



STAFF REPORT Growth Management

Title: Flood Plain Mapping Updates for the Laurel/Clair Special Policy Area

Report Number: IPPW2015-093

Author: Robyn McMullen

Meeting Type: Council Meeting

Council/Committee Date: September 28, 2015

File: PS-15-05

Attachments: Appendix A – Terms of Reference for updating the flood plain mapping for the Laurel/Clair Special Policy Area

Ward No.: 4 – Northeast Ward, 5 – Southeast Ward, 6 – Central-Columbia ward and 7 – Uptown Ward

Recommendation:

1. That IPPW2015-093 be approved.
2. That the Terms of Reference for updating the flood plain mapping for the Laurel/Clair Special Policy Area be approved.
3. That the development of a Request for Proposals for consulting services be authorized.
4. That Council approve capital funding for the Flood Plain Mapping and Policy Updates project in the amount of \$155,000, funded \$16,000 from the Capital Reserve Fund and \$139,000 from the Development Charges Reserve Fund, as approved in the 2015 Capital Budget (Ref #709).

A. Executive Summary

Special Policy Areas (SPA) were established by the Province in limited circumstances beginning in the 1980s. They correspond to existing built up areas that historically existed in the flood plain and are intended to provide for continued viability of existing uses and address the significant social and economic hardships that would result from strict adherence to Provincial policies concerning development. SPAs are not intended to allow for new or intensified development if a community has feasible opportunities for development outside the flood plain.

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The City of Waterloo has one SPA, known as the Laurel/Clair SPA. The SPA was approved in 1990, with the modeling and mapping dating back to 1986. Significant advancements have been made since then in terms of technology and software. Incremental change has also occurred on the ground. Given this, along with the need for certainty around development potential in the core area of the City, particularly where the SPA overlaps the provincially-designated Urban Growth Centre, staff are proposing a review of the SPA boundaries and policies. To facilitate that review, updated flood plain mapping is needed. The updated flood plain mapping would constitute Phase 1 of the project, with the review of the SPA boundaries and policies making up Phase 2. This report outlines the specifics of Phase 1, including a Terms of Reference. A separate report and Terms of Reference for Phase 2 would be brought to Council at a future date.

Building on the proposal to update the flood plain mapping for the Laurel/Clair SPA, staff are interested in investigating Federal funding to facilitate additional flood plain mapping updates in the City. Therefore, this report also describes the funding program.

B. Financial Implications

The approved 2015 Capital Budget funding (Ref#709) of \$155,000, funded \$16,000 from the Capital Reserve Fund and \$139,000 from the Development Charges Reserve Fund, is being requested via this report.

C. Technology Implications

None.

D. Legal Considerations

Staff did not seek legal advice.

E. Link to Strategic Plan

(Strategic Priorities: Multi-modal Transportation, Infrastructure Renewal, Strong Community, Environmental Leadership, Corporate Excellence, Economic Development)

Updating the flood plain mapping for the Laurel/Clair Special Policy Area supports the Environmental Leadership objective of advancing the Laurel Creek Watershed Study and the Economic Development objective of continuing a growth management approach that encourages infilling, redevelopment and adaptive re-use.

F. Previous Reports on this Topic

PR 89-61 and PR 85-82.

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G. Approvals

Name	Signature	Date
Author: Robyn McMullen		
Director: Scott Nevin		
Commissioner: Cameron Rapp		
Finance: Michael Pugliese		

CAO



Flood Plain Mapping Updates for the Laurel/Clair Special Policy Area IPPW2015-093

BACKGROUND AND OVERVIEW

The Province sets the standards for delineating flood plain limits. In the Grand River watershed, flood plain limits are based on the greater of Hurricane Hazel or the 100-year event. Flood lines are modelled and mapped by engineers using detailed calculations, including how much water comes off the landscape (hydrology) and how the water moves across the landscape (hydraulics). For policy purposes, flood plains are divided into three categories:

1. One Zone Policy Area – This is the most restrictive category and it captures most of the flood plain areas in the City of Waterloo. In these areas, the entire flood plain is considered the floodway and new development is generally prohibited.
2. Two Zone Policy Area – There is a moderate level of permissiveness associated with this category. The flood plain is divided in two parts: floodway and flood fringe. New development is generally prohibited in the floodway. Some development, with restrictions, is permitted in the flood fringe. The flood fringe is the outer portion of the flood plain where the depth and speed of flood water is less than the floodway, therefore posing less of a threat to people and property.
3. Special Policy Area – This is the most permissive category. As defined in the Provincial Policy Statement, a Special Policy Area (SPA) is an area within a community that has historically existed in the flood plain where site-specific policies, approved by both the Ministers of Natural Resources and Forestry and Municipal Affairs and Housing, are intended to provide for the continued viability of existing uses (which are generally on a small scale) and address the significant social and economic hardships to the community that would result from strict adherence to Provincial policies concerning development. The criteria and procedures for approval are established by the Province. A SPA is not intended to allow for new or intensified development and site alteration, if a community has feasible opportunities for development outside the flood plain.

SPAs were established by the Province in limited circumstances beginning in the 1980s. The City of Waterloo has one SPA, known as the Laurel/Clair SPA (shown on page 6). It was established through an Official Plan Amendment and By-law 89-110, and formally approved by the Ministry of Natural Resources in 1989 and the Region of Waterloo, as the Ministry of Municipal Affairs and Housing's delegate, in 1990.

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While the SPA was ultimately approved in 1990, the modeling and mapping used to establish it dates back to 1986. Significant advancements have been made since then in terms of technology and software. There have also been incremental on-the-ground changes. Given this, along with the need for certainty around development potential in the core area of the City, particularly where the SPA overlaps with the Provincially-designated Urban Growth Centre, staff are proposing a review of the SPA boundaries and policies. To facilitate that review, updated flood plain mapping is needed.

The updated flood plain mapping would constitute Phase 1 of the project, with the review of the SPA making up Phase 2. This report outlines the specifics of Phase 1 – the flood plain mapping updates, including a Terms of Reference for undertaking the work (Appendix A). A separate report and Terms of Reference for Phase 2 – the SPA review, would be brought to Council at a future date.

With respect to what Phase 2 would entail, as previously noted, the procedures for reviewing a SPA are set by the Province. The two main components are a Flood Risk Assessment and a SPA Justification Report:

1. Flood Risk Assessment – The Flood Risk Assessment would bring together all relevant technical information related to flood risk, including updated flood lines and details on flood depths, flood flow velocities, flood plain extent, and opportunities for remedial works.
2. SPA Justification Report – The SPA Justification Report would take the results of the Flood Risk Assessment and make recommendations about proposed changes to the SPA boundaries and policies. Any proposed changes would need to be justified in terms of how they achieve the goal of limiting risk to public health and safety and property damage.

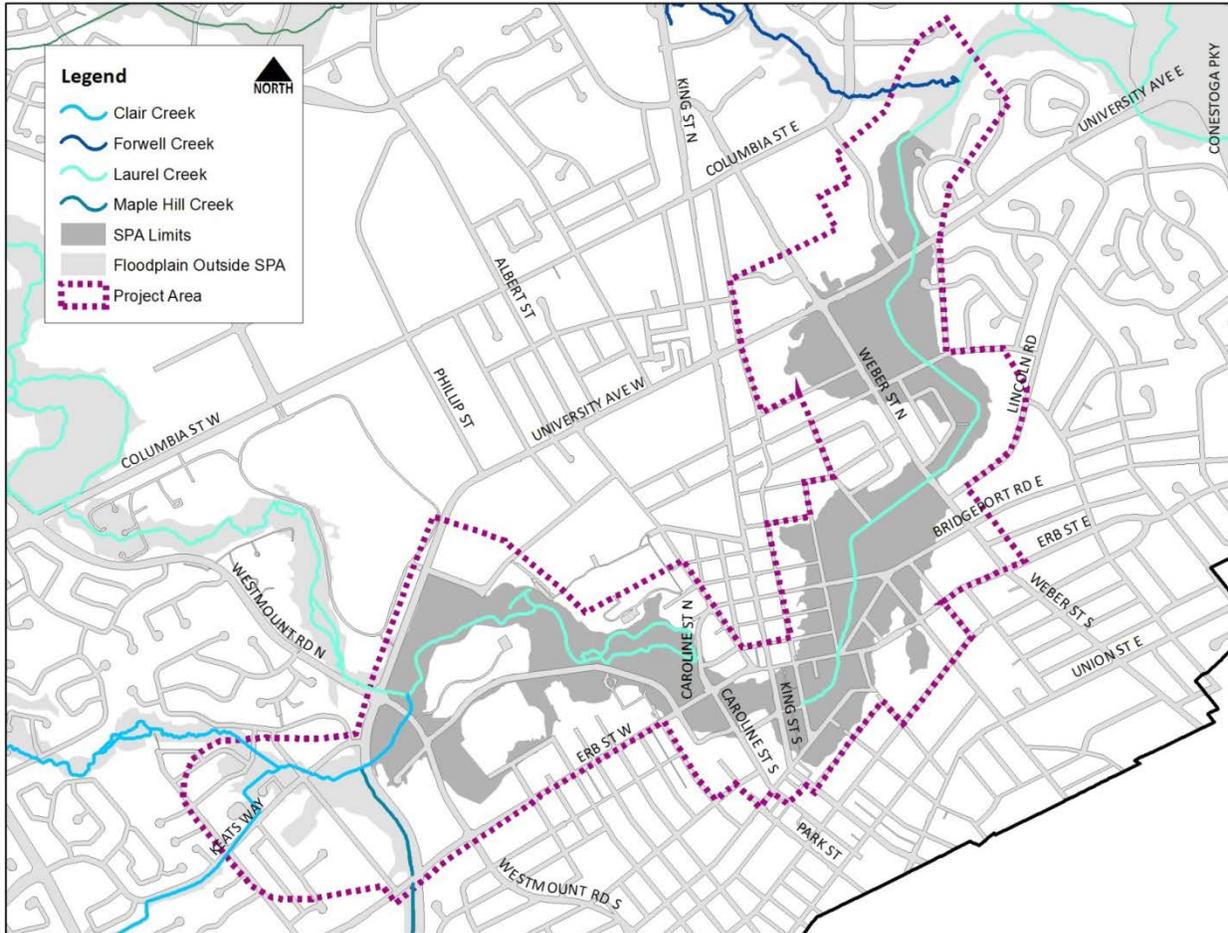
A SPA review is a technical planning process with land use implications for property owners, business owners, residents, and government agencies. The complex nature, level of collaboration, and amount of data required to complete the review would necessitate involvement from a diverse group of City staff (planners, engineers, building officials, emergency services), Regional staff, Provincial staff, Grand River Conservation Authority (GRCA) staff, and stakeholders. Phase 2 would begin with Council's approval of a Terms of Reference, following the completion of Phase 1. With Phase 1 being a prerequisite for Phase 2, the remainder of this report is focused on Phase 1.

PROJECT TEAM

This project would be done in collaboration with the GRCA. It would be administered by the City of Waterloo, with a Project Team comprised of a Consultant, the City of Waterloo project manager and support staff, and the GRCA project manager and support staff.

PROJECT AREA

The SPA currently extends from the Clair Creek and Laurel Creek crossing of University Avenue West to approximately 475 metres downstream of the Laurel Creek crossing of University Avenue East. Recognizing the flood plain continues beyond the boundaries of the SPA, and that consideration would have to be given to the interface that exists both upstream and downstream of the SPA, the Project Area would include lands beyond the SPA boundaries. Both the SPA limits and the Project Area are shown below.



SCOPE OF WORK

The scope of work that would need to be undertaken to update the flood plain mapping for the SPA includes the following:

Preparation of base mapping – LiDAR (Light Detection and Ranging) data, which was obtained through optical remote sensing technology as a highly accurate method of capturing 3D data, would be used with stream and water crossing surveys to create a Digital Elevation Model.

Development of hydrologic models – Hydrologic models would be developed to determine flow rates (how much and how quickly water comes off the landscape and through the creek system).

Development of hydraulic models – Hydraulic models would be developed to determine flow characteristics (flood elevations, extent of flooding, velocities, etc.).

Preparation of flood plain mapping – Mapping for the Regulatory Storm (Hurricane Hazel) and other select storm events would be prepared. Mapping and digital outputs would include flood limits, depths, velocities, elevations, and a time series of select events to inform a future risk assessment.

Modelling reach-based hydraulic scenarios – The Project Area would be divided into seven “reaches” for the purposes of investigating and reporting on flood risk and opportunities. Model scenarios would be developed and could include items such as the existing floodway, infrastructure improvement opportunities, revisions to development blocks, and flood mitigation measures.

Report preparation – A report would be prepared to document methodology and characterize flooding conditions.

Stakeholder consultation – To ensure public awareness and provide opportunities for input and dialogue, three Public Information Centres (PIC) would be held. The first PIC would be held shortly after the project is initiated, to display existing flood plain mapping and outline the purpose and scope of this project. The second PIC would be held to present draft mapping. The third PIC would present the final updated flood plain mapping prior to it being taken to City of Waterloo Council and GRCA General Membership, and potentially the Province, for endorsement.

This scope of work has been incorporated into a Terms of Reference for the project. The Terms of Reference is included as Appendix A. If Council approves the Terms of Reference, it will be used to form the basis of a Request for Proposal document.

PROJECT TIMING

The flood plain mapping updates would take approximately nine months to complete.

POTENTIAL OUTCOMES

The flood plain mapping produced through this project would be based on significantly more sophisticated technology and software than was used in 1986 when the flood lines were originally delineated for the SPA. As a result, the flood lines would likely change. This project would not “create” flood plain but rather update the mapping of it; the flood plain of a creek exists whether or not it is shown on a map.

The City has the responsibility, in coordination with the GRCA and the Province, to ensure land within the flood plain is managed in accordance with City, Conservation

Authority and Provincial policies. A key component of flood plain management is managing the risk to life and property. With updated, more accurate mapping, we would be in a better position to manage that risk.

CONSIDERATION OF CLIMATE CHANGE

Climate change will result in an increased frequency and severity of extreme weather events. Accordingly, the implications of climate change were considered in this project. As set through Provincial regulation, flood plain limits are based on a rainfall distribution patterned after Hurricane Hazel. A description of Hurricane Hazel is provided below along with descriptions of two other recent Ontario-based storms.

Hurricane Hazel (October 1954) – Instead of dissipating, Hurricane Hazel rapidly re-intensified when it reached southern Ontario on October 15, 1954. Wind speeds reached 110 kilometres per hour and 285 millimetres (11.22 inches) of rain fell in 48 hours. Bridges and streets were washed out, homes were washed into Lake Ontario, and 81 people were killed.

Peterborough Thunderstorms (July 2004) – On July 15, 2004, severe thunderstorms produced 190 millimetres of rain in the Peterborough area over approximately 12 hours. The storm caused extensive damage to public and private properties. According to reports, most of the 150 millimetres (5.9 inches) of rain fell in a 4 to 5 hour period in the early morning.

Greater Toronto Area Severe Rainfall (August 2005) – On August 19, 2005, the interaction of a passing weather front with the air of Lake Ontario created a series of extremely intense thunderstorms centered over the Highway 401 to Highway 7 corridor. Rainfall amounts of 100 to 150 millimetres (3.9 to 5.9 inches) were generally recorded between 3:15 and 4:15 p.m., exceeding any previous recordings for a one hour storm in the area. Most major street interchanges were flooded in excess of one metre and a portion of Finch Avenue was washed away.

In considering climate change, the issue at hand is the need to incorporate appropriate margins of safety. For the three examples given, there is considerable variation in rainfall amounts and storm duration. On the country-wide scale, the National Flood Plain Mapping Framework is recommending the use of the 1:350 year storm as the minimum standard to map flood plain extent. Hurricane Hazel exceeds this standard, as estimates of the occurrence interval for Hurricane Hazel are between 1:500 and 1:1000 years.

Given the sheer magnitude of Hurricane Hazel, coupled with the fact that it remains the Provincially-mandated Regulatory Storm, City and GRCA staff are of the opinion that updating the mapping based on the Hurricane Hazel standard incorporates a sufficient margin of safety to address climate change at this time.

FEDERAL FUNDING PROGRAM

Building on this proposal to update the flood plain mapping for the Laurel/Clair SPA, staff are interested in investigating Federal funding to facilitate additional flood plain mapping updates in the City. The Federal program, known as the National Disaster Mitigation Program (NDMP), was established to reduce the impacts of natural disasters on Canadians.

Under the NDMP, Provincial and Territorial governments are the eligible recipients for funding. However, they may redistribute funding to eligible entities, such as municipalities and Conservation Authorities. Through the NDMP, the Federal government will cost-share project costs of up to 50 per cent. The Province has confirmed it does not have any funding to put towards cost sharing for 2015-2016. Given this, municipalities and Conservation Authorities are encouraged to collaborate to determine if they have eligible projects, including their own sources of matching funds.

Staff anticipate an application intake to be announced this fall. In the event of a funding opportunity, staff will investigate and apply, as appropriate.

NEXT STEPS

Should Council approve the Terms of Reference for updating the flood plain mapping for the Laurel/Clair SPA (Appendix A), staff will prepare a Request for Proposal document for consulting services. Staff will also investigate funding opportunities under the NDMP.

APPENDIX A – TERMS OF REFERENCE FOR UPDATING THE FLOOD PLAIN MAPPING FOR THE LAUREL/CLAIR SPECIAL POLICY AREA

This Terms of Reference sets out the process by which the City will update the flood plain mapping for the Laurel/Clair Special Policy Area (SPA).

1.0 Introduction

The SPA extends from the Clair Creek and Laurel Creek crossing of University Avenue West to approximately 475 metres downstream of the Laurel Creek crossing of University Avenue East. The completion of updated flood plain mapping will involve the preparation of base mapping, including the processing of LiDAR and survey data to develop a Digital Elevation Model (DEM), the development of hydrologic models, the development of hydraulic models, the preparation of flood plain mapping for select return period and regulatory events, the modelling of reach-based hydraulic scenarios, report preparation, and stakeholder consultation.

2.0 Background

SPAs were established by the Province in limited circumstances beginning in the 1980s. The designation recognizes existing built up areas that have historically existed in the flood plain and is intended to provide for continued viability of existing uses and address the significant social and economic hardships that would result from strict adherence to Provincial policies concerning development.

The City of Waterloo has one SPA, known as the Laurel/Clair SPA. It was established through an Official Plan Amendment and By-law 89-110, and formally approved by the Ministry of Natural Resources in 1989 and the Region of Waterloo, as the Ministry of Municipal Affairs and Housing's delegate, in 1990.

The City of Waterloo will be undertaking a review of the SPA boundaries and policies. The review will be done in accordance with the Ministry of Natural Resources' Procedures for Approval of New SPAs and Modifications to Existing SPAs under the Provincial Policy Statement, 2005, Policy 3.1.3 – Natural Hazards – Special Policy Areas (2009). To facilitate this review, updated flood plain mapping is needed.

3.0 Project Team

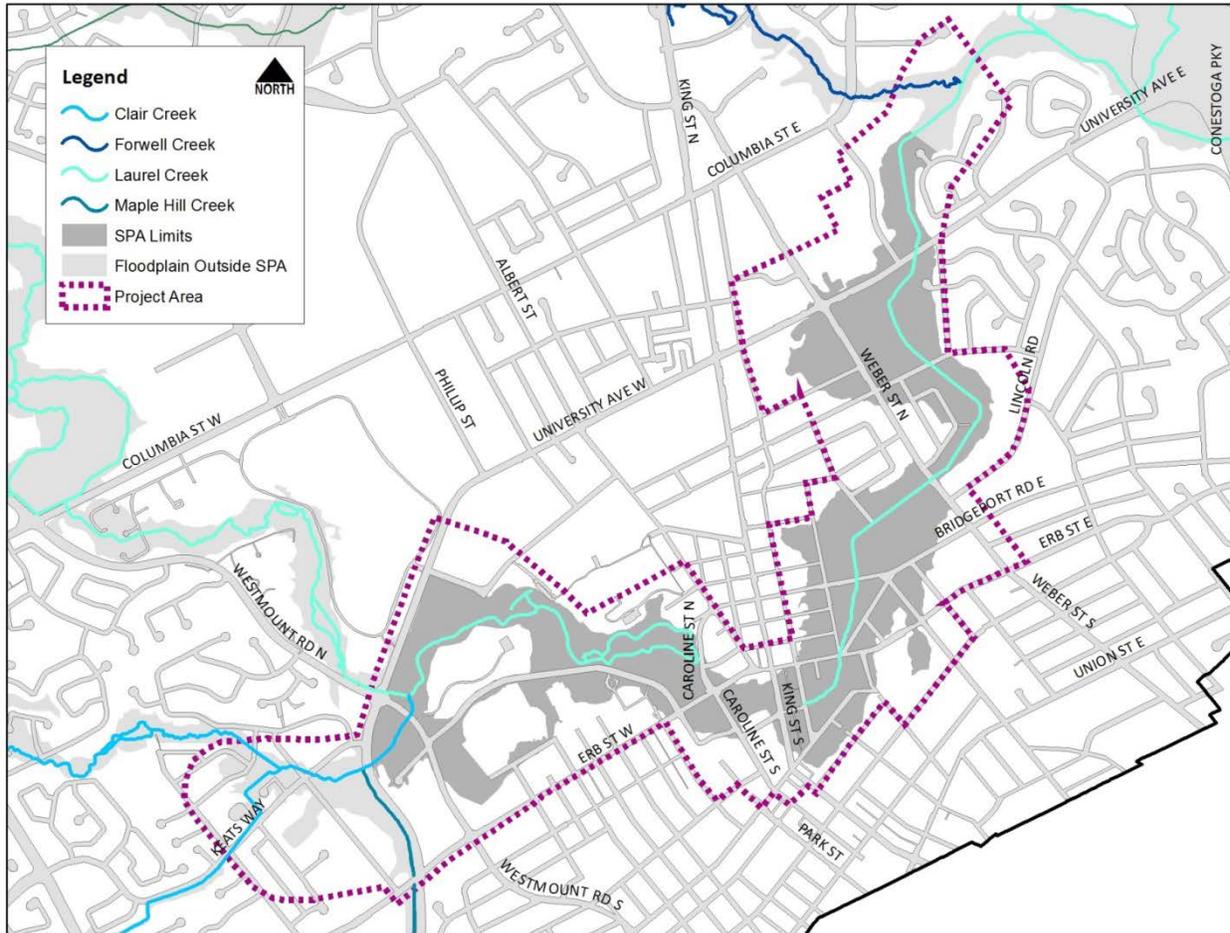
The project will be administered by the City of Waterloo. The Project Team will include a Consultant, the City of Waterloo project manager and support staff, and the Grand River Conservation Authority (GRCA) project manager and support staff.

4.0 Project Area

The SPA currently extends from the Clair Creek and Laurel Creek crossing of University Avenue West to approximately 475 metres downstream of the Laurel Creek crossing of University Avenue East. Recognizing the flood plain extends beyond the boundaries of the SPA, and that consideration must be given to the interface that exists both upstream and downstream of the SPA, the Project Area extends from Forwell Creek to Clair

Creek (main and south branch confluence) and Maple Hill Creek, as shown on Figure 1. The watercourse length through the Project Area is approximately 6 km and contains some 16 public and private road crossings, 2 rail crossings, 5 walkway bridges and an approximate 500 m long culvert under Uptown Waterloo.

Figure 1 – SPA Limits and Project Area



5.0 Scope of Work

The scope of work will include:

Preparation of base mapping – The City was flown with LiDAR (an optical remote sensing technology and highly accurate method of capturing 3D data) in Fall 2014. The LiDAR data will be used along with stream and water crossing surveys to create a Digital Elevation Model.

Development of hydrologic models – Hydrologic models will be developed to determine flow rates (how much and how quickly water comes off the landscape and through the creek system).

Development of hydraulic models – Hydraulic models will be developed to determine flow characteristics (flood elevations, extent of flooding, velocities, etc.).

Preparation of flood plain mapping – Mapping for the Regulatory Storm and select return period events will be prepared. Mapping and digital outputs will include flood limits, depths, velocities, elevations and a time series of select events to inform a future risk assessment. This work is also intended to improve current implementation difficulties in identifying safe access limits.

Modelling reach-based hydraulic scenarios – The Project Area will be divided into seven reaches for the purposes of investigating and reporting on flood risk and opportunities. Model scenarios will be developed in consultation with the Project Team and input received from stakeholders. Scenarios could include items such as the existing floodway, infrastructure improvement opportunities, revisions to development blocks, and flood mitigation measures.

Report preparation – A report will be prepared to document methodology and characterize flooding conditions.

Stakeholder consultation – Although this work is very technical in nature, stakeholder consultation will be very important to the success of this project; ensuring public awareness will be imperative. To ensure public awareness and provide opportunities for input and dialogue, three Public Information Centres (PIC) will be held. The first PIC will be held shortly after the project is initiated, to display existing flood plain mapping and outline the purpose and scope of this project. The second PIC will be held to present draft mapping. The third PIC will be held to present the final updated flood plain mapping prior to it being taken to City of Waterloo Council and GRCA General Membership, and potentially the Province, for endorsement.

6.0 Project Management

A Project Management Plan will be created to define how the project will be executed. Major milestones will include:

- Project Initiation Meeting
- PIC #1
- Completion of base mapping and models
- Draft flood plain mapping
- PIC #2
- Draft Report
- PIC #3
- Report to City of Waterloo Council and GRCA General Membership

As the administrator of the project, the City of Waterloo's responsibilities will be as follows:

- Act as project administrator
- Provide any existing City of Waterloo information that is available

- Attend meetings as required to direct and guide the project
- Maintain stakeholder mailing lists
- Prepare and publish all advertisements and distribute all information notices
- Provide location for PICs
- Participate at PICs
- Authorize and process payments to the consultant
- Report to City of Waterloo Council

As the technical lead for the project, the GRCA's responsibilities are as follows:

- Provide any existing GRCA information that is available
- Attend meetings as required to guide the project
- Review and approve DEM, hydrology modelling, hydraulic modelling
- Maintain models
- Participate at PICs
- Report to General Membership

7.0 Timing

This project is anticipated to begin in November 2015 and take approximately 9 months to complete.