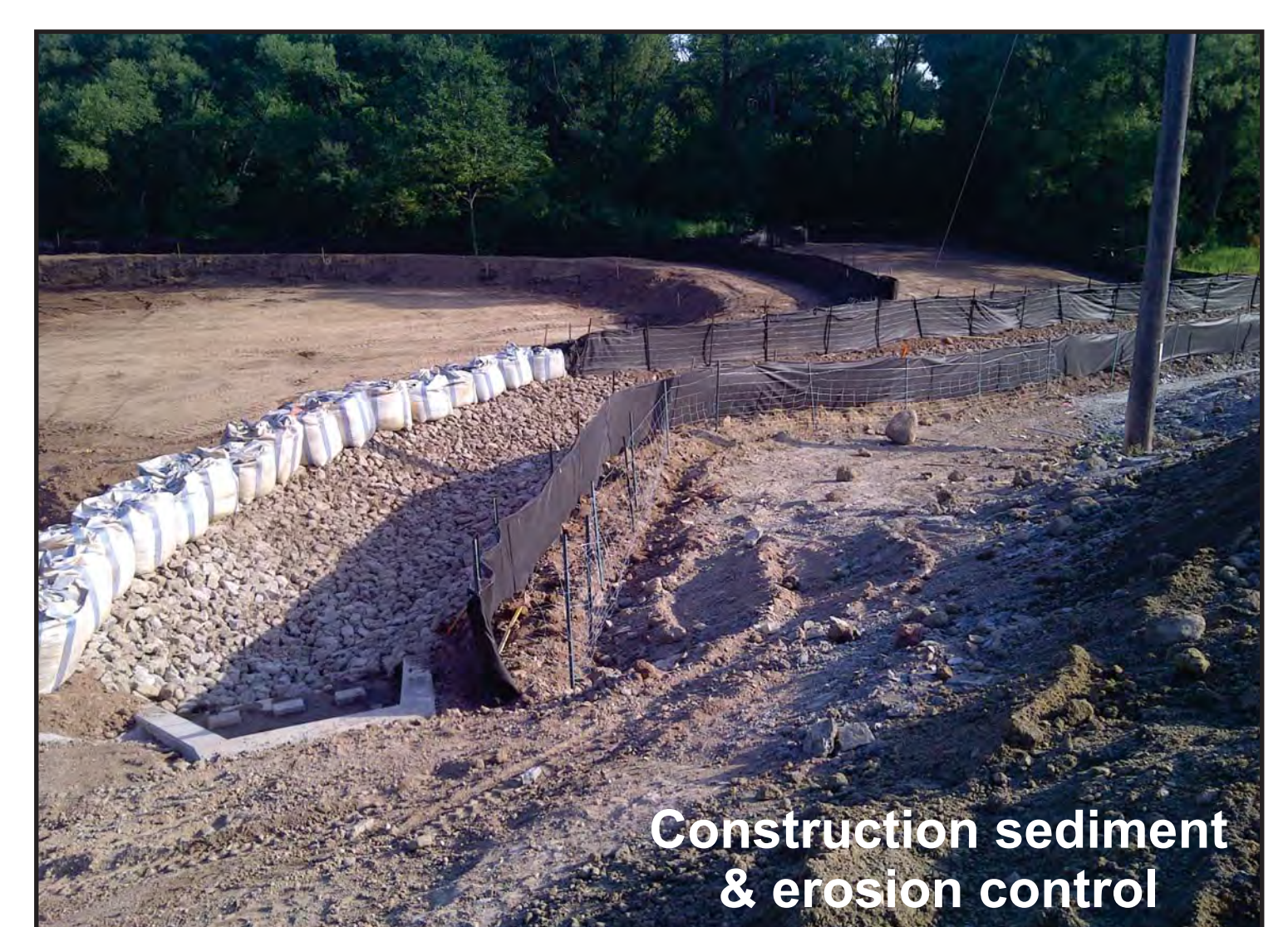
This includes infrastructure optimization (storm sewer flushing, catch basin cleaning), street cleaning, leaf clearing and removal, erosion and sediment controls for construction, and public/business education and awareness.



Street sweeping



Leaf build-up & public education



Construction sediment & erosion control

City of Kitchener Integrated Stormwater Management Master Plan

- Evaluation Criteria-

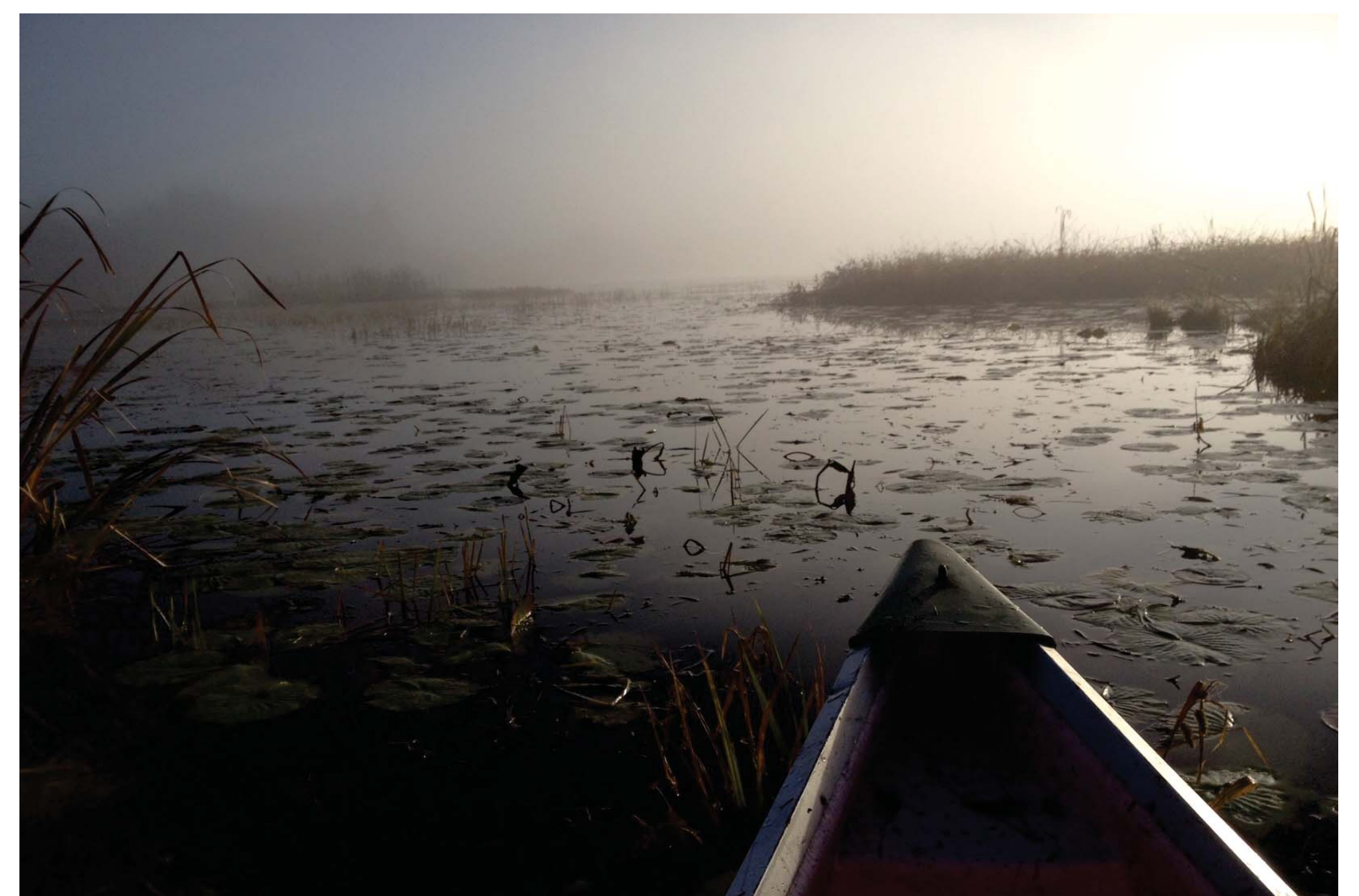
Physical & natural environment criteria

- Water Quality
- Stream Geomorphology
- Aquatic Habitat
 - Fisheries
 - Wildlife
- Groundwater Resources



Social & cultural criteria

- Visual Aesthetics
- Recreational Opportunities
- Cultural/Heritage Resources
- Health & Safety



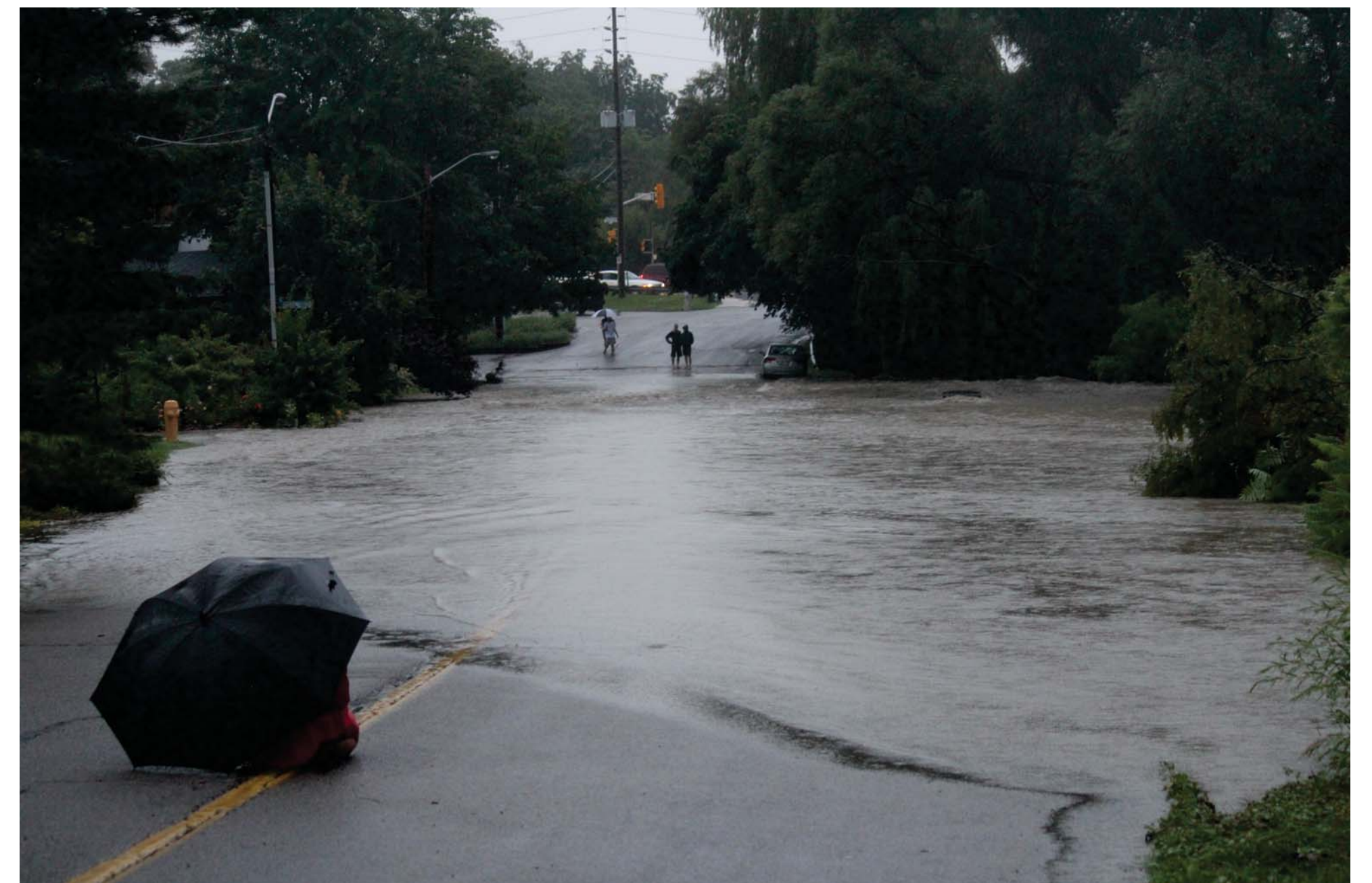
Economic criteria

- Capital Costs
- Operations & Maintenance Cost
- Lifecycle Costs
- Ability to coordinate with other projects



Technical & engineering criteria

- Flood Control
- Erosion Control
- Ease of Implementation
- Operations & Maintenance



City of Kitchener Integrated Stormwater Management Master Plan

- Next Steps & Contact Information -

Stage 2 – Development of the Master Plan

1. Undertake field activities;
2. Complete social marketing research;
3. Finalize the alternative stormwater measures and practices;
4. Undertake an environmental evaluation and screening process to determine feasible alternatives and priority;
5. Development of a short list of stormwater measures and practices;
6. Present to public at public open house
7. Development and assessment of alternative strategies
8. Recommendation of stormwater management strategy measures.

Stage 3 – Description of the Master Plan

1. Developing of an implementation plan



King Street, Kitchener, ON

Mr. Nick Gollan, CET

Project Manager

City of Kitchener

Telephone: 519 741 2200 Extension 7422

Email: nick.gollan@kitchener.ca

Mr. Chris Denich, M.Sc., P.Eng

Project Engineer

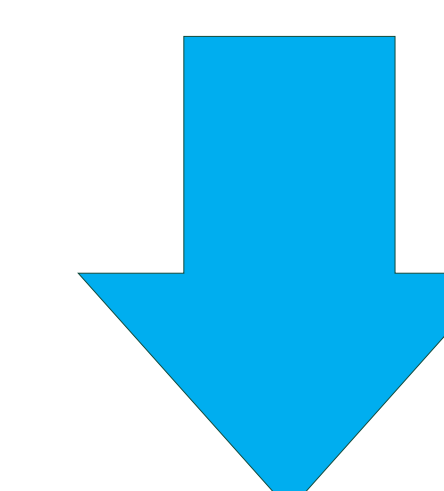
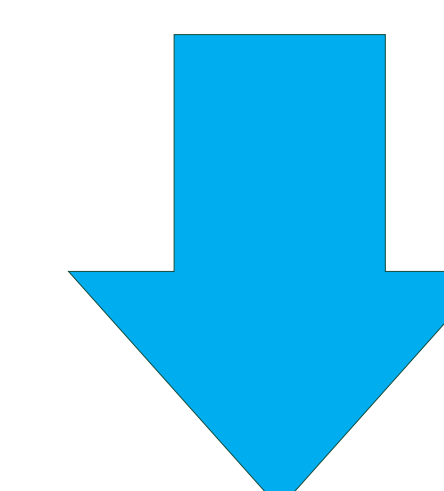
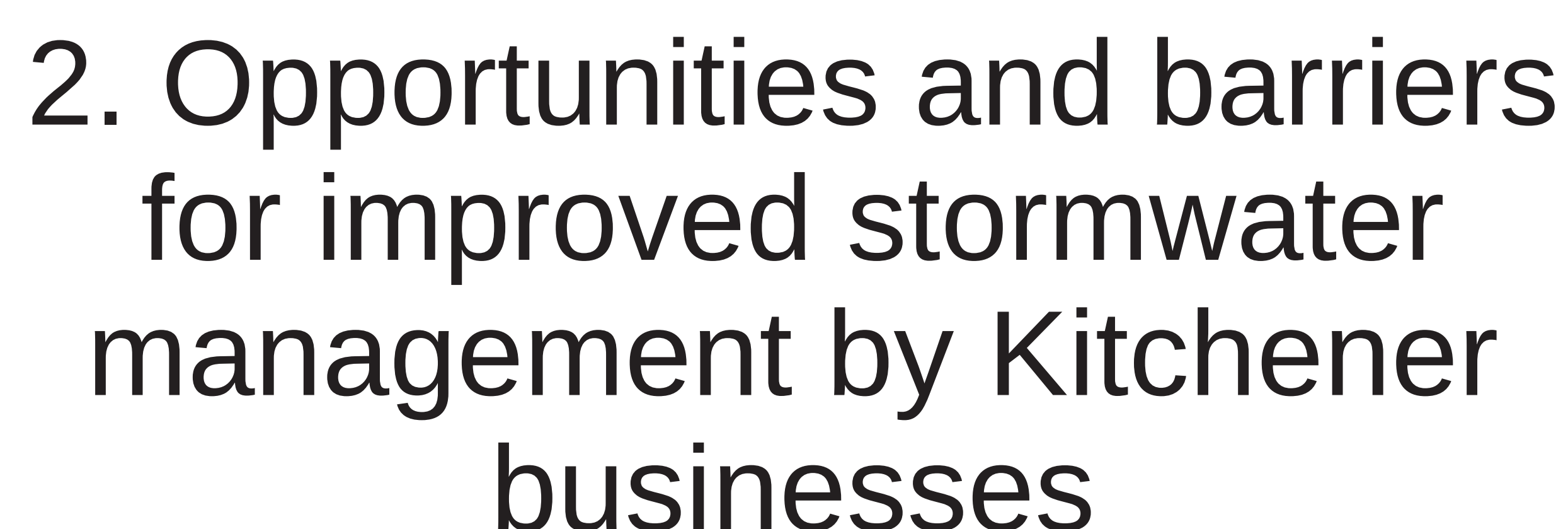
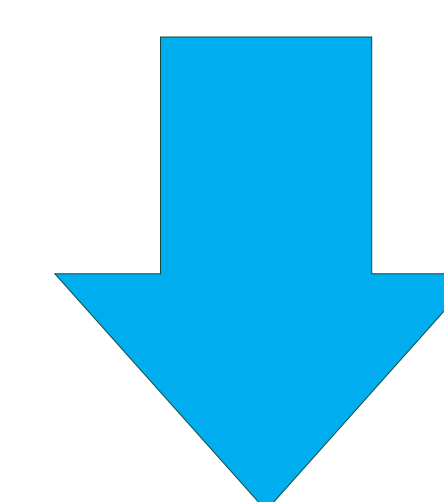
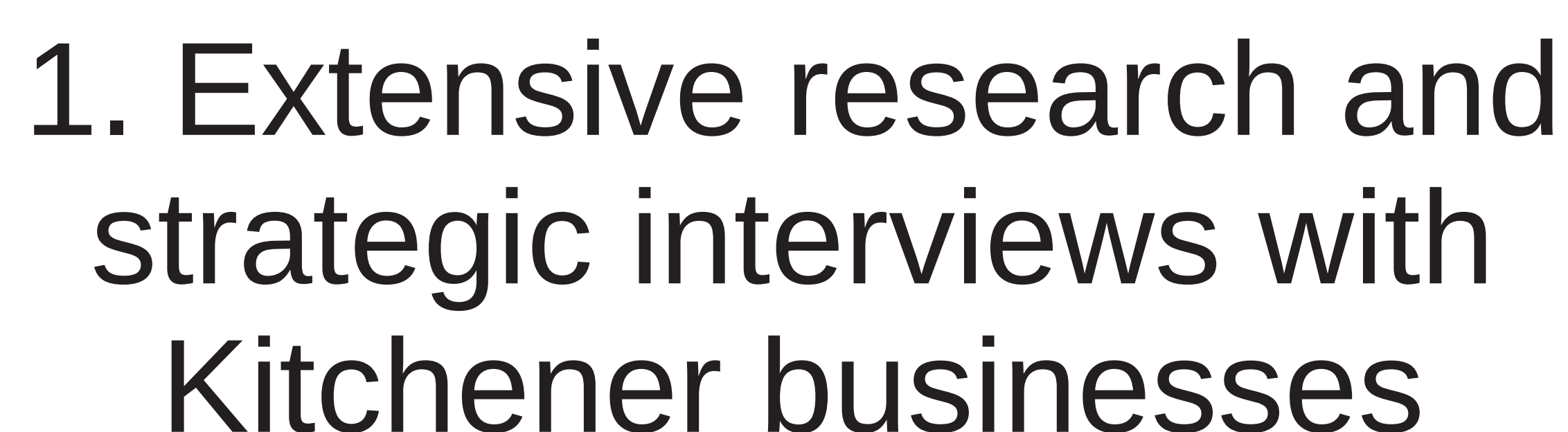
Aquafor Beech Limited

Telephone: (519) 224-3740, Extension 1236

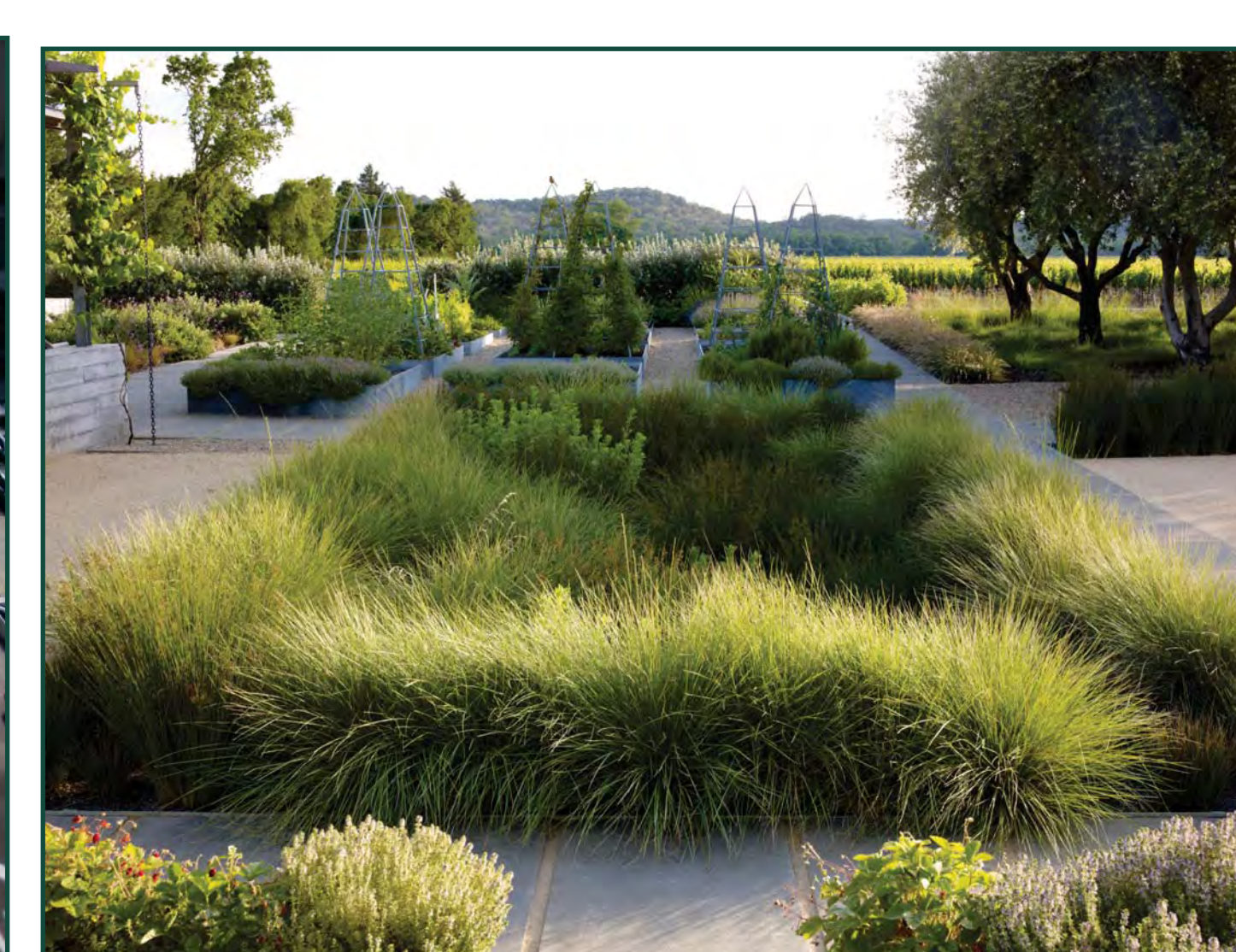
Email: denich.c@aquaforbeech.com

Thank you for participating



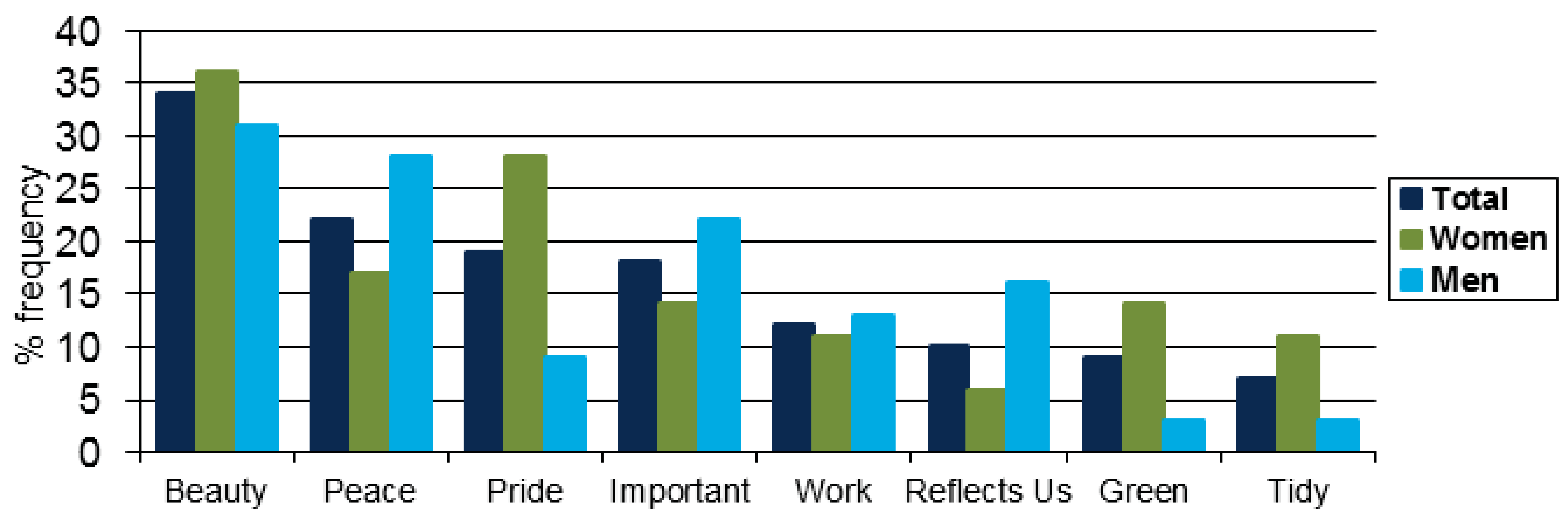


4. Preferred options



RESEARCH WITH KITCHENER RESIDENTS

Ideas and input from Kitchener residents & stakeholders



Residents drawing of an "ideal" landscape for their home



Residents drawing of a "naturescape" landscape for their home

