CITY OF VAUGHAN

CLASS ENVIRONMENTAL ASSESSMENT

STUDY FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

NOTICE OF COMPLETION

In 2009, the City of Vaughan initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). The objective of the study was to review alternatives for establishing a flood control facility within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park. The study was completed as a 'Schedule B' project in compliance with the Municipal Engineers Association document "*Municipal Class Environment Assessment*," (October 2000, amended 2007) which addresses Phases 1 and 2 of the Class EA process.

During the Class EA study, the project team identified a set of alternative solutions, evaluated the alternatives, and presented them to the Public and Agencies for comment at different times during the study. The preferred stormwater management solution as determined by the Class EA was to construct a "dry pond" within the park, south of the Gallanough Memorial Library.

As part of the Environmental Assessment (EA) studies, a Design Charrette was held on January 28, 2010 and a Public Information Centre (P.I.C.) on February 25, 2010. Based on input received from the Design Charrette and the P.I.C. as well as input from review agencies and other key stakeholders, the City of Vaughan and its consultant have prepared a Project File for this project.

The Project File outlines and documents the study that was conducted, including its purpose, process, conclusions, and the details of the preferred alternative. This Project File will be filed with the City of Vaughan for a 30 calendar day review period for the public commencing on November 18, 2010. The Project File can be reviewed at the following locations:

City of Vaughan, Engineering Department
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
Tel: 905-832-8525

Bathurst/Clark Resource Library
900 Clark Avenue West
Vaughan, ON L4J 8C1
Tel: 905-653-7323

A Project File will also be available for viewing from November 18, 2010, on the City's web page.

During the review period, the public will have the opportunity to review the Project File and provide any written comments or concerns to the Project Team members identified below until January 7, 2011. If any persons/party cannot resolve their conflicts with the City of Vaughan, they have the right to submit a Part II Order request to the Minister of the Environment. In the event of a Part II Order request, the Minister of the Environment will review the request, attempt to resolve any conflicts, and has the final ability to decide if an Individual Environment Assessment should be conducted for the project. This request must be submitted to the Minister ***prior to January 7, 2011*** and a copy shall also be sent to the City of Vaughan, at the addresses noted below. If there is no outstanding request received by the end of the review period, the City of Vaughan will be able to proceed with detailed design and implementation of the preferred alternative.

For further information on this project or if you wish to submit any concerns or comments, please contact:

Mr. Pat Marcantonio, C.E.T.
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Cole Engineering Group Ltd.
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Markham, ON L3R 4T5
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If you wish to submit a Part II Order request, please contact:

The Honourable John Wilkinson
Minister of the Environment
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, ON M7A 2T5
Tel: 416-314-6790
Fax: 416-314-7337

This notice was first published November 18, 2010.

Stormwater Management Facility within Gallanough Park Municipal Class EA




Project File

November 2010

VAUGHAN

Clarifica
Water Resources
A division of Cole Engineering Group Ltd.

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1.0 Introduction

In 2009, the City of Vaughan (the City) initiated a Schedule 'B' Municipal Class Environmental Assessment (Class EA) for constructing a Stormwater Management (SWM) Facility in Gallanough Park in Thornhill. The SWM Facility is proposed to assist in alleviating the flooding issue that exists for some residents in the Thornhill area, north of Gallanough Park. The Thornhill neighbourhood is located at the southwest corner of Yonge Street and Centre Street. The study area is illustrated in **Figure 1.** The Class EA will comprise of design alternatives for the SWM Facility in Gallanough Park and selection of a preferred alternative solution based on relevant evaluation criteria.

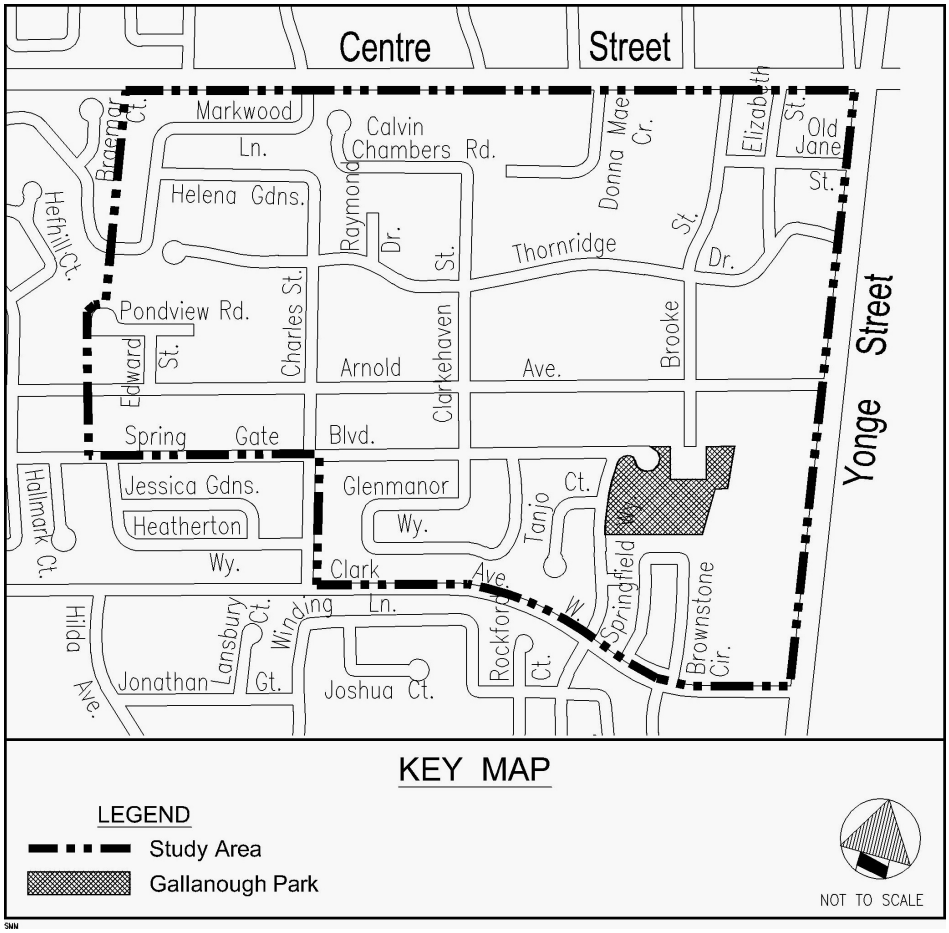


Figure 1. Study Area

1.1. Study Background

This Thornhill neighbourhood is part of the Thornhill Heritage Conservation District. It typically consists of older single family residential homes with some homes recently being redeveloped to larger homes. The City is in the process of reconstructing some local roads in the area and wishes to combine an effective SWM Plan with the proposed road works, where feasible.

Gallanough Park is approximately 2.16 ha in size and is located south of the east end of Spring Gate Boulevard and east of Springfield Way. The storm drainage pipe network which is bounded by Yonge Street to the east, Arnold Avenue to the north, Bathurst Street to the west, and CN railway to the south leads to Gallanough Park where it all drains to the 3.0 m diameter Brooke Street Trunk Sewer (Trunk Sewer). The total drainage area for the Trunk Sewer is 171 ha. The Trunk Sewer alignment starts in Gallanough Park and follows Brooke Street to a tributary to the Don River where it outlets. In addition to the drainage areas described above, two (2) ditch inlet connections from drainage courses #2 and #3 exists near Arnold Avenue and Brook Street intersection and a 2.1 m diameter storm sewer connection exists at the Centre Street and Brook Street intersection. **Figure 2** illustrates the drainage areas, the Trunk Sewer, and the three (3) drainage courses within the Thornhill Neighbourhood.

The Trunk Sewer is subject to significant surcharging. During major storm events there is surface flooding at Arnold Avenue and Brooke Street, and stormwater cannot enter into the Trunk Sewer as it is already surcharged. The majority of the flows in the Trunk Sewer originate from the drainage area runoff directed to Gallanough Park. The proposed SWM Facility in the Park would detain runoff and regulate the discharge rates into the Trunk Sewer to reduce surcharging of the Trunk Sewer. This would then allow for stormwater in the area to the north of Gallanough Park to be captured and conveyed through the Trunk Sewer. This Class EA will investigate and evaluate design options for the Gallanough Park SWM Facility.

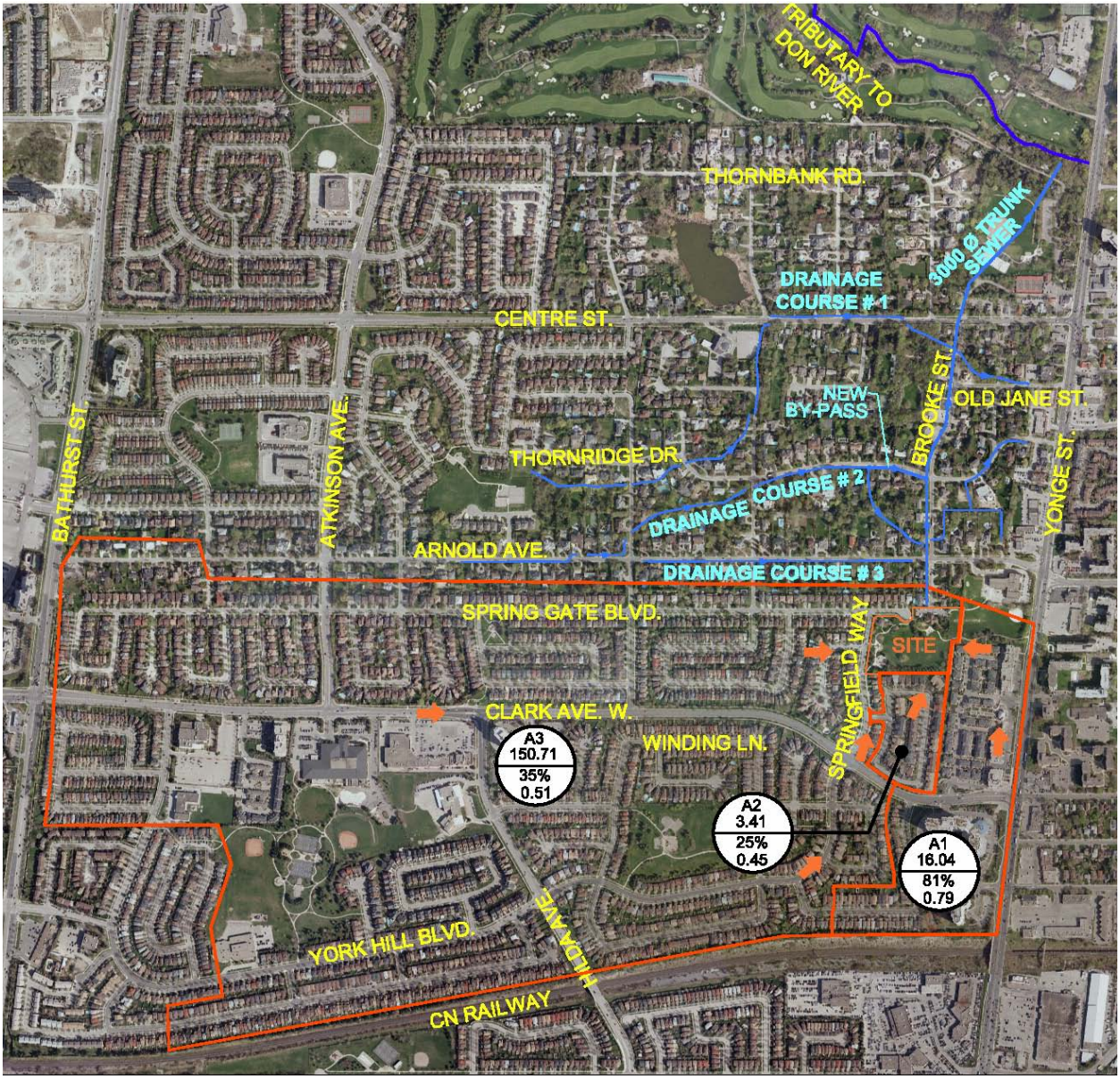


Figure 2: Drainage Area Plan

1.2. Previous Studies

Two (2) previous studies have investigated the flooding issue in the Thornhill Neighbourhood area and have identified the need for a SWM Facility in Gallanough Park as part of the solution. These studies include:

- Thornhill Storm Drainage Improvements Study Final Report – Stage 1 by Genivar, February 2008; and,
- Thornhill Area Road Reconstruction Stormwater Management Final Report by W.G. Clarke, P.Eng., May 2009.

In December 2006, the City retained an engineering consultant (Genivar) to undertake a storm drainage improvement study in the Thornhill area. The purpose of this study was to undertake a detailed investigation and assessment of the existing drainage infrastructure and to identify drainage system deficiencies. The Thornhill Storm Drainage Improvement Study followed the Schedule 'B' Municipal Class EA process. The most significant deficiency noted was the surcharging of the Brooke Street trunk storm sewer during major rainfall events. This study identified a number of alternatives, which would reduce or eliminate the risk of flooding in the Thornhill neighbourhood. The preliminary preferred alternative involved constructing a new SWM Facility in Gallanough Park.

The Thornhill Area Road Reconstruction SWM report (W.G. Clarke) is a component of the Thornhill Road Reconstruction Project. It presents the hydrologic and hydraulic analyses of the drainage systems and the calculations supporting the SNC-Lavalin Inc. design for drainage improvements associated with the road design works. The results of this study generally agree with the Thornhill Drainage Improvements Study and the drainage design work builds on the recommendations of the Thornhill Storm Drainage Improvement Study completed by Genivar. The Thornhill Relief sewer concept presented in this report is based on the prior construction of the Gallanough Park Pond to improve capacity in the Brooke Street trunk sewer.

1.3. Objectives of the Project

In 2009, the City retained Clarifica, a division of Cole Engineering Group Ltd. to design and evaluate alternative designs for the SWM Facility in Gallanough Park. The Study was undertaken in accordance with the Municipal Class EA Document (October 2003, amended in 2007) as described in **Section 2.0** and the Ontario Environmental Assessment Act.

The objectives of this project are to:

1. Reduce flooding potential to the residential properties located north of Gallanough Park that fronts onto Brooke Street, Thornridge Drive, and Arnold Avenue;
2. Reduce the risk to public safety;
3. Reduce the risk to surrounding properties; and,
4. Provide environmental benefits.

1.4. Purpose of the Project File

This Project File documents the planning and design process followed and conclusions reached for the Gallanough Park Enhancement Class EA Study. In accordance with the Municipal Class EA, the problems and opportunities associated with this study were investigated and documented. A Design Charrette was held with interested parties to obtain public input on the potential forms of the facility. Using the information gathered, a number of alternative solutions were identified and evaluated, leading to the selection of a preferred solution. This information was presented to stakeholders at a Public Information Centre (PIC). The Project File documents the EA process followed and is structured for ease of public review.

2.0 Planning Context and the EA Planning Process

2.1. Municipal Class EA

The Municipal Class EA (October 2003, as amended in 2007) planning and design process was followed for this project because it allows the City to meet the requirements of the Ontario Environmental Assessment Act (OEAA) for municipal infrastructure without having to either undertake an Individual EA or request a specific exemption for the project. The Class EA is a planning process approved under the OEAA for a class or group of undertakings including municipal infrastructure. Municipal projects included in the Class EA may be implemented without further approval under the OEAA, provided that the approved Class EA planning and design process is followed (refer to **Figure 3**).

2.1.1. Three (3) Project Schedules

Since projects undertaken by municipalities vary in their environmental effects, the Class EA classifies these projects into four (4) schedules according to their environmental significance:

Schedule 'A'

Projects are limited in scale, have minimal adverse effects and include the majority of municipal maintenance and operational activities. These projects are approved and may proceed directly to Phase Five for implementation without following the other phases.

Schedule 'A+'

Projects are limited in scale and have minimal adverse effects. These projects are approved and may proceed directly to Phase Five for implementation without following the other phases. However, the public is to be advised prior to project implementation though there is no ability for the public to request a Part II Order.

Schedule 'B'

Projects have the potential for some adverse environmental effects. The municipality is required to undertake a screening process (Phases One and Two) involving mandatory contact with directly affected public and relevant review agencies to ensure that they are aware of the project and that their concerns are addressed. Schedule 'B' projects require that a Project File report be prepared and submitted for review by the public and review agencies. If there are no outstanding concerns, then the municipality may proceed to Phase Five for implementation.

Schedule 'C'

Projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA Document (Phases One to Four). Schedule 'C' projects require that an Environmental Study Report be prepared and submitted for review by the public and review agencies. If there are no outstanding concerns, then the municipality may proceed to Phase Five for implementation.

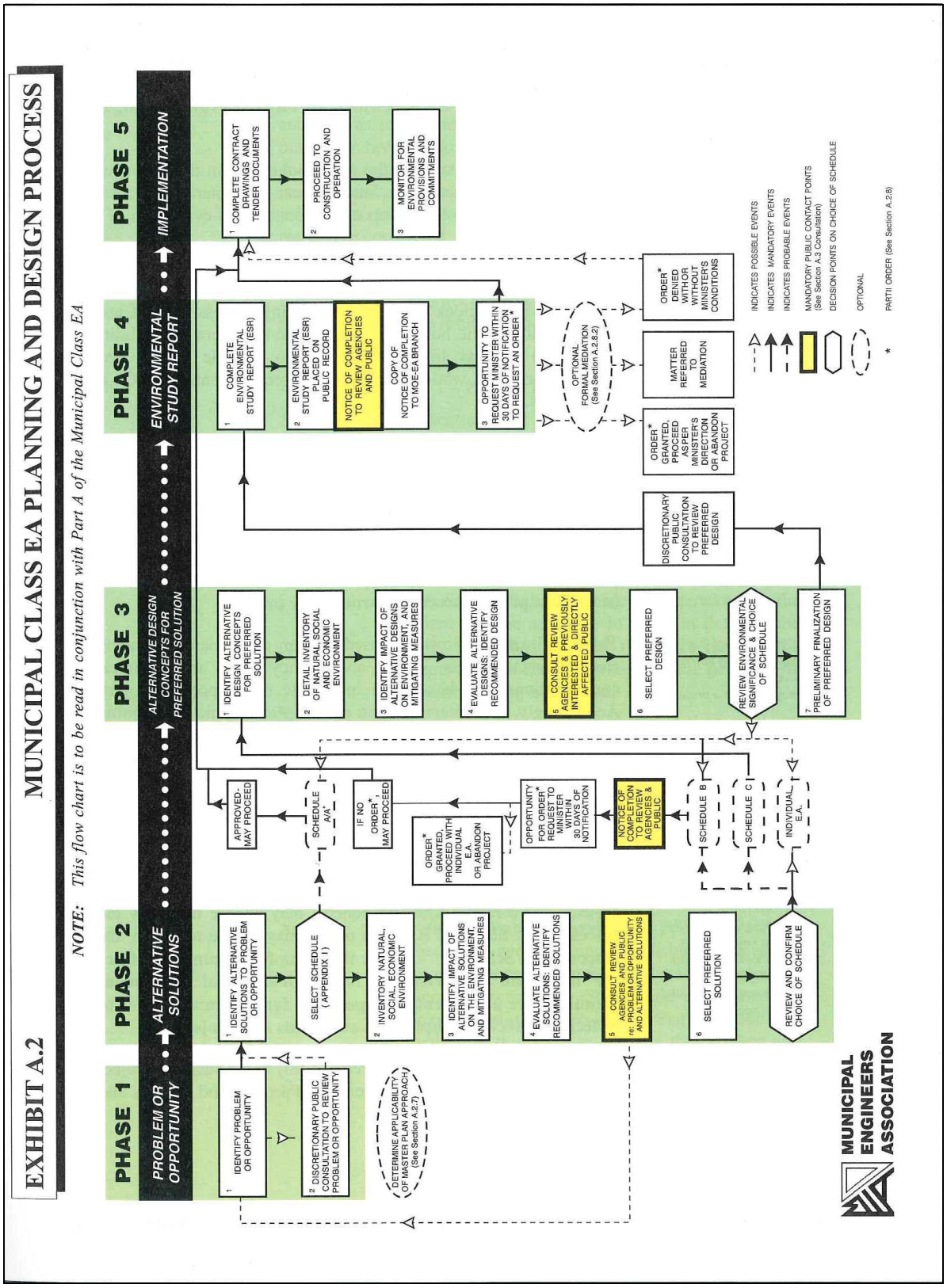


Figure 3. Municipal Class EA Process

2.1.2. Schedule 'B' Classification

Appendix 1 of the Municipal Class EA document identifies activities or projects subject to Schedule 'B' of the Class EA, including the following:

- *"3. Establish new storm water retention/detention ponds and appurtenances or infiltration systems including outfall to receiving water body."*

Since the Gallanough Park project involves establishing a new stormwater detention Pond, it is classified as a Schedule 'B' project.

2.1.3. Schedule 'B' EA Process

The following activities were carried out for this Study:

Phase One: Identify the Problem/Opportunity

This phase involves identifying the problem/opportunity to be addressed through the study and describing it in sufficient detail to lead to a clear problem/opportunity statement. Upon completion of the problem/opportunity statement, a Notice of Commencement is published to notify the public that the Class EA study has been initiated. This phase is described in **Section 3.0.**

Phase Two: Identify and Evaluate Alternative Solutions to the Problem/Opportunity

This phase involves six (6) steps:

1. Prepare a general inventory of the existing natural, and social environments in which the project is to occur (**Section 4.0**);
2. Identify reasonable alternative solutions to the problem/opportunity (**Section 5.0** and **Section 6.0**);
3. Identify the net positive and negative effects of each alternative solution, including mitigating measures (**Section 7.0**);
4. Evaluate the alternative solutions (**Section 7.7**);
5. Identify design and construction considerations (**Section 8.0**);
6. Consult with review agencies and the public to solicit comment and input (**Section 9.0**); and,
7. Select or confirm the preferred solution (**Section 7.8**).

Once completed, the Project File is placed on public record for a period of at least 30 calendar days to allow review agencies and the public an opportunity to review it. During this review period, concerned individuals have the right to raise and discuss issues prior to requesting a Part II Order before the project may proceed to implementation. A Part II Order requires an Individual EA to be carried out and submitted to the Minister of the Environment for review and

approval. The decision on whether the project should be subject to a Part II Order rests with the Minister of the Environment. Assuming there are no outstanding Part II Order requests, the Municipality is able to proceed to the final phase of the process once the review period has expired.

3.0 Problem/Opportunity Statement

3.1. Problem

The residential properties located north of Gallanough Park that front onto Brooke Street, Thornridge Drive, Clarkhaven Street, and Arnold Avenue have been frequently affected by flooding during heavy storms over the years. The City has investigated the drainage infrastructure in and around the affected area and has determined that flooding is partly caused by the surcharged Trunk Sewer along Brooke Street. Other causes are from deficient/deteriorated culverts and poor drainage practices resulting from residential re-development in the Thornhill Neighbourhood area.

3.2. Opportunity

The project presents an opportunity to provide social and environmental benefits. Through SWM implementation of Gallanough Park, improvements (reduction) in the risk of flooding can be realized. The reduced risk of flooding will benefit the safety of the public and private properties. The enhancement will include the latest SWM measures and Low Impact Development (LID) measures that will improve the drainage characteristics and result in reduced erosion potential of the receiving creeks and reduced pollution input to the environment.

4.0 Inventory of Existing Conditions

4.1. Natural Environment

A site visit to the Park was made on December 04, 2009. The site consists of mostly open grassed areas with concrete trails and large diameter trees along the perimeter. A large Willow Tree is situated in the middle of the field and will need to be preserved during design and construction. A tree inventory or soils testing program was not part of the scope of this project.

The Design Charrette (see **Section 5**) revealed more details about the natural environment at and around the site. Gallanough Park has a bowl like appearance and a depressed shape because it was initially designed as a water holding area. Residents revealed that the area along Springfield Way on west side of the Park is prone to frequent flooding due to the existing topography and previous modifications to the Park features. The drainage area (see **Figure 2**) has been modified over the years in a way that can potentially decrease infiltration. For example, larger homes have

replaced smaller existing homes, and drainage ditches and swales have been filled by residents to create swimming pools or increase construction area. Finally, a potential exists within the property limit for high groundwater levels at certain locations. Areas near the Thornhill Public School have been known to contain a water table close to the existing ground surface, for instance.

4.2. Social Environment

Based on a desktop review of the study area property fabric and ownership, the Park is on the City's property. The surrounding area consists mainly of single family residential properties and has direct access to the Park. A library and a public school are also located adjacent to the Park with direct access.

Gallanough Park is heavily used by surrounding residents in all seasons, including tobogganing in the winter, picnics, sports and camps in the summer, as well as for walking throughout the year. The Park's additional uses include those by the public library and school. A small soccer field is present in the area of the proposed Pond. The soccer field is uneven, and drains poorly after rainfalls.

Local residents indicated that socially undesirable uses of this site by youth after dusk include loitering, drug use, vandalism and alcohol consumption.

4.3. Existing Infrastructure

The Park is where the storm and sanitary sewer networks from the southern areas converge into the Brook Street Trunk Sewer. Three (3) sewer alignments feed into the Trunk Sewer from the west, south, and the east. The sizes and inverts of the storm sewers are summarized below:

- West: 2.1 m diameter concrete pipe with an approximate invert of 174 m;
- South: 0.6 m diameter concrete pipe with an approximate invert of 173.5 m; and,
- East: 1.5 m diameter concrete pipe with an approximate invert of 168 m.

The sanitary sewers range in sizes between 200 mm and 450 mm diameter and are located at a similar elevation to the storm sewers on all three (3) sides.

The 3.0 m diameter Trunk Sewer has an invert of 166.47 m at Chamber #9 where all the sewers converge. The sanitary sewer is located within the Trunk Sewer and is encased in concrete. The effective diameter of the Trunk Sewer is estimated at 2.7 m.

5.0 Design Charrette

Affected residents and concerned citizens were given an innovative opportunity to provide input in the decision making process through a one (1) day Design Charrette. This activity is not part of the formal Municipal EA process but the City embraces it as another opportunity to empower

the community members in generating potential solutions to an issue that directly affects them. This event was held at Thornhill Presbyterian Church on Thursday January 28, 2010. 13 community members and 4 City staff were present at this event along with the consultants and a facilitator.

The purpose of the Charrette was to facilitate open discussion of issues, challenges and opportunities for Gallanough Park's use as a SWM Facility in an engaging, co-operative and fair manner. After providing background information, describing the problem at hand and outlining the constraints, the attendees were asked to individually highlight their major concerns and opportunities to address them by filling out index cards. The most important issues for the residents were aesthetics, loss of park/green space, human health and spread of disease, cost, water table changes and ability to only mitigate instead of resolving the problem. The attendees subsequently identified a list of constraints, from both their and the City's point of view, which needed consideration in the development of any feasible design plan.

After the individual activities, the participants were divided into groups and given instructions as well as a package of resources to develop preliminary designs of the Park. The attendees came up with many creative solutions to the problem and an undivided consensus was evident for an underground storage facility despite its higher cost. All input received from the Charrette was given careful consideration by the Design Team and it guided the selection of alternatives to be considered, the alternative evaluation process, as well as the preliminary preferred solution for the Public Information Centre (PIC).

Please refer to **Appendix A** for the detailed proceedings from the Design Charrette.

6.0 Alternative Solutions

A range of alternative solutions were developed in order to address the identified problem and opportunity. These alternatives can be categorized as do nothing or establish a SWM Facility. The four (4) alternatives identified for evaluation are:

Alternative # 1	Do Nothing
Alternative # 2	Dry Pond - Implement SWM Facility with surface storage only
Alternative # 3	Underground Storage - Implement SWM Facility with underground storage only
Alternative # 4	Mix of Dry Pond and Underground Storage - Implement SWM Facility with a combination of underground and surface storage

Even though the "Do Nothing" alternative does not address the Problem/Opportunity Statement, the Class EA document mandates its consideration in all Class EAs as a means of providing a benchmark for evaluating the other alternative solutions. Detailed drawings of each of the proposed alternatives are provided in **Drawings A to D**. The following subsections briefly describe each of these alternative solutions.

6.1. Alternative # 1 – Do Nothing

The "Do Nothing" alternative would involve leaving the Gallanough Park in its current condition. As a result, the Trunk Sewer would surcharge and flood at Arnold Avenue and Brook Street intersection during any storm events greater than the 2-year storm frequency. Culvert and drainage course improvements within the Thornhill Neighbourhood area may reduce the extent of flooding. Plan and profile of Gallanough Park in its current condition is provided as **Drawing A**.

6.2. Alternative # 2 – Above Ground Stormwater Management

This alternative involves excavating the Park grounds lower to provide storage space for the detained stormwater. Approximately 0.45 ha of open space is available to be used for surface storage. The available area will be lowered by approximately 0.5 – 3.0 m to create a "dry pond" that would receive storm runoff and convey it to the Trunk Sewer. This alternative involves retrofitting the existing storm sewer network within the Park to include inlet/outlet control structures. Plan and profile of Alternative # 2 is provided as **Drawing B**.

The potential for a wet pond facility was briefly reviewed by the Project Team as a possible sub-option. The benefits of a wet pond would be potential improvements to water quality. However, a permanent pool of water would be required. Given the comments received at the Design Charrette, local residents were opposed to any standing water within the Park, given safety and mosquito concerns. The presence of a permanent pool would also preclude the use of the dry pond for any recreation when not use for water storage. This sub-option was therefore not carried forward for any further analysis.

6.3. Alternative # 3 – Underground Stormwater Management

This alternative involves installing a concrete, cast-in-place, underground tank structure to provide storage space for the detained stormwater. The open space in the Park would be raised about 0.5 – 1.5 m to cover up the underground tanks. This alternative involves retrofitting the existing storm sewer network within the Park to include inlet/outlet control structures. Plan and profile of Alternative # 3 is provided as **Drawing C**. As noted in **Section 4.1**, there is potential for presence of high groundwater levels in some areas of the Park. The depth of underground storage tank and subsequent volume of water that can be detained may be limited by a high water table. Hydrogeological investigation of the site will need to be undertaken before this alternative is implemented. This alternative can provide improvements to the Park that will increase the Park's usage by the residents.

Based on discussions with residents at the Design Charrette and Public Information Centre, the Project Team considered several potential alternative materials for the underground tanks. The materials considered included:

- Open-bottom plastic/PVC arch chambers;
- Corrugated steel pipe galleries;

- Closed "Milk-crate" unit storage chambers; and,
- Concrete chambers.

After review of the potential options, it was determined that, while alternatives to concrete chambers offered significant cost advantages, the alternatives presented several disadvantages, including:

- Open-bottom arch chambers and "Milk Crate" unit storage chambers cannot be entered by maintenance workers, and are difficult to maintain, considering the large upstream untreated drainage area;
- Given the depth of the incoming storm sewers, allowable maximum cover would be exceeded for open bottom arch chambers; and,
- With the given site constraints, corrugated steel pipe galleries could not achieve the required storage volumes.

Alternative materials for use as underground storage were therefore not carried forward for any further analysis.

6.4. Alternative # 4 – Combination of Above Ground and Underground Stormwater Management

This alternative involves excavating the Park grounds lower by about 0.5 – 2.0 m for surface storage and also installing a smaller underground tank structure underneath the surface storage to provide enclosed storage space for the detained stormwater. This alternative involves retrofitting the existing storm sewer network within the Park to include inlet/outlet control structures. An 18 m section of the sanitary sewer needs to be lowered to accommodate the storm control outlet structure. Plan and profile of Alternative #4 is provided as **Drawing D**.

6.5. Hydrologic and Hydraulic Analysis

Two (2) hydrologic and hydraulic models were created to analyze the flows going through the Park and into the Brooke Street trunk sewer. The first model represented the existing condition and was used to confirm the existing flooding condition. The second model included the effects of the stormwater storage in the Park and the effects of the two (2) diversions proposed in the Thornhill area to analyze the benefits. The 6-hour Chicago distribution storm was used for this study as it was identified in the previous report by W. G. Clark as being the most conservative design storm. The models only account for the drainage area upstream of the Park and do not include the Thornhill area hydrology. The flow entering the Trunk Sewer at Arnold Avenue and Centre Street was entered in manually based on the flows estimated in the report by W. G. Clarke. The model assumed that any flow above the pipe capacity upstream of the trunk sewer enters the Park overland and is conveyed to Yonge Street if the existing storage capacity in the Park is exceeded. The input and output files are provided in **Appendix B**.

The existing condition model confirmed that during the 100-year storm event, the Brooke Street trunk sewer would overflow onto the streets and flood the area near Brooke Street and Thornridge Drive intersection. The model also indicated that the capacity of the Trunk Sewer is

exceeded for the 5-year storm event and greater, and therefore the ability of the Trunk Sewer to convey stormwater from the Brooke/Thornridge area is limited under existing conditions.

The proposed condition included an increased storage area at the Park with flow control to restrict flows. The overland flow route to Yonge Street was also included in the model. The existing inflow into the Trunk Sewer at Arnold Avenue was removed and a new inflow at Thornridge Drive was added (proposed diversion).

The total storage at the Park increased to 8200 m^3 from 800 m^3. The inflow at Centre Street remained the same. The rate of inflow at Thornridge Drive was increased until the modelling results indicated overflow onto the streets. It was determined that up to 5 m^3/s can be directed into the Trunk Sewer before flooding from the Trunk Sewer occur during the 100 year storm. A 1200 mm concrete sewer at 1.5 % slope can convey up to 4.8 m^3/s.

Only one proposed model was prepared because Alternatives # 2, # 3, and # 4 all include storage volumes that exceed 8200 m^3.

7.0 Evaluation of Alternatives

7.1. Identification/Description of Alternative Solutions

As an initial step, the Project Team identified and described alternative solutions, or functionally different ways of addressing the problem/opportunity statement, as described in **Section 6.0**. Any "reasonable" alternative was included initially. All alternatives were considered equally for discussion purposes and evaluation.

As discussed in **Section 6.5**, a hydrologic and hydraulic model (EPA-SWMM 5.0) was created to simulate the existing and the typical proposed condition. The input/output data of the analysis are included in **Appendix B**.

7.2. Common Elements to be Addressed

As noted in **Section 4.1,** residents along the Park boundary at Springfield Way experience flooding during many storm events. Except for Alternative # 1, regardless of the preferred alternative selection, the Design Team will propose a solution to this flooding problem. The current contour elevations along the Park's west boundary between the Park's southwest corner and Tanjo Crescent increase eastwards. Thus, the only place for collected surface water to enter the Park is around the intersection of Tanjo Crescent and Springfield Way. The existing topography around the concrete pathway that leads into the Park can be flattened to guide water into the large area within the Park to provide additional social and economic benefits.

7.3. Other Modifications Required Along with SWM Facility in Gallanough Park

Except for the Do Nothing alternative, all other alternatives' full benefits in terms of flood reduction are contingent on the completion of other modifications as outlined in the report by W.G. Clarke (2009). Please refer to **Figure 4** for major improvements required along with the SWM Facility in Gallanough Park. As upstream water from the Trunk Sewer's drainage area will be partially captured at Gallanough Park, a by-pass (By-Pass 1) of Drainage Course # 2 into the sewer is required to alleviate flooding along Thornridge Drive. Additionally, W.G. Clarke recommended creating By-Pass 2 to efficiently transport water eastwards to free-up capacity in the Trunk Sewer. Finally, numerous culvert upgrades and replacements are outlined by W.G. Clarke in for the Thornhill neighbourhood to reduce flood impacts. This report's conclusions assume the achievement of all required improvements by the City in a timely manner.

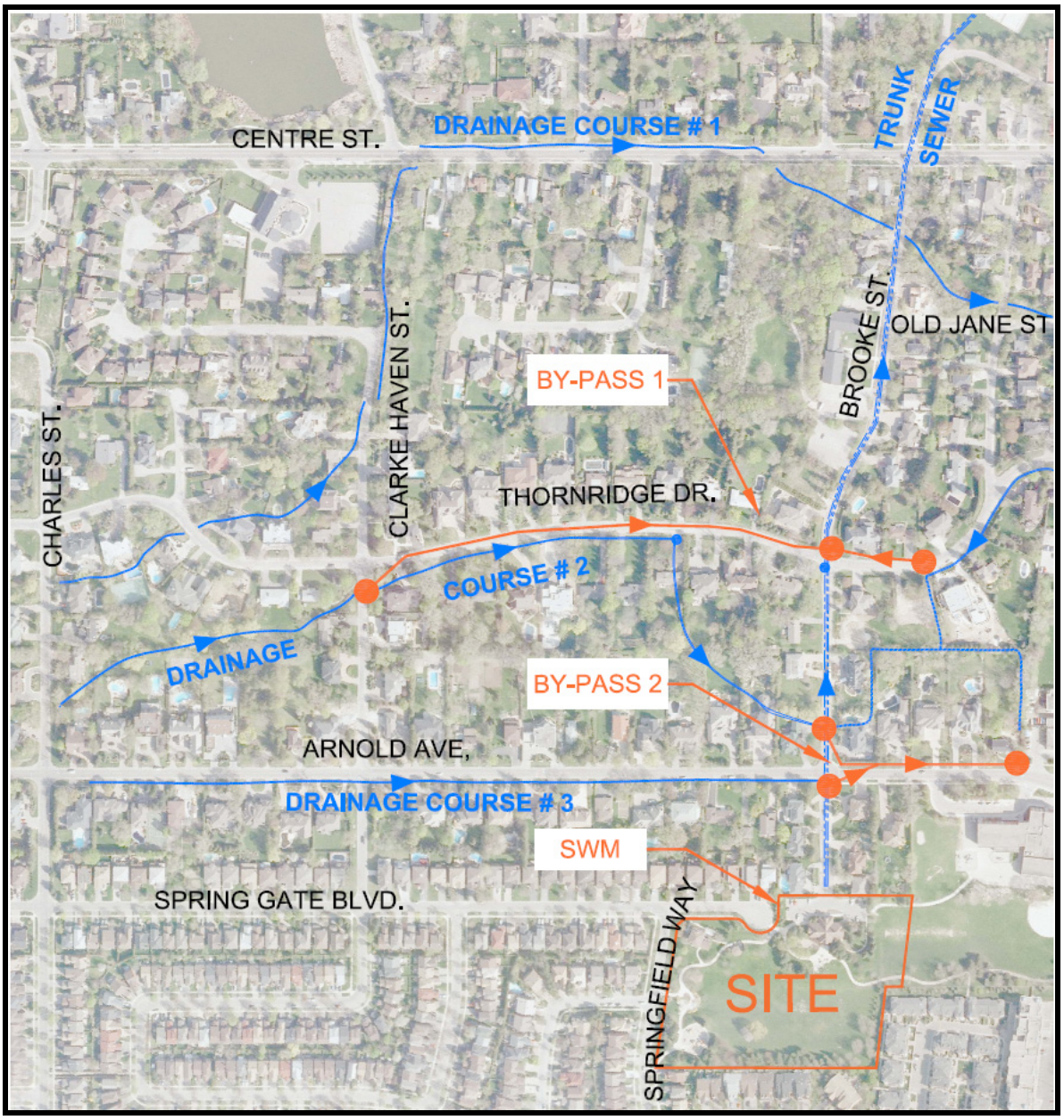


Figure 4: Overview of Required Drainage Improvements

7.4. Development of Evaluation Categories and Criteria

Evaluation criteria were developed to reflect the definition of "environment" provided in the OEAA and any specific circumstances associated with this project. The concerns and priorities of citizens living near the Park were heard at the Design Charrette and they subsequently played a major role in effective criteria development. All applicable comments were considered in the creation of the evaluation criteria in order to correctly incorporate all instances that would affect the Park, the Trunk Sewer, the surrounding area and users of the Park. Criteria were divided into four (4) categories, as listed in **Table 1** below:

Table 1–Evaluation Criteria

Social
Impacts to existing Park uses
Creation of new Park uses
Potential for standing water
Impacts to adjacent properties during and after construction
Economic
Capital construction cost
Operation and maintenance cost
Reduction in flood damages
Natural Environment
Impacts on general water quality
Impacts to the existing vegetation
Functional
Ease of construction
Ease of operations and maintenance
Risk to adjacent or upstream properties
Risk to downstream properties

7.5. Undertake Net Effects Analysis

Using the evaluation criteria, the Project Team applied a net effects analysis to the alternative solutions, which involved the following steps:

- Identify potential effects;
- Develop and apply mitigation/compensation/enhancement measures; and,
- Determine net effects after mitigation measures have been applied.

The details of the net effects analysis are included in **Appendix C**. Cost estimates to support the evaluation of the alternative solutions are included in **Appendix D**.

7.6. Comparative Evaluation Based on Net Effects and Identification of Recommended Alternative Solution

The comparative evaluation was undertaken using a "reasoned argument" or trade-off method. This method highlights the relative advantages and disadvantages of each alternative solution based on its identified net effects. This allowed for a clear presentation of the key trade-offs between the various evaluation factors and the reasons why one alternative solution is preferred over another. As a result, the relative differences and key trade-offs between each alternative solution for the various factors are clearly understood, and a traceable rationale for selection of the preferred solution has been provided.

7.7. Evaluation Summary

The alternative solutions were ranked in order of preference according to their net effects analysis as identified in the comparative evaluation. The ranking is summarized in **Table 2**. Comparison matrix of four (4) alternatives with respect to all of the criteria can be found in **Table 3**.

Table 2 - Summary of Comparative Evaluation

Rank	Alternative Solution
1st	Alternative # 2
2nd	Alternative # 4
3rd	Alternative # 3
4th	Alternative # 1

The following provides a rationale for the ranking of each of the alternative solutions.

7.7.1. Alternative # 2: Ranked First

Alternative # 2: Dry Pond ranked highest among the four (4) alternatives due to similar benefits for reduction in flooding as Alternatives # 3 and # 4 at significantly lower capital and maintenance costs while keeping the Park usable most of the time.

Alternative # 2 provides an overall net advantage under all categories of criteria. Reduction in flooding events in the Thornhill area, which is the primary functional goal of this EA, can be achieved with this alternative as about 10,000 m^3 of stormwater can be held in the Gallanough Park SWM Facility until the Trunk Sewer is able to accept additional flows. More importantly, this alternative presents the best case scenario for a cost-benefit analysis as it has the lowest capital cost at about $800,000 while providing similar flooding reduction as other alternatives.

The Surface Dry Pond is also easy to construct and maintain. No special procedures, such as confined space entry, etc. need to be followed for its maintenance. With the exception of Alternative # 1, all alternatives will require removal of certain mature trees to create site access for construction equipment. However, unlike underground storage in concrete chambers, Alternative # 2 will allow standing water to infiltrate into soils, which acts as a natural filtration system for contaminants in the water and aides in recharging of the ground water. Water quality can potentially benefit from the use of a Surface Dry Pond to store run-off water as long as the Pond is well-maintained. Creation of a surface Pond will also create a positive side-benefit of steeper slopes around the Pond banks. During the re-grading of the banks, some potential exists for Park use improvements, such as the creation of enhanced tobogganing hills. At the Design Charrette, citizens highlighted the Park's heavy use in winter for tobogganing and enhancement of this Park use is possible by choosing Alternative # 2. Many community members also wished to see a jogging/walking track around the Park. While this feature is not part of the current preliminary design, it can be incorporated at a later stage as the potential for this trail is maintained in Alternative # 2. Finally, since the current soccer field will be re-graded to create the SWM Facility, a smaller replacement soccer field is proposed within the Pond to be used

whenever standing water is not present (see **Drawing E)**. This alternative is also easier to construct compared to Alternative # 3 and # 4.

The disadvantages of this alternative include inconvenience for Park users during larger rainfall events (greater than 2-year event) due to 'wet' ground for a few days and potential for standing water during storm events (greater than 2-year storm event).

7.7.2. Alternative # 4: Ranked Second

Alternative #4: Mix of Dry Pond and Underground Storage ranked second, although it has higher potential for Park use improvements with similar flooding reduction capabilities, its capital and maintenance costs are significantly higher than Alternative # 2.

Alternative # 4 is advantageous over Alternative # 2 with respect to the social criteria. During a storm event, the stormwater will first be stored in underground storage chambers and only the remaining water will be stored above ground so the potential for standing water reduces to storms of 10-year frequency and higher. Thus, higher potential exists for Park use improvements compared to Alternative # 2.

The major disadvantages of Alternative # 4 are its capital and maintenance costs. This alternative costs over than five times more to construct than Alternative # 2 without providing significant additional benefit in flood attenuation. Moreover, underground storage chambers will require confined space entry procedures to be followed during maintenance. A minor disadvantage of creating underground storage tanks below the "wet" Pond is the reduction in potential for infiltration of stormwater. This alternative would be the more difficult to construct than other alternatives because both underground and above-ground stormwater storages are incorporated.

7.7.3. Alternative # 3: Ranked Third

Alternative #3: Underground Storage is ranked third among the four (4) alternatives since it provides considerable social benefits, but has the highest capital construction cost. This type of alternative received the most positive feedback at the Design Charrette and PIC.

The benefits of Alternative # 3 are limited to social benefits. Since all of the water storage will be done underground, the potential for standing water is the lowest. Additionally, the potential for improvement in aesthetics and Park use is the highest among four (4) alternatives due to the flat ground created during construction of underground chambers.

The drawbacks of Alternative # 3 are within the economic and functional criteria. Underground Storage has highest capital cost at $5,400,000. Underground storage chambers will require confined space entry procedures during maintenance, which increases cost. Construction of underground chambers will also be more involved and prolonged than creation of a Surface Dry Pond.

7.7.4. Alternative # 1: Ranked Fourth

Alternative # 1 (Do nothing) ranked last among the four (4) alternatives primarily because it does not address the problem or opportunity statement.

Alternative # 1 provides limited advantages towards the economic, environmental and constructability criteria categories. This option requires no construction work, therefore has no associated capital costs, does not disturb the existing Park uses, and does not cause construction disturbance to nearby property owners.

Alternative # 1 presents overall disadvantages under the functional and social criteria categories.

The option to do nothing does not reduce risk to adjacent, upstream or downstream properties from flood damages. The current flooding conditions in Thornhill Neighbourhood pose a social and economical hazard to private properties. The existing flooding issues may worsen over time due to climate change. Finally, the Do Nothing alternative counters recommendations made by previous studies on the same issue.

7.7.5. Summary

Table 3 provides a summary of evaluation and identifies the advantages and disadvantages of each alternative.

Table 3 – Comparison of Alternatives

	Alternative #1 (Do Nothing)	Alternative #2 (Dry Pond)	Alternative #3 (Underground Tank)	Alternative #4 (Mix of Underground Tank and Dry Pond)
Social				
Impacts to existing Park uses	Advantage	Disadvantage	Advantage	Disadvantage
Creation of new Park uses	Disadvantage	Advantage	Advantage	Advantage
Potential for standing water	Advantage	Disadvantage	Advantage	Disadvantage
Impacts to adjacent properties during & after construction	N/A	Disadvantage	Disadvantage	Disadvantage
Economic				
Capital construction cost	Advantage $0	Advantage $800,000	Disadvantage $5,400,000	Disadvantage $4,400,000
Operation & maintenance cost	Advantage	Advantage	Disadvantage	Disadvantage
Reduction in flood damages	Disadvantage	Advantage	Advantage	Advantage
Natural Environment				
Impacts on general water quality	Disadvantage	Advantage	Advantage	Advantage
Impacts to the existing vegetation	Advantage	Disadvantage	Disadvantage	Disadvantage
Functional				
Ease of construction	N/A	Advantage	Advantage	Advantage
Ease of operations & maintenance	Advantage	Advantage	Disadvantage	Disadvantage

	Alternative #1 (Do Nothing)	Alternative #2 (Dry Pond)	Alternative #3 (Underground Tank)	Alternative #4 (Mix of Underground Tank and Dry Pond)
Risk to adjacent or upstream properties	Advantage	Advantage	Advantage	Advantage
Risk to downstream properties	Disadvantage	Advantage	Advantage	Advantage

7.8. Preferred Alternative Solution

The net advantages of Alternative # 2: Dry Pond is superior to the other alternatives since it addresses the problem/opportunity statement and is the most economically viable solution. This alternative involves the creation of a Dry Pond by lowering approximately 0.45 ha area of the Park and installing inlet/outlet structures to control flows. In addition, this Alternative is to most easily operated and maintained.

Consequently, when comparatively evaluated against the other alternative solutions, Alternative # 2 was identified as being the preliminary recommended alternative solution and this was presented to the public and government review agencies for comment at the PIC in February 2010. At the detailed design stage, more research and analysis will be done and the particular materials and method of construction will be selected.

7.8.1. Design and Construction Considerations

Design Considerations

As mentioned in **Section 4.1**, there is potential for high groundwater levels at certain locations in the Park. Thus, hydrogeological investigation will be required at the preliminary design stage to measure and monitor the groundwater levels within the study area. The findings from that study may necessitate modifications to the dry Pond SWM Facility design, such as its allowable depth and placement of inlet/outlet structures. Moreover, geotechnical investigation of the excavation area will be required to determine the make-up of the excavated material. If hazardous contaminants are found in the sediment at elevated levels, the removed fill will require special handling as well as disposal at an approved Facility.

The type and size of inlet/outlet structures with flow control is required. A piped connection to convey the small flows (less than 2-year storm intensity) is required to maximize Park usage and minimize the presence of surface water. The existing overland flow route towards Yonge Street must be maintained and incorporated into the design. A detailed survey of the site is required and inverts of the existing sewers should be checked as part of the survey work. A tree inventory may be initiated to determine the presence of sensitive or endangered species. This information can then be used to create a site access route that minimizes harm to such trees.

The MOE has published a Stormwater Management Planning and Design Manual in March 2003. This manual outlines design requirements for SWM Facilities, including safety concerns. As any proposed SWM Facility is required to adhere to these guidelines, the proposed Dry Pond design should incorporate all applicable guidelines from this manual at the preliminary design

stage. Latest SWM best management practices and LID guidelines should be considered and incorporated at the design stage.

Incorporation of Public Comments

Public input from the Design Charrette and the PIC should be reviewed in detail and feasible suggestions should be incorporated into the preliminary design. For example, details of the enhanced tobogganing hills need to be confirmed. Conflicting public comments were received regarding additional walking trails, particularly around the south limits of the proposed pond. Additional discussions should be held with landowners immediately to the south of the proposed pond to review the potential for these trails. Consideration should be given to integrating other improvements to Gallanough Park concurrently with construction of the Pond.

Construction Considerations

The construction of a SWM Facility is a major undertaking and the Park will be fenced off for the duration of the construction. In addition to the typical erosion control, health and safety, and environmental protection measures, traffic flow control and noise control should be considered to minimize nuisance to the local residents. Advance notice of construction to the local community groups (soccer club, public school, library, and other clubs) should be provided so that their planned activities at the Park can be rescheduled.

Additional details of the implementation of the project are provided in **Section 10**.

8.0 Public and Agency Consultation

8.1. Consultation Activities

The general public, residents, property owners, agencies, etc., were given a variety of opportunities throughout the project for learning, sharing, and responding by means of the following points of public contact. The Municipal Class EA requires the Proponent to undertake two (2) mandatory points of public contact during Phase Two (Alternative Solutions) for a Schedule 'B' project. The Project Team has exceeded the mandatory number of public contacts, with the following opportunities for comment provided:

- Notice of Commencement;
- Design Charrette;
- Notice of Public Information Centre;
- Public Information Centre; and
- Notice of Completion.

All relevant parties including the general public, Provincial and Federal Agencies, First Nation Groups, and the local Conservation Authority were contacted regarding this Municipal Class EA. More than one (1) individual/department were contacted within the same agency, where required. Each party was mailed a package that contained a cover letter, Notice of

Commencement and PIC panels for review and comment. Complete list of agencies contacted regarding this project can be found in **Table 4**.

Table 4 – Contact List of Agencies

Provincial Ministries
Ministry of Agriculture and Food
Ministry of Agriculture - OMAFRA
Ministry of Culture
Ministry of Health and Long-Term Care
Ministry of Municipal Affairs
Ministry of Municipal Affairs and Housing
Ministry of Natural Resources
Ministry of Culture
Ministry of Tourism
Ministry of Environment
Ministry of Transportation - Ontario
Niagara Escarpment Commission
Ministry of Public Infrastructure
Federal Agencies
DFO/Coast Guard
Environment Canada
First Nations
Department of Indian and Northern Affairs
Lands & Trusts Services, Department of Indian and Northern Affairs
Indian and Northern Affairs Canada
Ministry of Aboriginal Affairs
Chiefs of Ontario Mapping
Association of Iroquois and Allied Indians
Chippewas of Georgina Island
Conservation Authority
Toronto Region Conservation Authority

8.1.1. Notice of Commencement

A Notice of Commencement was prepared and distributed to local stakeholders and review agencies and first issued on Tuesday November 24, 2009. The notice was published for two weeks in the City's "City Page Online". In addition, the notice was mailed directly to about 2000 affected households within the Study Area (refer to **Figure 1**). The purpose of the notice was to notify the public that a Class EA Study has been initiated for the study area. It also provided background information on the study, including the purpose, objectives, and process. In addition, the contact information for the City's Project Manager and Cole Engineering's Project Manager were made available to the public to engage any initial feedback on the project.

A copy of the Notice of Commencement is provided in **Appendix E**.

8.1.2. Design Charrette

Please refer to **Section 5** and **Appendix A**. Opportunities to provide comments were provided to the attendees of the Design Charrette.

8.1.3. Notice of Public Information Centre

Notice of the PIC was mailed directly to residents on the mailing list and was accessible to the general public via publication in the City's "City Page Online", first issued February 11, 2010. A copy of the Notice of PIC is provided in **Appendix F**. The notices provided a project description, information updates since the last notice, and a request for comments and input. Contact information for the City's Project Manager and Cole Engineering's Project Manager was also provided to encourage the submission of comments.

8.1.4. Public Information Centre

One (1) PIC took place during the project. The PIC was held on February 25th, 2010 once the preliminary preferred solution had been identified. It was attended by more than 18 people (some individuals did not sign-in at registration booth). The following key elements were presented at the PIC.

- Background on the Class EA screening;
- Problem/Opportunity Statement;
- Description of the Alternative Solutions;
- Evaluation of the Alternative Solutions; and,
- Preferred Alternative.

The PIC format included two (2) hours for drop-in and discussing the project with the Team, followed by a formal presentation and a question/answer period. The display panels and slides presented at the PIC can be found in **Appendix G**. The PIC sign-in sheet and comment forms received are enclosed as **Appendix H**. Contact information for the City's Project Manager and Cole Engineering's Project Manager was also provided to encourage the submission of comments after the PIC. Comments were accepted via phone, mail, e-mail or fax until March 18, 2010. The written comments received are summarized in **Table 5.**

Table 5 - Summary of Comments Received

Address	Summary of Comments Received	Consideration of Comments Received
12 Brownstone Circle	▪ The proposed alternative is an upstream solution to a downstream problem ▪ Consider covered (underground) or do nothing option	▪ N/A – No further action required
4 Spring Gate Boulevard	▪ Keep developing new ideas as we are far from solutions	▪ N/A – No further action required

Address	Summary of Comments Received	Consideration of Comments Received
71 Franklin Avenue	▪ In favour of surface dry Pond over underground chambers due to significantly higher cost without added benefits ▪ Relocate soccer field to Hefhill Park	▪ N/A – No further action required
7610 Yonge Street	▪ Choose the low cost option ▪ Would not like tax increase	▪ N/A – No further action required
53 Spring Gate Boulevard	▪ Alternative # 1 preferred	▪ N/A – No further action required
53 Spring Gate Boulevard	▪ A new stormwater drainage system should be considered for areas of Arnold and Brooks Streets as well as Thornridge Drive. ▪ Deep water, while occasional, creates hazard for children while complete fencing will render Park unusable most of the time.	▪ Councillor Alan Shefman responded to the resident to address the raised concerns.

8.1.5. Follow-up with First Nations

Follow-up letters were sent to First Nations' contacts prior to completing the Project File. These letters indicated that the study was nearing completion and any comments should be provided in the near future.

8.1.6. Notice of Completion

The Notice of Completion informs stakeholders of the completion of the Class EA and provides the locations where stakeholders can review the completed Project File. The notice also informs the public of the 30 day review period associated with the conclusion of the EA process. During this review period, concerned individuals have the right to raise and discuss issues prior to requesting a Part II Order before the project may proceed to implementation. A copy of the Notice of Completion is included at the start of the Project File.

8.2. Comments from Various Agencies

Few comments were received from agencies listed in **Table 4** regarding this Municipal Class EA. All received comments are summarized in **Table 6** and they can be found in their entirety in **Appendix I**. It is noted that Suzanne Bevan, Planner II, Environmental Assessment Planning, Toronto and Region Conservation Authority contacted the Project Team via telephone only.

Table 6 – Summary of Agency Comments

Agency	Summary of Comment	Follow-up Action Undertaken
Niagara Escarpment Commission	▪ The site under consideration is outside of Niagara Escarpment Plan so no comments are offered.	N/A
Ministry of Health and Long-Term Care	▪ Wishes to be informed of future developments. Local Medical Officer of Health to be contacted for input.	Medical Officer of Health contacted with no response received.
Ministry of Environment TSS	▪ Standard information regarding report, consultation and Class EA process provided.	Suggestions were incorporated in preparations of the Project File.
Ministry of Tourism and Culture	▪ The proposed site has low archaeological potential so an archaeological assessment is not required as part of the approval process. ▪ Agency office must be contacted without delay if deeply buried archaeological finds are discovered. ▪ Local police must be contacted if human remains are found during excavation. ▪	N/A
Toronto and Region Conservation Authority (TRCA)	▪ The site is not located within a TRCA Regulated Area ▪ While the TRCA is interested in reviewing the Project File, they do not see a need to review the Project File in advance of the 30 day review ▪ TRCA should be consulted during detailed design.	Two (2) copies of Project File sent directly to TRCA at time of filing.

9.0 Description, Implementation, and Monitoring of the Project

9.1. Description of the Project

For the purpose of the Class EA, the steps listed below are intended to provide a broad overview of the construction methodology of the project. The details of the construction procedure will be refined as more information becomes available through the design process.

9.1.1. Permits and Approvals

Table 7 below is a summary of Permits and Approvals required prior to construction.

Table 7 – Summary of Permits and Approvals

Agency	Approval Mechanism	Comments
Toronto and Region Conservation Authority (TRCA)	Consultations or potentially a Permit under O.Reg.162/06	▪ Pre-consultation with TRCA has been undertaken as discussed in **Section 9.2**. ▪ Additional consultation should be undertaken during detailed design ▪ Although the site is not regulated, permit application will be made if required during detailed design process.
Ministry of Environment (MOE)	Permit To Take Water	▪ Should high groundwater be encountered during construction, a permit to take water may be required.
Ministry of Environment (MOE)	Section 53 Certificate of Approval	▪ Although the Pond is providing quantity control only, and is not intended to treat stormwater, a C of A may be required ▪ Additional consultation should be undertaken with MOE during detailed design
City of Vaughan	Engineering Approvals	▪ The detailed design will be to City of Vaughan standards, and will be reviewed and approved by City Engineering staff prior to construction.

All permits and approvals must be in hand prior to commencing the works.

9.1.2. Construction Sequencing

At this time, a preliminary construction sequence has been developed, and is outlined in this section.

Site Clearing and Preparation

In order to create a safe and effective working site within the Park, its public use must be halted or restricted during construction. This can be done by installing restricted entry and danger signs.

Some mature trees growing along the perimeter of the Park will need to be removed to create an access route for the construction equipment. Transplantation will be considered if desirable sensitive species are discovered. Potential for vegetation retention will be assessed on a site specific basis during the detailed design process. Trees not to be removed should be protected by hoarding or tree protection fencing.

Erosion and Sediment Control

A comprehensive erosion and sediment control plan will be developed during detailed design to mitigate the potential release of sediments from the site to the receiving Trunk Sewer. It is anticipated that the plan will focus on isolation of the work area from incoming upstream flow and control of on-site sediments runoff.

Flow Bypass

As new inlet/outlet connections need to be made with the existing storm sewer network, temporary by-passes may need to be created. As much as possible should be completed within

the new pond, prior to breaking into the existing storm sewers. It may be possible to construct most works, and then break into and remove the existing sewers.

Consideration should also be provided to the method of flow bypass. Setup and operation of a storm bypass dam and pump type system within a storm sewer is onerous and expensive. It may be more cost effective to reduce the duration of bypass through careful construction staging and to maintain an open channel through the work area when required.

Pond Construction

Major elements of the pond construction include:

- Topsoil stripping;
- Removals;
- Earthworks;
- Installation of new inlet/outlet structures;
- Connection to existing sewers; and,
- Landscaping.

During detailed design, construction quantities will be confirmed, and the cost estimate within **Appendix D** should be refined accordingly.

Re-Vegetation and Site Take-Down

Once the Dry Pond has been created, its perimeter will be re-vegetated with native plantings. This will provide additional bank integrity, increase the aesthetics of the Park, and provide improved terrestrial habitat. This initiative will mitigate the impacts that may have been caused on the local environment due to the construction of the SWM Facility.

The City may install a fence and warning notices around the dry Pond, if they are deemed necessary. Once the site is stabilized, temporary bypass works, erosion and sediment controls and all equipment will be removed from the Park.

9.2. Summary of Potential Effects and Mitigation Measures

9.2.1. Effects on Adjacent Uses

Given the close proximity of the site to residential land uses, there is a potential for some nuisance effects, such as noise, odour and dust. Through the design process, a management plan will be prepared to mitigate these potential effects. A possible mitigation measure that can be included in the management plan is the scheduling of construction to occur between the hours of 8:00 a.m. to 5:00 p.m., to minimize the effect on the adjacent properties. However, by-pass operations, which may include pumps, must be kept in operation around the clock. The effectiveness of the mitigation measures to control noise, odour and dust will be monitored by the resident inspector and adjusted in the field to ensure control.

9.2.2. Erosion and Siltation

During construction, there is a risk of potential erosion and siltation impacts that could release sediment into the storm sewer or catch basin, which eventually reaches the tributary to the Don River. This impact would degrade the water quality of the tributary and affect the habitat of wildlife. Therefore an erosion and siltation plan must be developed to mitigate this potential effect. Possible measures include, but are not limited to, use of siltation fences, coffer dams and mud mats during construction. These activities will be confirmed during the detail design phase of the project before implementation and will be reviewed and approved by City Engineering staff, with input from TRCA.

9.2.3. Waste Disposal

Removal will be required of all the debris and excavated fill from the Park. These items will need to be disposed of and can potentially impact the local environment if not disposed of properly. Therefore during construction, all waste removed from the site must be directed to the appropriate facility for disposal. During the geotechnical investigation included in the detailed design phase the existing material in the Park should be assessed for its disposal requirements. If any hazardous/biological waste is discovered, the appropriate agencies should be notified and the waste should be directed to the required facility. To further mitigate any potential waste that can be re-directed from landfill facilities, every attempt will be made to use portions of the excavated fill on site for regrading purposes. Other waste will be investigated to determine if there are feasible alternative facilities to recycle or reuse the material. The waste management plan will be confirmed during the Detailed Design phase of the project.

9.3. Implementation

9.3.1. Notification of Completion

The last step of the Schedule 'B' Class EA process following documentation of Phases One and Two involves issuing a "Notice of Completion" to review agencies and the public and providing the Project File for review for a period of 30 calendar days. Following the end of the review period for the Project File, if there are no outstanding Part II Order Requests, the City may proceed to Phase 5 of the Class EA process to complete the contract drawings and tender documents. This undertaking requires a number of permits to be acquired before construction can begin, as described in **Section 9.1.1.**

In order to satisfy the notification requirements, a Notice of Completion will be mailed to each of the previously contacted individuals in the project mailing list who wished to be further involved in the project and published in the City's "City Page Online". The notice will inform stakeholders and the general public of the project's completion, including the preferred solution and their rights regarding the Part II Order provisions.

9.3.2. Proposed Construction Schedule

Assuming that there are no outstanding Part II Order requests at the end of the 30 calendar day review period and the Vaughan City Council approves the project, construction of the preferred alternative is tentatively scheduled as follows:

- End of 30 day review period — Month 0
- Design and Tender Period — Month 0 to Month 9
- Construction — Month 9 to Month 12
- Post-Construction Monitoring — Month 12 to Month 24

9.4. Proposed Mitigation Measures, Monitoring, and Maintenance

As part of implementing this project, monitoring and maintenance will be conducted during construction to ensure that:

- Individual mitigation measures are providing the expected control and/or protection continuously throughout the construction period;
- The mitigating measures are adequate to minimize or eliminate adverse effects;
- Additional mitigating measures are provided, if required, to address any unanticipated adverse environmental effects that arise during construction; and,
- Adequate information is available for the assessment of the mitigative measures.

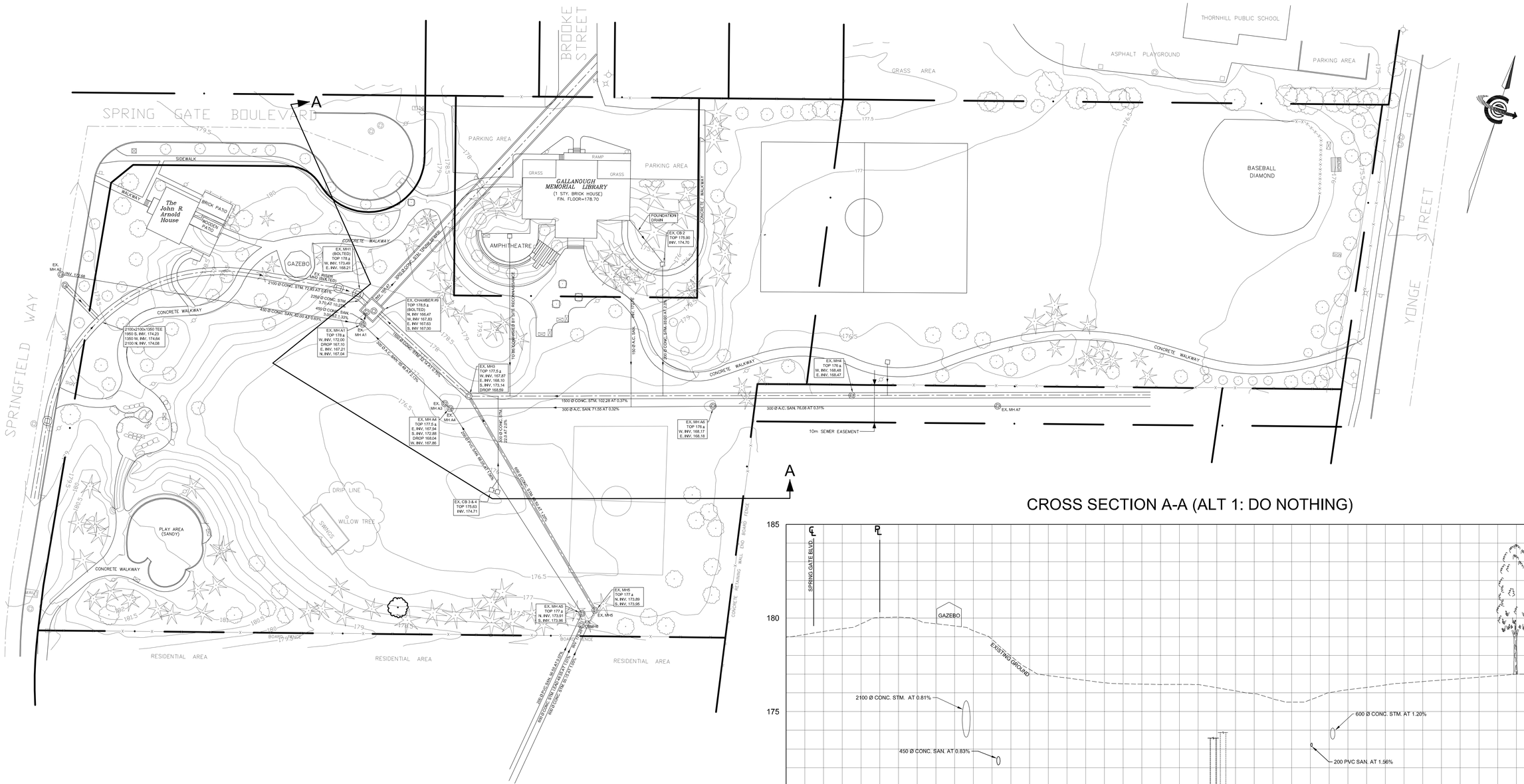
Post-construction monitoring of the Pond will include engineering inspections of the erosion control structures. Consideration could be given to implementing a water quantity control monitoring program that would include a rain gauge network and flow monitors upstream and downstream of the pond to assess the performance of the Pond. In addition, ecological inspections may be conducted to monitor vegetation growth and determine the presence of non-native species. Subsequent recommendations will be made after the monitoring to determine any required maintenance activities.

10.0 References

Municipal Engineers Association, 2000 (amended 2007).
Municipal Class Environmental Assessment Document.

W.G. Clarke, 2009
Thornhill Area Road Reconstruction – Stormwater Management Final Report

Genivar, 2008
Thornhill Storm Drainage Improvements Study Final Report



CROSS SECTION A-A (ALT 1: DO NOTHING)

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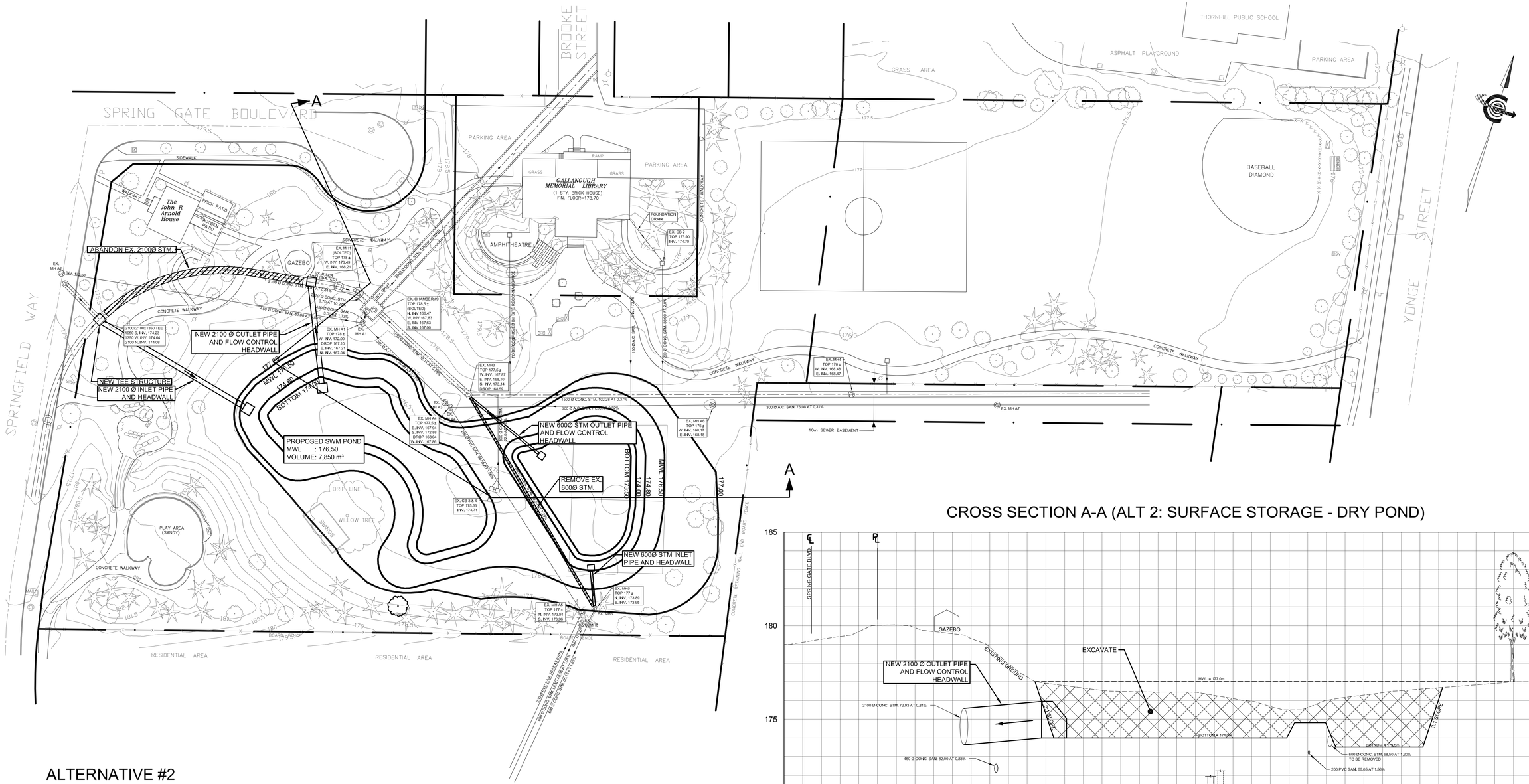
LEGEND

ALTERNATIVE # 1 (DO NOTHING)

STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2005
CITY OF VAUGHAN

DATE:	JANUARY 2010	PROJECT No.:	W09-287
SCALE:	1:500	FIGURE No.:	A



CROSS SECTION A-A (ALT 2: SURFACE STORAGE - DRY POND)

ALTERNATIVE #2
SURFACE POND VOLUME SUMMARY

BASE:	COMPARISON:	VOLUME:
POND	176.5m	8235 m³
POND	177.0m	10575 m³

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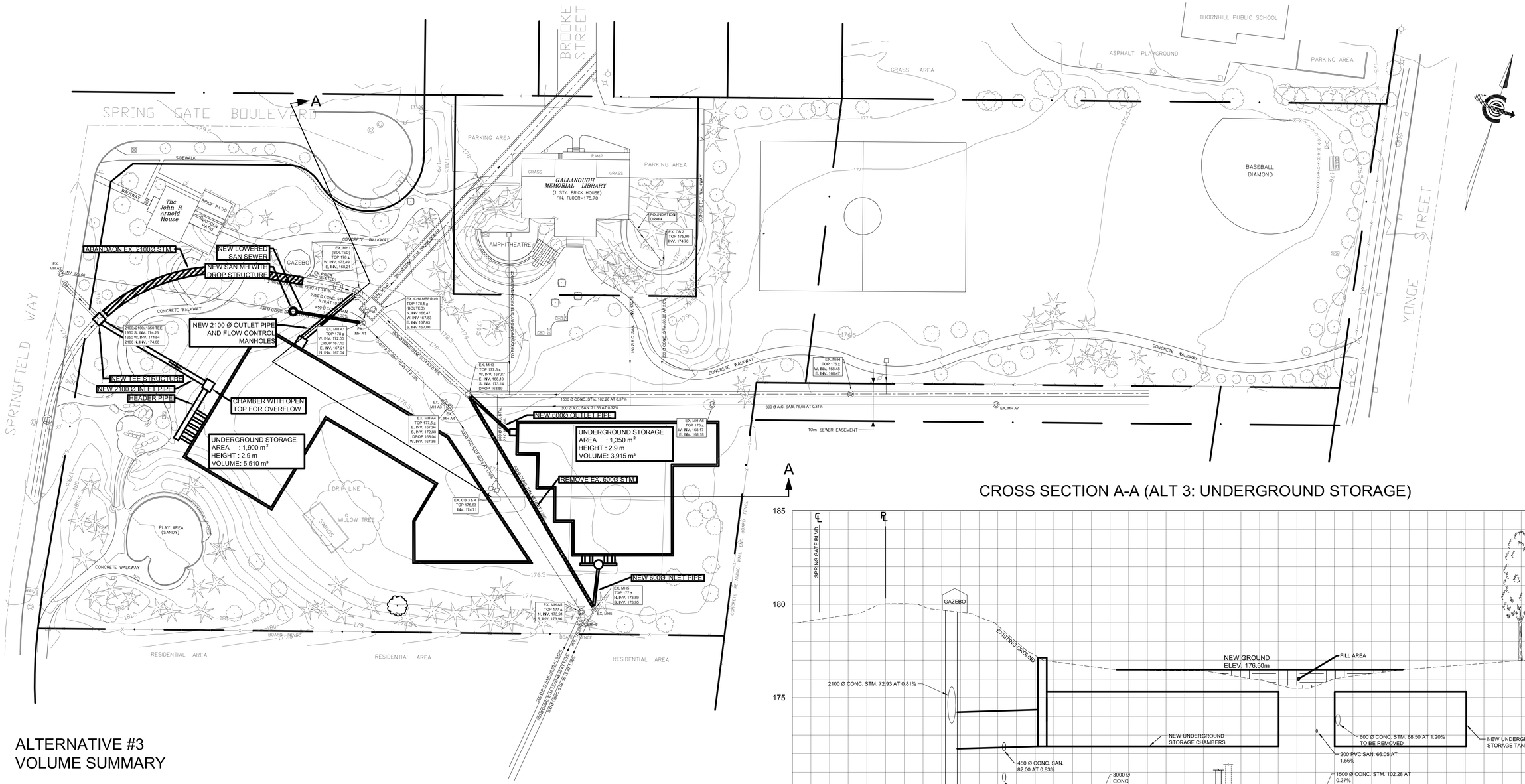
LEGEND

ALTERNATIVE # 2 (SURFACE DRY POND)

STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2005
CITY OF VAUGHAN

DATE:	DECEMBER 2009	PROJECT No.:	W09-287
SCALE:	1:500	FIGURE No.:	B



CROSS SECTION A-A (ALT 3: UNDERGROUND STORAGE)

ALTERNATIVE #3
VOLUME SUMMARY

<UNDERGROUND VOLUME>
AREA : 3,250 m²
BOTTOM: 172.6 m
HEIGHT : 2.9 m
VOLUME: 9,425 m³

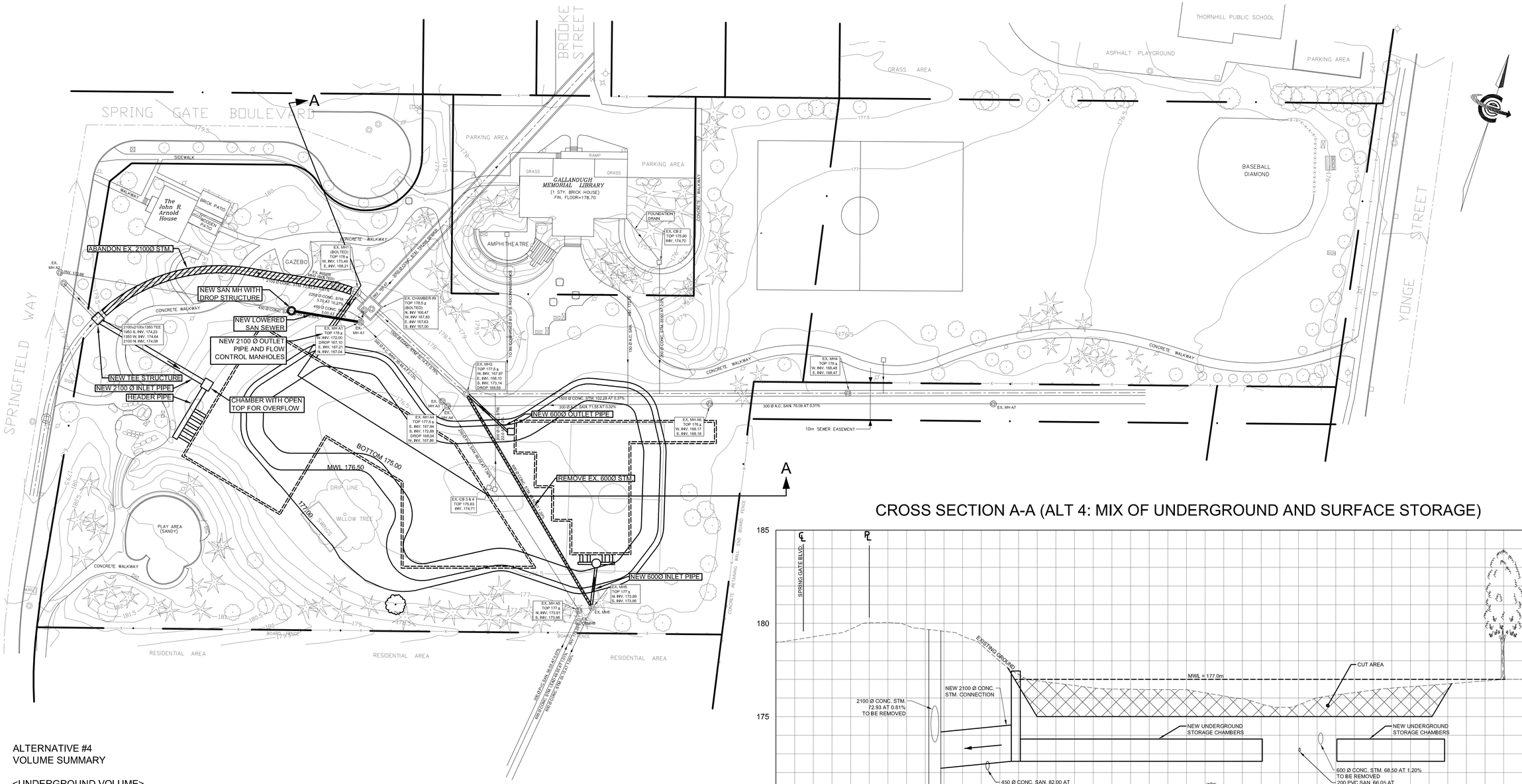
Clarifica Water Resources
A division of Cole Engineering Group Ltd.

LEGEND

ALTERNATIVE # 3 (UNDERGROUND STORAGE)

STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2005
CITY OF VAUGHAN

DATE:	DECEMBER 2009	PROJECT No.:	W09-287
SCALE:	1:500	FIGURE No.:	C



CROSS SECTION A-A (ALT 4: MIX OF UNDERGROUND AND SURFACE STORAGE)

ALTERNATIVE #4
VOLUME SUMMARY

<UNDERGROUND VOLUME>
AREA : 3,250 m²
BOTTOM: 172.6 m
HEIGHT : 1.2 m
VOLUME: 3700 m³

<SURFACE VOLUME>

BASE:	COMPARISON:	VOLUME:
POND	176.5m	5475 m³
POND	177.0m	7755 m³

Clarifica
Water Resources
A division of Cole Engineering Group Ltd.

LEGEND

ALTERNATIVE # 4 (MIX OF U/G AND SURFACE STORAGE)

STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2005
CITY OF VAUGHAN

DATE:	DECEMBER 2009	PROJECT No.:	W09-287
SCALE:	1:500	FIGURE No.:	D

SPRING GATE BOULEVARD

A

PARKING AREA

RAMP

GRASS

GRASS

GALLANOUGH MEMORIAL LIBRARY
(1 STY. BRICK HOUSE)
FIN. FLOOR=178.70

PARKING AREA

CONCRETE WALKWAY

SIDEWALK

WALKWAY

The John R. Arnold House

BRICK PATIO

WOODEN PATIO

CONCRETE WALKWAY

GAZEBO

AMPHITHEATRE

CONCRETE WALKWAY

CONCRETE WALKWAY

TOBOGGAN HILL FOR KIDS

MAINTAIN EXISTING EMERGENCY SPILL ROUTE

CONCRETE WALKWAY

10m SEWER EASEMENT

177.00

MWL 176.50

174.80

BOTTOM 174.00

LOW FLOW CHANNEL

POTENTIAL MAJOR FLOW ROUTE IMPROVEMENT

NEW DEPRESSED AREA

DRIP LINE

EX. WILLOW TREE TO BE PRESERVED

WILLOW TREE

SWINGS

PLAY AREA (SANDY)

TOBOGGAN HILL EXTENDED FROM 13 m TO 25 m IN LENGTH

CONCRETE WALKWAY

2% MIN

2% MIN

RELOCATED SOCCER FIELD

POSSIBLE FUTURE WALKING TRAIL

BOTTOM 173.50

174.00

174.80

MWL 176.50

177.00

LOW FLOW PIPE

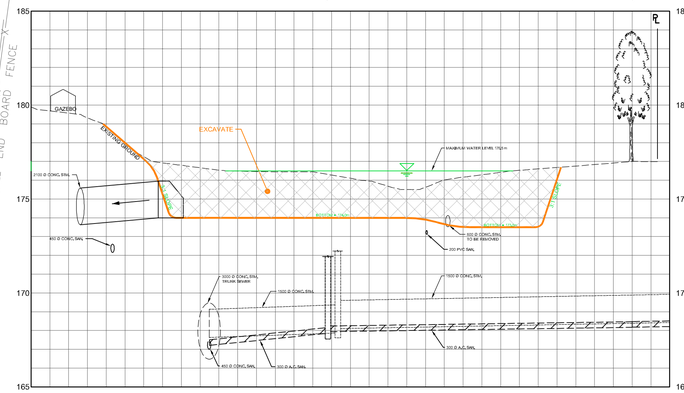
A

CONCRETE RETAINING WALL END BOARD FENCE

BOARD FENCE

BOARD FENCE

CROSS SECTION A-A (ALT 2: SURFACE STORAGE - DRY POND)



Clarifica Water Resources
A division of Cole Engineering Group Ltd.

EXISTING VEGETATION

PROPOSED VEGETATION

PREFERRED ALTERNATIVE (DRY POND)

STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2005
CITY OF VAUGHAN

DATE:	FEBRUARY 2010	PROJECT No.:	W09-287
SCALE:	1:300	FIGURE No.:	E

Appendix A

Design Charrette Proceedings

City of Vaughan
Design Charrette

PROCEEDINGS

Gallanough Park
Stormwater Management Facility

"Tell me, I forget. Show me, I remember.
Involve me, I understand."

- Chinese Proverb -

January 28th, 2010

Thornhill Presbyterian Church
271 Centre Street

Prepared By: Planning Solutions Inc. for Clarifica, a Division of Cole Engineering

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Executive Summary

The Gallanough Park Stormwater Management Facility Design Charrette was held at the Thornhill Presbyterian Church in Vaughan on Thursday, January 28th, 2010. The objective of the Charrette was to offer a forum where invited participants could develop preliminary design or plans for the Gallanough Park Stormwater Management Facility and present these preliminary design plans for the consideration of the City and the Consulting Team.

The comments received and insights shared during the Charrette will form an integral part of the work that is ongoing to address stormwater management in the vicinity of Gallanough Park. The Charrette was structured to allow invited participants to share their thoughts on how Gallanough Park could be better utilized to manage stormwater runoff. It provided a forum for engaging community members and built on the important role City staff place on community and resident engagement.

This Charrette had its genesis in a process that has been lead by the City to improve stormwater management and infrastructure support. These efforts have been ongoing for sometime and over the years, a number of engineering studies have examined the drainage issues facing the community. The Design Charrette represented the first time members of the community have been asked to provide their design advice for a structure such as this in Gallanough Park.

The Charrette offered an opportunity for information and idea exchange. It began by providing the context for the stormwater management initiative and offered participants an opportunity to collectively define the key issues facing the community including community concerns with respect to Gallanough Park stormwater management facility and the continued long term use of the Park for park-related purposes.

The Design Charrette generated a great deal of discussion among those who participated and a number of stellar ideas and design concepts emerged from the small working groups. Four concept plans emerged from the session and interestingly, the preliminary design plans contained many of the same design fundamentals. Participants felt first and foremost, that the most optimal solution was an underground storage facility. Gallanough Park is a well used park and members of the community were united in their views that the park needs to be retained, given the number of uses and users who rely on it for various activities. There is however an opportunity to enhance the Park and to reconfigure the site so that it serves a wider array of users more effectively.

Participants expressed concern with an above-ground storage facility. Concerns focused on public health and safety predominantly although aesthetic impacts were also raised. Concern with injury, spread of disease from stagnant or ponding water and the overriding concern with the loss of access to and usage of Gallanough Park were raised by virtually all in attendance. While it was recognized that the cost to construct an underground facility is likely far more expensive than a dry-pond (surface storage), there are far greater social and environmental benefits that will result. There were few concerns raised about the focus on Gallanough Park. Some suggestions were made to look at other parks and open space areas in the vicinity though City staff indicated that site design, stormwater servicing logistics and land tenure led the City to focus on Gallanough Park.

All who participated agreed the session had been informative and interesting. Feedback following the meeting suggested residents were pleased to play an active part in the design of the Gallanough Park stormwater management facility and that they appreciated the opportunity to be involved and offer their perspectives to the Consulting Team.

Acknowledgements

The City would like to extend our thanks to those who participated in the January 28th Design Charrette and to those who worked diligently to ensure the Charrette was well organized and successful.

Having a broad spectrum of interests enabled all participants to better understand both the issues and the opportunities that are available. It afforded an opportunity to consider the initiatives that have been underway by the City to address flooding concerns and to consider the role for Gallanough Park from a stormwater management perspective.

The City is extremely pleased with the outcome of the Design Charrette and the progress that we were able to make. We note that this is a first step in a process that will continue to evolve and that will continue to involve the participation and support of stakeholders and community members as the stormwater management options for Gallanough Park become more crystallized.

The City is particularly proud of the efforts that have been forthcoming from the participants and, as a result, we are pleased to submit these proceedings as a formal record of our efforts.

Pat Marcantonio, C.E.T.
Project Manager
City of Vaughan

Mark Bassingthwaite, P.Eng.
Project Manager
Clarifica Water Resources
(A Division of Cole Engineering Group Ltd.)

Workshop Participants

Community Members:
Alan Smith
Katia Reisler
Joanne Gordon
Shawna Greenwald
Terry Goodwiin
Linda Orriell
Marilyn Braude
Heather Spear
Ronit Levi-Merrick
Charles Magerman
Esther Milstein
Harold Milstein
Bill Mardimae

City Staff:
Councillor Alan Shefman
Paul Gardner, Director of Parks Development
Pat Marcantonio, Project Manager
Tom Ungar, Design Engineer

Clarifica Team:
Mark Bassingthwaite
Dan Lee
Alicia Swan

Facilitator: Karen Wianecki, Planning Solutions Inc.

1.0 Background

The City of Vaughan is investigating options to better manage stormwater runoff in the vicinity of Gallanough Park. The area has a history of flooding north of Gallanough Park and drainage concerns in this area have been the subject of considerable study over the years. The City recently completed a City-wide drainage study which led to the identification of a number of road improvements in 2007. SNC Lavalin were retained by the City to complete a detailed study of the area including drainage concerns. The SNC Report identified certain areas that required additional study – specifically in those areas where road work was being addressed. The tender for road improvements has been awarded by the City and is in various stages of completion. The SNC Lavalin Report and work completed through other studies carried out by the City identified a number of cross-culvert issues as well as specific concerns with the Brooke Street storm sewer.

The establishment of a stormwater management facility within Gallanough Park is being examined as a measure to alleviate the drainage problems. It was noted at the outset that the stormwater management improvements at Gallanough Park will not eliminate drainage concerns but will improve the situation. Utilizing Gallanough Park for stormwater management purposes is the subject of work now being completed by Clarifica, a division of Cole Engineering Group Ltd., who are completing a Class EA Study for the Gallanough Park stormwater facility. The intent is simple – construct a stormwater management facility to retain stormwater runoff from the area to the north of Gallanough Park; use that facility as a holding area for stormwater and release same into the storm sewer gradually. The intent is to control flows from the drainage area by constructing a stormwater management facility at Gallanough Park and thereby free up the capacity in the Brooke Street storm sewer to accommodate more runoff and alleviate flooding to the north of the Park.

It is important to note that the Design Charrette is <u>not</u> part of the formal EA process but has been embraced by the City as an important addition to the standard and prescribed public notice provisions provided for under the Municipal Class Environmental Assessment process. A formal Public Information Centre has been scheduled for February 25th, 2010 at which time Clarifica will present a series of options to the community for stormwater management at Gallanough Park. In preparation for the February 25th PIC, City staff felt that it would be important to connect with the community and secure input and advice in the design of stormwater management options. Having the ability to incorporate the views of the community – those who are affecting by the drainage issues and those who use Gallanough Park – will hold the Project Team in a position of strength moving forward.

The Design Charrette provided an opportunity to discuss the issues, challenges and opportunities for utilizing Gallanough Park for stormwater management purposes. The Charrette brought together community members and allowed participants to work in small teams to develop preliminary concept plans for the Park. Participants discussed their thoughts, shared their ideas and exchanged information. It was an opportunity for dialogue, deliberation and collective action.

While the Design Charrette offered a chance for community visioning and concept design, it is worth repeating that <u>this is not the only opportunity</u> for community involvement and feedback. The upcoming Public Information Centre will allow the Consulting Team to showcase in more detail, several design options based on hydrologic modelling. These options will be presented at the Public Information

Centre (PIC) and community feedback will be encouraged. Options that profile surface and subsurface stormwater storage will be considered. The options will be refined and once the EA document is completed, the options will be presented to the public, stakeholders and City Council.

The Charrette focused on producing results and, in this regard, it promoted an open forum and a fair process to allow all to participate. These proceedings document the outcome of the Design Charrette. Three preliminary design plans were developed by the three working groups, based on the collective issues and opportunities, and in alignment several critical parameters defined by the City: that the design must be 'construct-able'; that it must be cost efficient; that it must improve the current drainage concerns; and finally that it must be confined to the area of Gallanough Park.

The development of community-based concept plans represents an essential first step to involve the community in finding a solution that is responsive and supported by the community and the City.

2.0 Charrette Proceedings

The following Report captures the discussions held during the Charrette and the salient points of discussion that were raised. This Report will be shared with all who attended the Design Charrette on January 28th.

2.1 Introduction

Mark Bassingthwaite, on behalf of the Clarifica Consulting Team officially opened the meeting. He thanked participants for attending and turned the floor over to Pat Marcantonio who offered a welcome on behalf of City staff. Pat noted his pleasure at the attendance of so many community members and in particular, made mention of the attendance by Councillor Alan Shefman. Councillor Shefman (Ward 5) took the opportunity to welcome participants and expressed his support for the Design Charrette and his commitment to working with the community to seek mutually beneficial solutions.

Karen Wianecki outlined the focus for the meeting. She provided an overview of the structure and set up of the meeting; key objectives and what we hoped to achieve by the end of the session. Karen noted that while there has been a history of flooding in the broader area of the community, the purpose of the Design Charrette is to develop a concept plan for the Gallanough Park Stormwater Management Facility.

At the suggestion of Terry Goodwin, Karen explained the meaning of the term 'Charrette', noting it derives from a French term meaning cart. She indicated that it is a dynamic and engaging planning process that allows participants to develop their design drawings and concepts in a collaborative, integrated and innovative way. Karen indicated that charrettes were started in 18th century France and used predominantly among architecture and design schools. Teams were given a design challenge with a specific time horizon – their challenge was to create the best design and concept plan. Once the time had concluded, teams loaded their designs into a wheelbarrow or cart and wheeled their design drawings into a room where a Judging Panel awaited. Designs would be presented to everyone and the best design or best elements of design would be selected. Design Charrettes look at building on the knowledge of the group; they are fun, educational and entertaining and will allow the community to define the important elements that they would like to see form part of the stormwater management facility design.

2.2 Charrette Purpose & Objectives

Karen indicated the Design Charrette would provide participants with an opportunity to discuss the drainage issues facing the community and to put forward concept plans and drawings for a stormwater management facility at Gallanough Park.

She noted that the purpose of the Design Charrette was to allow participants to provide preliminary design input and advice to the Consulting Team in

relation to the Gallanough Park Stormwater Management Facility Class EA project.

Karen noted that the objectives for the Charrette were six-fold:

1. Understand the drainage concerns and the commitment made by the City to alleviate the drainage issues and make infrastructure (road and drainage) improvements.
2. Understand the scope, timeframe, deliverables and Class EA process associated with this initiative.
3. Define the constraints, the issues and the opportunities affecting Gallanough Park.
4. To understand the project objectives and what we are trying to accomplish.
5. Develop a collective sense of the design imperatives for the design of the Park.
6. Working in three small groups, to develop a preliminary design plan for the stormwater management facility that in turn will be used by the Project Team to develop the stormwater management options.
7. Understand that this is one step in a process that will continue to be evolutionary and that there will be additional opportunities, at the upcoming PIC meeting on February 25th, 2010, to review and respond to the stormwater management facility design options.

Karen indicated that the Charrette represents an important first step in crafting a mutually supported stormwater management plan for Gallanough Park that addresses the drainage concerns of the community and reflects the needs of the City to alleviate the concerns in a cost effective and efficient manner.

This Design Charrette was a starting point for more detailed and deliberate discussion that will follow, as the Consulting Team takes the input provided and translates the thoughts and concepts generated in the Charrette into a more fulsome discussion of the stormwater management options (e.g. above ground; dry pond storage; underground storage facilities, etc.)

The Design Charrette offered participants a chance to:

- Listen, hear others and learn from one another
- Reach consensus on the issues, constraints, opportunities and project design
- Increase our own individual knowledge and understanding
- Promote collaboration and strengthen our opportunities for working together
- Produce a design that is supported and focused on alleviating the drainage concerns, recognizing that the drainage issues can never be completely resolved.
- Focus on solutions that meet the needs of the community and the City, are ‘constructible’, cost effective and produce results (they improve the drainage situation).
- Provide direction to the Consulting Team that articulates what we are looking for at least from a preliminary design perspective
- Generate design ideas
- Focus on the Gallanough Park stormwater management facility as a catalyst for promoting landowner action in the area (e.g. opening up drainage ditches;

ensuring retention of pervious (permeable) cover, etc.) to further address drainage concerns.

2.3 Setting the Stage – Gallanough Park Class EA

Mark Bassingthwaite took delegates through an overview of the work completed by the Clarifica Team. He provided an overview of the hydrologic modelling and the work that Clarifica is completing for the City. Mark outlined briefly the Class EA Project schedule, referencing the upcoming Public Information Centre (PIC) meeting scheduled for February 25th, 2010.

Mark noted that the focus for the Class EA rests with Gallanough Park. Evidence suggests that there is a need to free up capacity in the existing Brooke Street storm sewer and as a result, the Consulting Team are developing a suite of options for managing stormwater and utilizing Gallanough Park for stormwater retention purposes.

It was made clear at the Design Charrette that the "slate" is a clean one – that while the Clarifica team has undertaken some preliminary hydrological modelling, they are looking to the community for design advice and suggestions. At the same time, it is important to recognize that the City and the Consulting Team face some key design imperatives and constraints that need to be taken into account:

1. Whatever design is suggested must be capable of being constructed.
2. The design must be contained within the physical site limits of Gallanough Park. (Note: Other parks in the community have been considered by the City but do not offer workable solutions given the servicing requirements to existing storm sewers as well as land tenure issues).
3. The design must be cost effective.
4. The design must achieve results - it must improve the drainage concerns.

2.4 Issues, Opportunities & Constraints

Community members shared a number of facts:

- The community has had drainage concerns for many years
- Catastrophic community-wide flooding occurred on August 19, 2005 when damage was extensive
- The western entrance to Gallanough Park at the intersection of Springfield Way and Tanjo Court, has been subject to regular flooding (2 feet) for many years
- Gallanough Park was originally designed to hold water – hence the extensive depressed design and bowl like appearance of the Park
- The community has transitioned over the years and many new and larger homes have resulted in less permeable cover (pervious cover) meaning that stormwater is unable to percolate into the soil.
- Residents have filled in drainage ditches and swales and constructed swimming pools and larger homes on the existing lots also adding to the drainage issue.

Despite these challenges, it was noted that Gallanough Park is a well used park that sees high level of use from an array of users. Tobogganing in the winter, walking year round, use of the gazebo by residents and use of the park by children in the

summer (camps) as well as the parkette facilities suggests the park use must be retained over the long term. Community members also pointed out some of the less than desirable uses of Gallanough Park – the fact that youth are attracted to the area after dark and that there have been issues of loitering and vandalism, drug use and alcohol in the park. It was suggested that the Design Charrette consider ways of improving the drainage situation but also address some of these other issues that are affecting the community and its use of Gallanough Park.

Participants were asked to complete individual index cards highlighting their critical concerns and opportunities to address these concerns. The results of the individual assessment are included in Appendix A.

Collectively, participants discussed the concerns they shared and the opportunities that a stormwater management facility at Gallanough Park offers. The following reflects the key points of discussion that were raised:

Issues	*Opportunities*
Aesthetics – large hole in the ground; unsightly;	Permeable Surface material
Loss of the Park; Loss of Greenspace	Could increase the utility of the Park; Would allow the Park to be 'reworked' to make it more useable
Human Health Issues – stagnant water; spread of West Nile virus; current water ponding	Will force the issue of drainage to be considered more broadly as well as the broader solutions: - Interim moratorium on new development - No new flows from new development
Cost	
Not a complete solution – it will only mitigate; it will not eliminate the issue	
Focuses the problem on Gallanough	
Potential Water table impacts	

Participants were asked to consider the needs of the City (cost effectiveness; drainage results and the spatial limits of Gallanough Park) and how these needs could be translated into a concept plan that addresses community issues.

Charrette participants identified the following list of constraints and issues that need to be considered in the development of any design plan. These are captured in brief below:

Loss of Park:	The loss of Gallanough Park generally.
Regular Flooding @ West Side of Park:	The entranceway to the park at the west side is regularly flooded. Any concept plan must address this.
Aesthetics:	Maintain the park and the greenspace.
Diverse Demographics:	Maintain the diversity of uses and users. Consider the blend of uses and users (School, Day Care, Summer

	Camp, Dog Walkers, Children; Tobogganers, etc.) Retain uses but consider creating an even more dynamic demographic with a broader range of park offerings.
Community Safety	There are issues right now with youth, crime, vandalism, drug use and alcohol. Need to think about community safety and improving the safety of the park. Any design must be safe and must not create a public safety issue. Any design must not exacerbate the existing flooding situation.
Public Health	Any design must take public health into account (e.g. standing water; potential for the spread of disease, etc.)
Cost Effective	Any design must be cost effective.
Maintenance	Any design must consider the long term maintenance.
Tangible Results	Any design must produce results. It must improve the flooding situation.
Relevant, Buildable & Functional	Need to recognize that any design needs to be 'buildable' and remain functional over the long term.
Public Access	Gallanough Park is a well used park. Public access to the park must be maintained.

2.5 Small Working Groups

Delegates were divided into three (3) smaller working groups. Each group was charged with the responsibility of developing a preliminary design plan for the Park, with an emphasis on stormwater management.

Groups were provided with a set of instructions and a package of resources including copies of base maps, a toolkit with the requisite pens, pencils and working materials. A resource centre was established in the room that was accessible to all three design teams. The resource centre included background documents and studies. The groups each elected a timekeeper, a recorder and a spokesperson. They were given an hour to develop their preliminary design plan.

2.6 Group Report Back

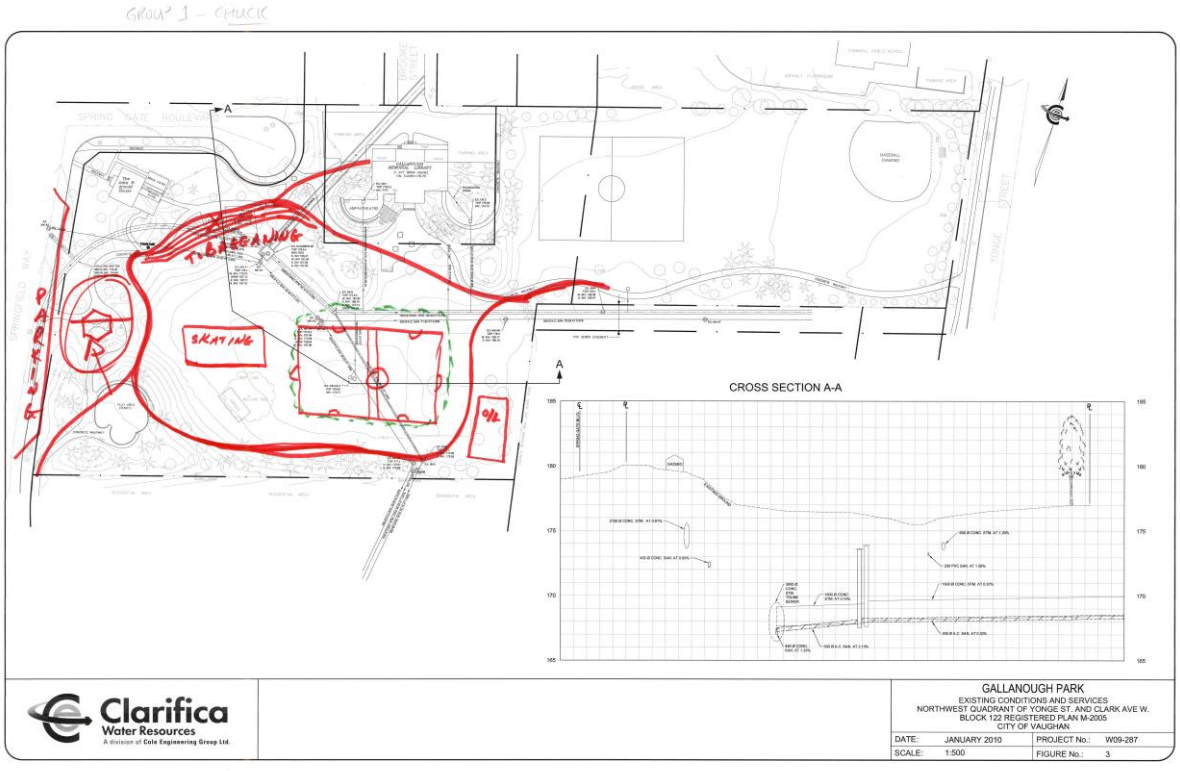
Group 1: Chuck's group

Group 1 developed a preliminary design plan that reflects a Master Concept Plan for the Park.

Stormwater Management Facility Design: Underground

The concept plan developed by Group 1 emphasized underground storage. A key design element was the need to increase the utility of the park and to address issues with safety and youth vandalism. Key elements of the design included the following:

- Bury the stormwater management facility as this would retain the park for park purposes, it would address issues of community safety, human health concerns (stagnant or ponding water and the like).
- Use the soil generated from the site to redesign other components of the park
- Tobogganing hills are a real winter-time draw; additional berming could be done to enhance existing toboggan areas
- Move the gazebo and use the existing on-site soil to reconfigure the site where the gazebo sits presently
- Incorporate walking trails around the perimeter of the park – could be used for walking, jogging, etc.
- Move the existing playground which is presently on a hill and is being used by teens
- Move the gazebo to the middle of the playground area which would create a junior and senior playground area
- Remove several of the berms that inhibit the use of the park
- Once the underground storage facility is complete, level the ground and use this as a full soccer field
- Use the shade from the existing willow tree to create a skating pond
- Consider a fenced off-leash dog area on the eastern perimeter of the park (it is currently being used for this purpose – legitimize it but create rules of use)



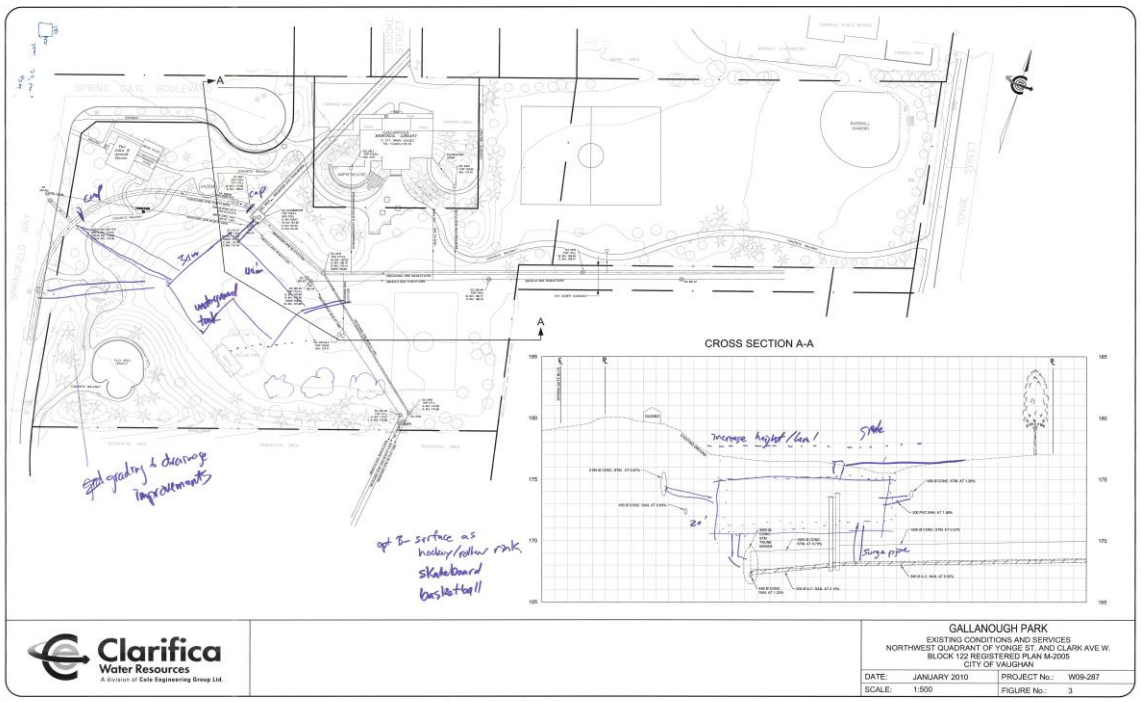
Group 2: Alan's Group

Stormwater Management Facility Design: Underground

The concept plan developed by Group 2 emphasized underground storage of stormwater. A key design element was the need to increase the utility of the park and to address issues with safety and youth vandalism. Key elements of the design included the following:

- Recognize that the purpose is to divert water
- Need to rework the west side of the park to address persistent flooding
- Reuse the soil for on-site grading improvements
- Consider a skating rink or skateboard park on top of the underground storage
- Consider incorporating new safety features – better lighting; play music (classical) in the Gazebo to dissuade loitering

The preliminary design plan submitted by Group 2 has been scanned below.



Group 3: Shawn's Group

Stormwater Management Facility Design: Underground

Group 3 developed two design plans that included a number of critical design fundamentals. Both designs emphasized underground storage so that the park site could continue and be enhanced.

Plan A:

Key elements of the first design included the following:

- Two toboggan areas
- Jogging track
- Need to retain the park aesthetics
- Incorporate noisier uses where the gazebo is presently located

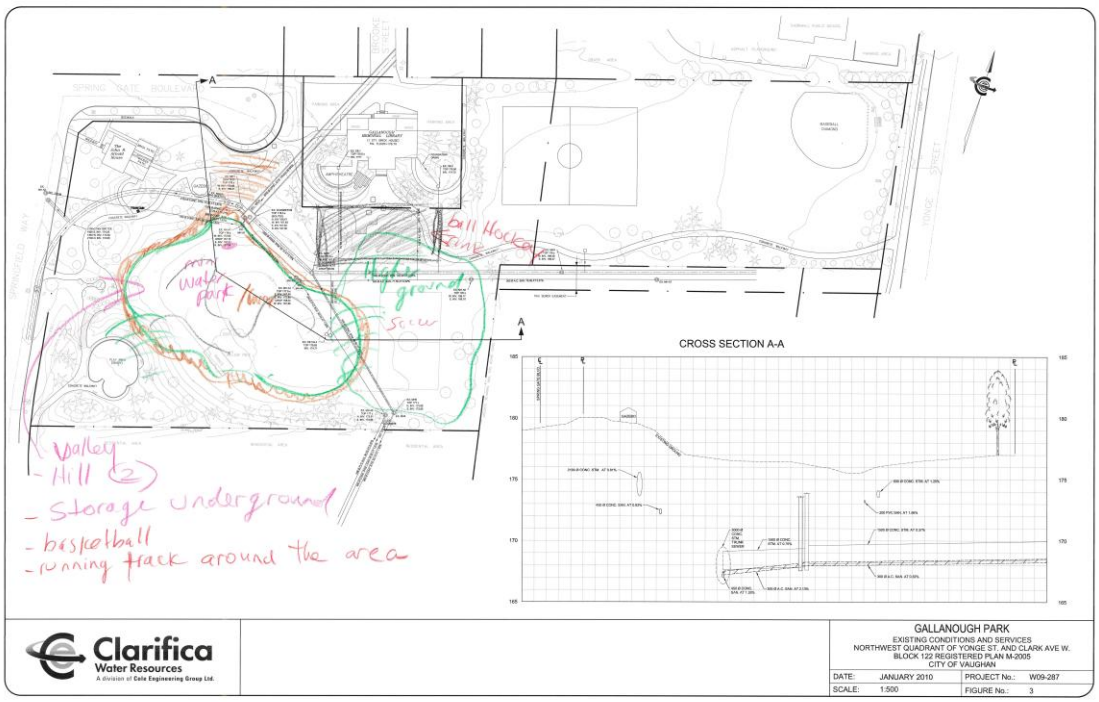
The first preliminary design plan submitted by Group 3 appears below.

Plan B:

Key elements of the second concept plan included the following:

- Toboggan runs
- Water park
- Rubber rock and sprinklers
- Ball hockey or basketball nets close to Gallanough Library
- Jogging track around the park periphery
- Use the higher ground for a soccer area

The second preliminary design plan submitted by Group 3 appears below:


CROSS SECTION A-A
Valley
Hill
- storage underground
- basketball
- running track around the area
Clarifica
Water Resources
GALLANOUGH PARK
EXISTING CONDITIONS AND SERVICES
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2005
CITY OF VAUGHAN
DATE: JANUARY 2010
PROJECT No.: W09-287
SCALE: 1:500
FIGURE No.: 3

3.0 Summary & Conclusions

Karen Wianecki provided an overview of the meeting accomplishments. She noted that the session had been arranged to promote information exchange and idea generation. Karen noted several critical take-aways from the Design Charrette:

1. There is a drainage issue in the community that is critical, long-standing and of concern to both the City and residents.

2. Gallanough Park offers an opportunity to improve the drainage conditions to the north of the Park.

3. The construction of a stormwater management facility at Gallanough Park will not eliminate the drainage concerns – it will only improve the situation by creating more capacity in the Brooke Street storm sewer.

4. Any facility at Gallanough Park needs to consider:
    - Cost effectiveness
    - The high use of the park by residents
    - The need for an aesthetic solution that meets the needs of the community
    - 'Constructability' of the design
    - Public safety and security (e.g. ponding water, ice; park vagrants, etc.)

5. There may be opportunities to enhance the park – expand its uses and users; increase safety; retain existing uses and honour existing users but make it 'better.'

6. There are water concerns that go beyond Vaughan. We don't want to lose sight of the bigger picture but we are focusing our efforts on Gallanough Park at this time.

7. There is a need over the long term to consider drainage issues as a whole in Vaughan and whether there may be an opportunity to consider some 'joined up solutions' with Markham as well as the need for additional safety measures (e.g. Interim Moratorium on New Development until the problem is solved; open drainage requirements; no filling in of ditches or swales in the area, landowner education and outreach, etc.)

Mark Bassingthwaite, on behalf of Clarifica, took the opportunity to thank all who participated. All participants agreed the Charrette had been rewarding and valuable, and that a great deal of innovation had emerged from the small group discussions. The four plans that emerged from the three working groups demonstrated a remarkable degree of similarity in terms of the design fundamentals.

There was a great degree of excitement in the room concerning the promise that these plans hold for Gallanough Park and the inherent value of working together to find solutions that are of mutual benefit to the community and to the City.

Meeting concluded at 8:30 pm.

Appendix A

Individual Reflection – Critical Issues & Solutions

Participants took the time to complete individual index cards, citing their critical concerns and how these concerns could be addressed. These individual reflections have been categorized into key areas for presentation purposes and appear below:

Critical Concerns/Issues:

Public Health & Safety:

- Safety (Drowning, Ice, Mosquitoes)
- Safety Issue – Thornhill Public School
- Safety Issue – Northwood Pre-School
- Safety Issue – Children Using Gallanough Library
- Safety for children and people in general.
- Safety hazard to children or animals (large drop offs, standing water)
- West Nile Virus
- Water may attract undesirable elements (e.g. mosquitoes, animals)
- West Nile Virus. With so much water sitting around, we need to resolve this sooner rather than later.

Loss Of Use:

- Can this be done at a reasonable cost?
- Utility of the Park – Preserve It
- Aesthetics of the Park – it is a park!
- Would not be able to use amphitheatre due to safety concerns.
- Park is well used at present – would take away the use of the park.
- Will pond area be taken away from useable park area?
- The children and families in the area really depend on the park and public school and programs.
- Facility will blend in to park/not alter uses of the park.

Scope of Improvements/Economic Impacts:

- Stormwater Solution? – this will only mitigate, it will not 'solve' the problem
- Is the park operating as designed? How much water has to be stored?
- The Facility will not resolve the flooding problem, so why spend money on this and destroy a good park facility for the neighbourhood.
- Will the facility meet the design objectives (quantity, model)?
- Will cause surcharging of other sewers/drains that feed the park.
- Facility itself will cause flooding of adjacent properties.

Environmental Impacts:

- What is this doing or does it affect the water table that may rise during flooding.

Options for Resolution:

Underground Storage:

- Bury the Holding Facility
- Utility as a Park – bury the facility
- Make it mostly underground

Surface Storage:

- Keep area open as only 12-24 hour water hold. No worse than a creek in a park.

Explore Other Stormwater Capacity Options:

- Explore other options – increase capacity along Brooke Street Storm sewer
- Can a second 'surcharge' pipe be constructed on Brooke Street at a higher elevation? (Not as deep?)
- We need more pipes running in different areas that carry the water to the river.

Other Engineering Solutions:

- Upkeep the landscape and other maintenance of the area so water goes where it is supposed to go.
- Slant streets and level areas in Gallanough to get the water to the right place

Bigger Picture Solutions:

- No more new housing and development in this area until the water issue is resolved.

Appendix B

Input/Output Data and Results

Existing Condition Input

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
START_DATE           12/22/2009
START_TIME           00:00:00
REPORT_START_DATE    12/22/2009
REPORT_START_TIME    00:00:00
END_DATE             12/22/2009
END_TIME             08:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:05:00
WET_STEP             00:05:00
DRY_STEP             01:00:00
ROUTING_STEP         0:00:30
ALLOW_PONDING        YES
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
CONSTANT     0.0

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAIN             INTENSITY 0:10   1.0    TIMESERIES 2YR_6HR_CHI

[SUBCATCHMENTS]
;;                                                  Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
;DRAINAGE AREA 1
A1               RAIN             ex._mh_4         16.04    82.4     490      2.4      0
```

Existing Condition Input

```
;DRAINAGE AREA 2
A2                RAIN              ex._mh_5          3.41     33        225       2.4       0
;DRAINAGE AREA 3
A3                RAIN              ex._2100x2100x1350_tee 150.71   40.6      1500      0.9       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1                0.013      0.024      1          1.5        25         OUTLET
A2                0.013      0.024      1          1.5        25         OUTLET
A3                0.013      0.024      1          1.5        25         OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
A1                50         7.5        2          0          0
A2                50         7.5        2          0          0
A3                50         7.5        2          0          0

[JUNCTIONS]
;;                Invert     Max.       Init.      Surcharge  Ponded
;;Name            Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
EX._MH_3          167.87     9.63       0          0          0
;Gallanough Park
CHAMBER_9         166.47     12.03      0          0          0
;ARNOLD AVENUE
CHAMBER_8         166.05     8.678      0          0          0
;THORNRIDGE DRIVE
CHAMBER_7         165.522    10.761     0          0          0
;CENTRE STREET (HIGHWAY 7B)
CHAMBER_6         164.466    10.334     0          0          0
CHAMBER_5         161.822    9.36       0          0          0
;INFLOW FROM TRIBUTARY 3. 0.35 CMS IS THE CAPACITY
;OF THE DITCH INLET STORM PIPE CONNECTION.
TRIBUTARY_3       171.55     2.45       0          0          0
;INFLOW FROM TRIBUTARY 2. 1.19 CMS IS THE CAPACITY
;OF THE DITCH INLET STORM PIPE CONNECTION.
TRIBUTARY_2       171.15     2.85       0          0          0
;INPUT FLOW FROM 2100mm DIA. CENTRE STREET.
CENTRE_STREET     165        10         0          0          0
to_YONGE          173.5      0          0          0          0
EX._2100x2100x1350_TEE 174.08     4.92       0          0          0
EX._MH_5          173.89     3.11       0          0          0
EX._MH_4          168.47     7.53       0          0          0

[OUTFALLS]
```

Existing Condition Input

```
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
EAST_DON         160.705    FREE                        NO
;Overland Flow towards Yonge Street
;during major storm events.
MARKHAM          173        FREE                        NO

[STORAGE]
;;               Invert   Max.     Init.    Shape      Shape                     Ponded   Evap.
;;Name           Elev.    Depth    Depth    Curve      Params                    Area     Frac.    Infiltration Parameters
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- -------- ----------------------
;Storage volume available in existing Gallanough Park.
EX_PARK          175.5    2.5      0        TABULAR    EX_PARK                   0        0

[CONDUITS]
;;               Inlet            Outlet                      Manning    Inlet      Outlet     Init.      Max.
;;Name           Node             Node             Length     N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
2100             EX._2100x2100x1350_TEE CHAMBER_9        72.93      0.013      *          173.490    0          0
600              EX._MH_5         EX._MH_3         58.50      0.013      *          173.14     0          0
1500_1           EX._MH_4         EX._MH_3         102.28     0.013      *          168.100    0          0
1500_2           EX._MH_3         CHAMBER_9        32.14      0.013      *          167.630    0          0
3000_1           CHAMBER_9        CHAMBER_8        174.50     0.013      *          *          0          0
3000_2           CHAMBER_8        CHAMBER_7        179.2      0.013      *          *          0          0
3000_3           CHAMBER_7        CHAMBER_6        345.2      0.013      *          *          0          0
3000_4           CHAMBER_6        CHAMBER_5        328        0.013      *          *          0          0
3000_5           CHAMBER_5        EAST_DON         95.5       0.013      *          *          0          0
DICB_375         TRIBUTARY_3      CHAMBER_8        10         0.013      *          171.15     0          0
DICB_600         TRIBUTARY_2      CHAMBER_8        10         0.013      *          170.75     0          0
;2100 mm diameter @ 0.6% slope (slope is estimated
;based on P/P drawing).  Resulting full flow
;input to the Brooke Street trunk sewer is 13.43 cms.
;This model uses 15 cms for all storm events.
2100_CEN         CENTRE_STREET    CHAMBER_6        10         0.013      *          164.846    0          0
OVERLAND_2       EX._MH_5         EX_PARK          50         .03        176.5      175.50     0          0
OVERLAND_4       EX_PARK          to_YONGE         150        .03        176.0      174.5      0          0
OVERLAND_3       EX._MH_4         to_YONGE         50         .03        174        173.5      0          0
LINK             to_YONGE         MARKHAM          10         0.013      *          *          0          0
;Upstream invert set at obvert of 2100mm pipe to
;simulate major flow into pond.
OVERLAND_1       EX._2100x2100x1350_TEE EX_PARK          50         0.03       176.18     175.50     0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
2100             CIRCULAR     2.1              0          0          0          1
```

Existing Condition Input

```
600              CIRCULAR     .6              0          0          0          1
1500_1           CIRCULAR     1.5             0          0          0          1
1500_2           CIRCULAR     1.5             0          0          0          1
3000_1           CIRCULAR     2.67            0          0          0          1
3000_2           CIRCULAR     2.67            0          0          0          1
3000_3           CIRCULAR     2.67            0          0          0          1
3000_4           CIRCULAR     2.67            0          0          0          1
3000_5           CIRCULAR     2.67            0          0          0          1
DICB_375         CIRCULAR     .375            0          0          0          1
DICB_600         CIRCULAR     .6              0          0          0          1
2100_CEN         CIRCULAR     2.1             0          0          0          1
OVERLAND_2       TRAPEZOIDAL  1               15         3          3          1
OVERLAND_4       TRAPEZOIDAL  .5              30         3          3          1
OVERLAND_3       TRAPEZOIDAL  1               30         3          3          1
LINK             DUMMY        0               0          0          0          1
OVERLAND_1       TRAPEZOIDAL  .5              15         3          3          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
TRIBUTARY_3      FLOW             ""               FLOW     1.0      1.0      0.35     Pattern
TRIBUTARY_2      FLOW             ""               FLOW     1.0      1.0      1.19     Pattern
CENTRE_STREET    FLOW             ""               FLOW     1.0      1.0      15       Pattern

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
EX_PARK          Storage    0          13
EX_PARK                     1          2422
EX_PARK                     1.5        6660
EX_PARK                     2.0        8900

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
2YR_6HR_CHI      FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\2YR 6HR CHI.DAT"

5YR_6HR_CHI      FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\5YR 6HR CHI.DAT"
```

Existing Condition Input

```
10YR_6HR_CHI     FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\10YR 6HR CHI.DAT"

25YR_6HR_CHI     FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\25YR 6HR CHI.DAT"

50YR_6HR_CHI     FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\50YR 6HR CHI.DAT"

100YR_6HR_CHI    FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\100YR 6HR CHI.DAT"

[PATTERNS]
;;Name           Type       Multipliers
;;-------------- ---------- -----------
Pattern          HOURLY     .5    1     1     1     1     1
Pattern                     1     1     1     1     1     1
Pattern                     1     1     1     1     1     1
Pattern                     1     1     1     1     1     1

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
Subcatch  A1               A1
Subcatch  A2               A2
Subcatch  A3               A3

[MAP]
DIMENSIONS -266.803 582.620 11270.811 14371.426
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX._MH_3         6568.807           7972.694
CHAMBER_9        4045.506           7978.411
CHAMBER_8        4591.688           8891.699
CHAMBER_7        4582.734           9849.756
CHAMBER_6        4582.734           10986.889
CHAMBER_5        4582.734           12562.759
TRIBUTARY_3      725.919            8529.604
TRIBUTARY_2      752.234            10253.204
```

Existing Condition Input

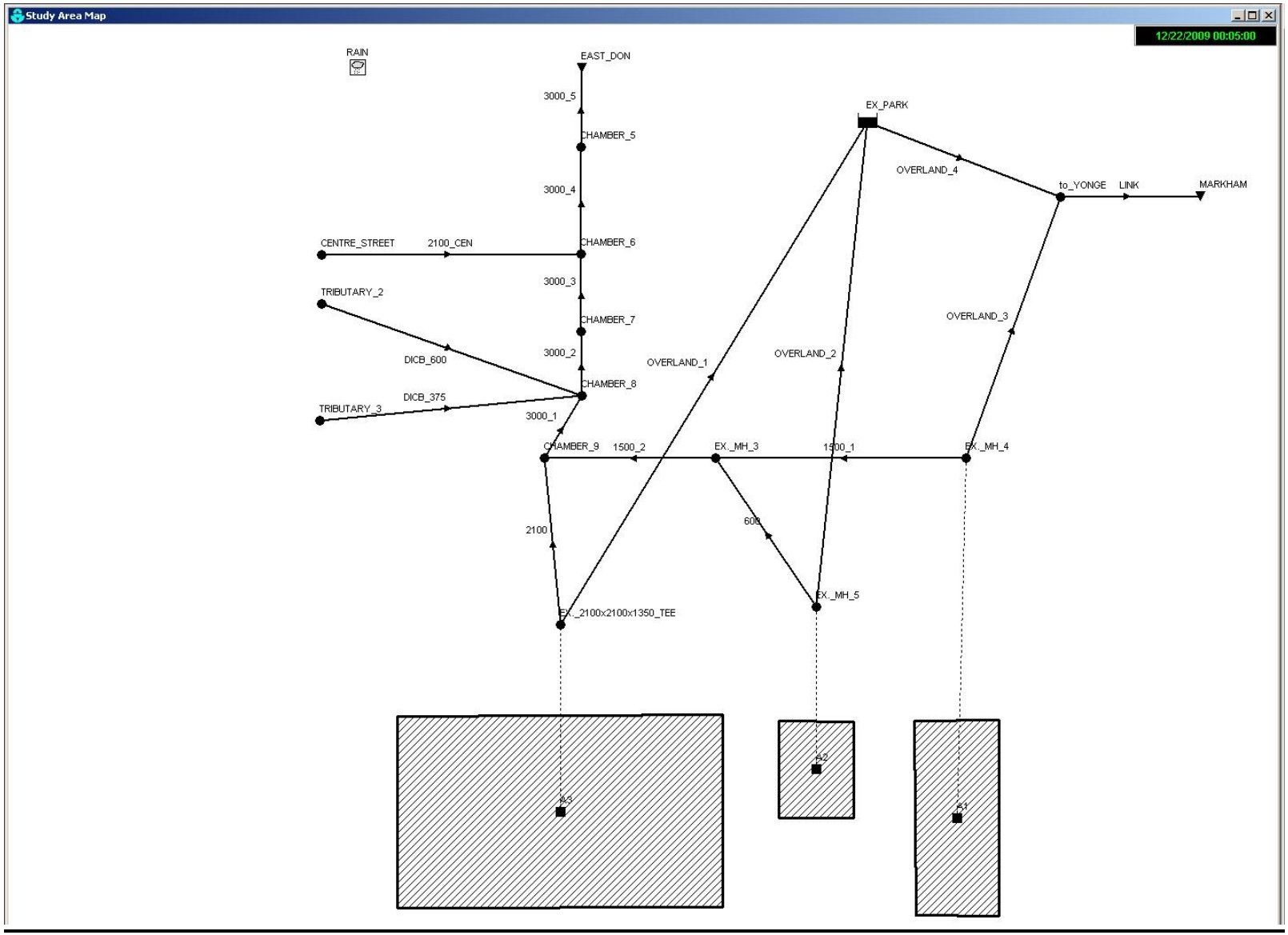
```
CENTRE_STREET    752.234           10976.854
to_YONGE         11659.601         11832.075
EX._2100x2100x1350_TEE 4278.379          5516.592
EX._MH_5         8054.512          5779.737
EX._MH_4         10264.931         7976.999
EAST_DON         4600.642          13744.662
MARKHAM          13725.290         11845.233
EX_PARK          8804.476          12937.285

[VERTICES]
;;Link           X-Coord           Y-Coord
;;-------------- ----------------- -----------------

[Polygons]
;;Subcatchment   X-Coord           Y-Coord
;;-------------- ----------------- -----------------
A1               10746.374         4110.148
A1               10746.374         1209.384
A1               9525.000          1228.468
A1               9505.916          4100.606
A2               8609.716          4088.285
A2               8609.716          2666.529
A2               7502.846          2666.529
A2               7502.846          4097.827
A3               1867.776          4156.160
A3               1867.776          1331.732
A3               6676.936          1341.274
A3               6676.936          4184.786

[SYMBOLS]
;;Gage           X-Coord           Y-Coord
;;-------------- ----------------- -----------------
RAIN             1307.909          13733.055
```

Existing Condition Output



Existing Condition Output

2 Year Chicago Storm – 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 08:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Existing Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link DICB_375
WARNING 03: negative offset ignored for Link DICB_600
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link LINK
WARNING 03: negative offset ignored for Link LINK
WARNING 02: maximum depth increased for Node EX._MH_5

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         6.492        38.152
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         3.432        20.168
Surface Runoff ...........         2.984        17.534
Final Surface Storage ....         0.092         0.541
Continuity Error (%) .....        -0.240

**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         2.985        29.848
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        44.654       446.549
External Outflow .........        47.442       474.425
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.211         2.112
Continuity Error (%) .....        -0.029

***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (99.98%)

*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Existing Condition Output

```
************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     0.77 sec
Maximum Time Step           :     1.66 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------------------
                        Total    Total    Total    Total    Total       Total      Peak  Runoff
                       Precip    Runon     Evap    Infil   Runoff      Runoff    Runoff   Coeff
Subcatchment               mm       mm       mm       mm       mm    10^6 ltr       CMS
-----------------------------------------------------------------------------------------------
A1                     38.152    0.000    0.000    5.778   31.840       5.107    2.833   0.835
A2                     38.152    0.000    0.000   22.390   15.752       0.537    0.455   0.413
A3                     38.152    0.000    0.000   21.650   16.052      24.192    9.696   0.421
-----------------------------------------------------------------------------------------------
System                 38.152    0.000    0.000   20.168   17.534      29.837   12.984   0.460


******************
Node Depth Summary
******************

-----------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max
                                Depth    Depth      HGL   Occurrence
Node                 Type      Meters   Meters   Meters  days hr:min
-----------------------------------------------------------------------
EX._MH_3             JUNCTION     0.14     0.78   168.65     0  02:10
CHAMBER_9            JUNCTION     0.36     1.84   168.31     0  02:10
CHAMBER_8            JUNCTION     0.65     1.84   167.89     0  02:11
CHAMBER_7            JUNCTION     0.64     1.86   167.38     0  02:12
CHAMBER_6            JUNCTION     1.44     2.15   166.61     0  02:13
CHAMBER_5            JUNCTION     1.28     1.84   163.66     0  02:13
TRIBUTARY_3          JUNCTION     0.29     0.59   172.14     0  01:00
TRIBUTARY_2          JUNCTION     0.46     1.65   172.80     0  01:00
CENTRE_STREET        JUNCTION     1.26     1.85   166.85     0  01:00
to_YONGE             JUNCTION     0.00     0.00   173.50     0  00:00
EX._2100x2100x1350_TEE JUNCTION     0.26     1.21   175.29     0  02:10
EX._MH_5             JUNCTION     0.05     0.35   174.24     0  02:10
```

Existing Condition Output

EX._MH_4	JUNCTION	0.16	0.89	169.36	0	02:10
EAST_DON	OUTFALL	1.28	1.84	162.54	0	02:13
MARKHAM	OUTFALL	0.00	0.00	173.00	0	00:00
EX_PARK	STORAGE	0.00	0.00	175.50	0	00:00

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_3	JUNCTION	0.000	3.249	0	02:10	0.000	5.652
CHAMBER_9	JUNCTION	0.000	12.982	0	02:10	0.000	29.844
CHAMBER_8	JUNCTION	0.000	14.563	0	02:10	0.000	71.406
CHAMBER_7	JUNCTION	0.000	14.435	0	02:11	0.000	71.277
CHAMBER_6	JUNCTION	0.000	29.270	0	02:12	0.000	475.973
CHAMBER_5	JUNCTION	0.000	29.033	0	02:13	0.000	475.014
TRIBUTARY_3	JUNCTION	0.350	0.350	0	01:00	9.449	9.449
TRIBUTARY_2	JUNCTION	1.190	1.190	0	01:00	32.128	32.128
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	404.975	404.970
to_YONGE	JUNCTION	0.000	0.000	0	00:00	0.000	0.000
EX._2100x2100x1350_TEE	JUNCTION	9.692	9.692	0	02:10	24.195	24.195
EX._MH_5	JUNCTION	0.455	0.455	0	02:10	0.540	0.540
EX._MH_4	JUNCTION	2.832	2.832	0	02:10	5.112	5.112
EAST_DON	OUTFALL	0.000	29.095	0	02:13	0.000	474.423
MARKHAM	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
EX_PARK	STORAGE	0.000	0.000	0	00:00	0.000	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
TRIBUTARY_3	JUNCTION	0.01	0.212	1.863
TRIBUTARY_2	JUNCTION	0.01	1.053	1.197

Existing Condition Output

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EX_PARK	0.000	0	0.000	0	0 00:00	0.000

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	16.649	29.095	474.423
MARKHAM	0.00	0.000	0.000	0.000
System	49.99	16.649	29.095	474.423

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	9.736	0 02:10	4.78	0.62	0.57
600	CONDUIT	0.451	0 02:10	2.63	0.65	0.59
1500_1	CONDUIT	2.804	0 02:10	2.64	0.66	0.58

Existing Condition Output

1500_2	CONDUIT	3.262	0	02:10	3.52	0.53	0.52
3000_1	CONDUIT	13.023	0	02:10	3.19	0.81	0.68
3000_2	CONDUIT	14.435	0	02:11	3.53	0.81	0.69
3000_3	CONDUIT	14.274	0	02:12	3.20	0.78	0.74
3000_4	CONDUIT	29.033	0	02:13	6.48	0.98	0.75
3000_5	CONDUIT	29.095	0	02:13	7.09	0.82	0.69
DICB_375	CONDUIT	0.365	0	01:00	3.62	1.04	1.00
DICB_600	CONDUIT	1.302	0	01:00	5.07	1.06	1.00
2100_CEN	CONDUIT	17.937	0	01:00	7.72	0.83	0.82
OVERLAND_2	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND_4	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
LINK	DUMMY	0.000	0	00:00			
OVERLAND_1	CONDUIT	0.000	0	00:00	0.00	0.00	0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----						Avg.	Avg.
	/Actual		Up	Down	Sub	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Number	Change
2100	1.00	0.02	0.00	0.00	0.00	0.00	0.98	1.48	0.0000
600	1.00	0.02	0.00	0.00	0.00	0.00	0.98	1.45	0.0000
1500_1	1.00	0.02	0.00	0.00	0.00	0.00	0.98	0.99	0.0000
1500_2	1.00	0.02	0.00	0.00	0.00	0.00	0.98	1.34	0.0000
3000_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.39	0.0000
3000_2	1.00	0.00	0.00	0.00	0.04	0.96	0.00	1.04	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.39	0.0000
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	1.77	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	1.98	0.0000
DICB_375	1.00	0.00	0.00	0.00	0.00	0.00	0.00	2.07	0.0000
DICB_600	1.00	0.00	0.00	0.00	0.00	0.00	0.00	2.31	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.00	0.06	0.00	2.05	0.0000
OVERLAND_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

****
Conduit Surcharge Summary
****

Existing Condition Output

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
DICB_375	0.01	0.01	0.01	0.01	0.01
DICB_600	0.01	0.01	0.01	0.01	0.01
LINK	8.00	8.00	8.00	8.00	0.01

Analysis begun on: Wed Mar 17 09:56:05 2010
Analysis ended on: Wed Mar 17 09:56:07 2010
Total elapsed time: 00:00:02

Existing Condition Output

5 Year Chicago Storm – 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 08:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Existing Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link DICB_375
WARNING 03: negative offset ignored for Link DICB_600
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link LINK
WARNING 03: negative offset ignored for Link LINK
WARNING 02: maximum depth increased for Node EX._MH_5

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         8.580        50.425
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.042        23.755
Surface Runoff ...........         4.472        26.281
Final Surface Storage ....         0.094         0.552
Continuity Error (%) .....        -0.324

**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         4.475        44.754
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        44.654       446.549
External Outflow .........        48.935       489.351
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.211         2.113
Continuity Error (%) .....        -0.033

***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (98.34%)
Link DICB_600 (1.63%)

*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Existing Condition Output

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.77 sec
Maximum Time Step : 1.66 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.01

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	50.425	0.000	0.000	6.668	43.381	6.958	4.254	0.860
A2	50.425	0.000	0.000	25.758	24.869	0.848	0.775	0.493
A3	50.425	0.000	0.000	25.528	24.493	36.914	16.211	0.486
System	50.425	0.000	0.000	23.755	26.281	44.721	21.240	0.521

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_3	JUNCTION	0.17	2.22	170.09	0 02:12
CHAMBER_9	JUNCTION	0.44	3.54	170.01	0 02:13
CHAMBER_8	JUNCTION	0.71	3.47	169.52	0 02:13
CHAMBER_7	JUNCTION	0.70	4.88	170.40	0 02:11
CHAMBER_6	JUNCTION	1.47	4.52	168.99	0 02:11
CHAMBER_5	JUNCTION	1.30	2.11	163.93	0 02:14
TRIBUTARY_3	JUNCTION	0.29	0.59	172.14	0 01:00
TRIBUTARY_2	JUNCTION	0.46	1.65	172.80	0 01:00
CENTRE_STREET	JUNCTION	1.28	4.13	169.13	0 02:11
to_YONGE	JUNCTION	0.00	0.00	173.50	0 00:00
EX._2100x2100x1350_TEE	JUNCTION	0.31	1.87	175.95	0 02:10

Existing Condition Output

EX._MH_5	JUNCTION	0.06	0.58	174.47	0	02:10
EX._MH_4	JUNCTION	0.19	1.89	170.36	0	02:12
EAST_DON	OUTFALL	1.30	2.10	162.81	0	02:14
MARKHAM	OUTFALL	0.00	0.00	173.00	0	00:00
EX_PARK	STORAGE	0.00	0.00	175.50	0	00:00

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_3	JUNCTION	0.000	4.901	0	02:09	0.000	7.789
CHAMBER_9	JUNCTION	0.000	20.592	0	02:10	0.000	44.737
CHAMBER_8	JUNCTION	0.000	21.649	0	02:10	0.000	86.300
CHAMBER_7	JUNCTION	0.000	20.797	0	02:10	0.000	86.170
CHAMBER_6	JUNCTION	0.000	34.589	0	02:10	0.000	490.866
CHAMBER_5	JUNCTION	0.000	34.264	0	02:11	0.000	489.939
TRIBUTARY_3	JUNCTION	0.350	0.350	0	01:00	9.449	9.449
TRIBUTARY_2	JUNCTION	1.190	1.190	0	01:00	32.128	32.128
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	404.976	404.970
to_YONGE	JUNCTION	0.000	0.000	0	00:00	0.000	0.000
EX._2100x2100x1350_TEE	JUNCTION	16.208	16.208	0	02:10	36.931	36.932
EX._MH_5	JUNCTION	0.775	0.775	0	02:10	0.854	0.854
EX._MH_4	JUNCTION	4.252	4.252	0	02:10	6.968	6.968
EAST_DON	OUTFALL	0.000	34.248	0	02:14	0.000	489.348
MARKHAM	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
EX_PARK	STORAGE	0.000	0.000	0	00:00	0.000	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CHAMBER_7	JUNCTION	0.11	2.212	5.879
CHAMBER_6	JUNCTION	0.15	1.853	5.811

Existing Condition Output

```
TRIBUTARY_3          JUNCTION        0.01          0.212        1.863
TRIBUTARY_2          JUNCTION        0.01          1.053        1.197
CENTRE_STREET        JUNCTION        0.18          2.028        5.872


**********************
Node Flooding Summary
**********************

No nodes were flooded.


***********************
Storage Volume Summary
***********************

-------------------------------------------------------------------------------------
                       Average     Avg       Maximum     Max    Time of Max    Maximum
                        Volume    Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit           1000 m3    Full       1000 m3    Full    days hr:min        CMS
-------------------------------------------------------------------------------------
EX_PARK                  0.000       0         0.000       0       0  00:00      0.000


************************
Outfall Loading Summary
************************

-------------------------------------------------------------
                     Flow       Avg.      Max.       Total
                     Freq.      Flow      Flow      Volume
Outfall Node         Pcnt.       CMS       CMS    10^6 ltr
-------------------------------------------------------------
EAST_DON            99.99    17.089    34.248     489.348
MARKHAM              0.00     0.000     0.000       0.000
-------------------------------------------------------------
System              49.99    17.089    34.248     489.348


*******************
Link Flow Summary
*******************

-------------------------------------------------------------------------------
                              Maximum  Time of Max   Maximum    Max/    Max/
                               |Flow|   Occurrence  Velocity    Full    Full
Link                 Type         CMS  days hr:min     m/sec    Flow   Depth
```

Existing Condition Output

2100	CONDUIT	16.141	0	02:10	5.18	1.03	0.89
600	CONDUIT	0.753	0	02:10	2.84	1.08	0.94
1500_1	CONDUIT	4.154	0	02:09	2.93	0.98	1.00
1500_2	CONDUIT	4.677	0	02:09	3.65	0.77	1.00
3000_1	CONDUIT	20.109	0	02:10	3.59	1.25	1.00
3000_2	CONDUIT	20.797	0	02:10	3.75	1.16	1.00
3000_3	CONDUIT	19.599	0	02:10	3.52	1.08	1.00
3000_4	CONDUIT	34.264	0	02:11	6.56	1.16	0.89
3000_5	CONDUIT	34.248	0	02:14	7.24	0.96	0.79
DICB_375	CONDUIT	0.365	0	01:00	3.62	1.04	1.00
DICB_600	CONDUIT	1.302	0	01:00	5.07	1.06	1.00
2100_CEN	CONDUIT	17.937	0	01:00	7.72	0.83	1.00
OVERLAND_2	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND_4	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
LINK	DUMMY	0.000	0	00:00			
OVERLAND_1	CONDUIT	0.000	0	00:00	0.00	0.00	0.00

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
2100	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.48	0.0001
600	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.46	0.0001
1500_1	1.00	0.02	0.00	0.00	0.01	0.00	0.00	0.97	0.99	0.0001
1500_2	1.00	0.02	0.00	0.00	0.02	0.01	0.00	0.95	1.32	0.0000
3000_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.41	0.0001
3000_2	1.00	0.00	0.00	0.00	0.06	0.94	0.00	0.00	1.02	0.0001
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.40	0.0001
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.76	0.0001
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.97	0.0000
DICB_375	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.07	0.0000
DICB_600	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.31	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.03	0.06	0.00	0.92	2.00	0.0001
OVERLAND_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

Existing Condition Output

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.01	0.01	0.01	0.02	0.01
600	0.01	0.01	0.01	0.04	0.01
1500_1	0.04	0.04	0.04	0.01	0.01
1500_2	0.10	0.10	0.10	0.01	0.01
3000_1	0.10	0.10	0.10	0.13	0.05
3000_2	0.10	0.10	0.10	0.13	0.07
3000_3	0.11	0.11	0.11	0.11	0.07
3000_4	0.01	0.01	0.01	0.27	0.01
DICB_375	0.01	0.01	0.01	0.01	0.01
DICB_600	0.01	0.01	0.01	0.01	0.01
2100_CEN	0.18	0.18	0.18	0.01	0.01
LINK	8.00	8.00	8.00	8.00	0.01

Analysis begun on: Wed Mar 17 10:02:23 2010
Analysis ended on: Wed Mar 17 10:02:25 2010

Existing Condition Output

10 Year Chicago Storm - 6 Hours

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
  --------------------------------------------------------------


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Starting Date ............ DEC-22-2009 00:00:00
  Ending Date .............. DEC-22-2009 08:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:05:00
  Wet Time Step ............ 00:05:00
  Dry Time Step ............ 01:00:00
  Routing Time Step ........ 30.00 sec

  WARNING 03: negative offset ignored for Link 2100
  WARNING 03: negative offset ignored for Link 600
  WARNING 03: negative offset ignored for Link 1500_1
  WARNING 03: negative offset ignored for Link 1500_2
  WARNING 03: negative offset ignored for Link 3000_1
  WARNING 03: negative offset ignored for Link 3000_1
  WARNING 03: negative offset ignored for Link 3000_2
  WARNING 03: negative offset ignored for Link 3000_2
  WARNING 03: negative offset ignored for Link 3000_3
  WARNING 03: negative offset ignored for Link 3000_3
  WARNING 03: negative offset ignored for Link 3000_4
  WARNING 03: negative offset ignored for Link 3000_4
```

Existing Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link DICB_375
WARNING 03: negative offset ignored for Link DICB_600
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link LINK
WARNING 03: negative offset ignored for Link LINK
WARNING 02: maximum depth increased for Node EX._MH_5

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        10.077        59.218
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.365        25.654
Surface Runoff ...........         5.654        33.229
Final Surface Storage ....         0.096         0.562
Continuity Error (%) .....        -0.383


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         5.659        56.588
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        44.654       446.545
External Outflow .........        50.082       500.824
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.246         2.463
Continuity Error (%) .....        -0.030


************************
Highest Continuity Errors
************************
Node EX_PARK (67.94%)


**************************
Time-Step Critical Elements
**************************
Link 2100_CEN (97.65%)
Link DICB_600 (2.10%)
```

Existing Condition Output

```
*******************************
Highest Flow Instability Indexes
*******************************
Link DICB_375 (2)
Link 2100_CEN (1)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     0.78 sec
Maximum Time Step           :     4.67 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.03


**************************
Subcatchment Runoff Summary
**************************

---------------------------------------------------------------------------------------------
                        Total    Total    Total    Total    Total       Total      Peak  Runoff
                       Precip    Runon     Evap    Infil   Runoff      Runoff    Runoff   Coeff
Subcatchment               mm       mm       mm       mm       mm    10^6 ltr       CMS
---------------------------------------------------------------------------------------------
A1                     59.218    0.000    0.000    7.294   51.678       8.289    5.270   0.873
A2                     59.218    0.000    0.000   28.072   31.521       1.075    1.007   0.532
A3                     59.218    0.000    0.000   27.553   31.304      47.178   21.383   0.529
---------------------------------------------------------------------------------------------
System                 59.218    0.000    0.000   25.654   33.229      56.542   27.660   0.561


******************
Node Depth Summary
******************

-------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max
                                Depth    Depth      HGL   Occurrence
Node                 Type      Meters   Meters   Meters  days hr:min
-------------------------------------------------------------------
EX._MH_3             JUNCTION     0.21     5.21   173.08     0  02:12
CHAMBER_9            JUNCTION     0.50     6.50   172.97     0  02:13
CHAMBER_8            JUNCTION     0.75     6.09   172.14     0  02:13
```

Existing Condition Output

CHAMBER_7	JUNCTION	0.74	7.08	172.61	0	02:08
CHAMBER_6	JUNCTION	1.50	5.28	169.75	0	02:08
CHAMBER_5	JUNCTION	1.31	2.83	164.66	0	02:12
TRIBUTARY_3	JUNCTION	0.29	0.99	172.54	0	02:13
TRIBUTARY_2	JUNCTION	0.46	1.65	172.80	0	01:00
CENTRE_STREET	JUNCTION	1.30	4.84	169.84	0	02:08
to_YONGE	JUNCTION	0.00	0.00	173.50	0	00:00
EX._2100x2100x1350_TEE	JUNCTION	0.34	2.25	176.33	0	02:10
EX._MH_5	JUNCTION	0.06	1.29	175.18	0	02:10
EX._MH_4	JUNCTION	0.22	4.88	173.35	0	02:12
EAST_DON	OUTFALL	1.31	2.56	163.26	0	02:13
MARKHAM	OUTFALL	0.00	0.00	173.00	0	00:00
EX_PARK	STORAGE	0.22	0.30	175.80	0	02:13

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_3	JUNCTION	0.000	5.728	0	02:10	0.000	9.337
CHAMBER_9	JUNCTION	0.000	24.183	0	02:10	0.000	56.226
CHAMBER_8	JUNCTION	0.000	24.562	0	02:10	0.000	97.790
CHAMBER_7	JUNCTION	0.000	24.182	0	02:13	0.000	97.657
CHAMBER_6	JUNCTION	0.000	39.205	0	02:13	0.000	502.339
CHAMBER_5	JUNCTION	0.000	39.223	0	02:13	0.000	501.412
TRIBUTARY_3	JUNCTION	0.350	0.350	0	01:00	9.449	9.449
TRIBUTARY_2	JUNCTION	1.190	1.190	0	01:00	32.128	32.127
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	404.972	404.967
to_YONGE	JUNCTION	0.000	0.000	0	00:00	0.000	0.000
EX._2100x2100x1350_TEE	JUNCTION	21.375	21.375	0	02:10	47.197	47.205
EX._MH_5	JUNCTION	1.007	1.007	0	02:10	1.081	1.082
EX._MH_4	JUNCTION	5.269	5.269	0	02:10	8.297	8.301
EAST_DON	OUTFALL	0.000	39.235	0	02:13	0.000	500.821
MARKHAM	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
EX_PARK	STORAGE	0.000	2.359	0	02:10	0.000	0.347

****
Node Surcharge Summary
****

Existing Condition Output

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
CHAMBER_8	JUNCTION	0.06	0.618	2.585
CHAMBER_7	JUNCTION	0.24	4.414	3.677
CHAMBER_6	JUNCTION	0.28	2.611	5.053
CHAMBER_5	JUNCTION	0.06	0.165	6.525
TRIBUTARY_3	JUNCTION	0.06	0.619	1.456
TRIBUTARY_2	JUNCTION	0.07	1.053	1.197
CENTRE_STREET	JUNCTION	0.30	2.741	5.159

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EX_PARK	0.082	1	0.111	1	0 02:13	0.000

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	17.306	39.235	500.821
MARKHAM	0.00	0.000	0.000	0.000
System	49.99	17.306	39.235	500.821

Existing Condition Output

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	18.997	0	02:10	5.54	1.22	0.97
600	CONDUIT	0.962	0	02:10	3.40	1.38	1.00
1500_1	CONDUIT	4.793	0	02:09	3.00	1.13	1.00
1500_2	CONDUIT	5.231	0	02:07	3.71	0.86	1.00
3000_1	CONDUIT	23.044	0	02:11	4.12	1.43	1.00
3000_2	CONDUIT	24.182	0	02:13	4.32	1.35	1.00
3000_3	CONDUIT	24.188	0	02:13	4.32	1.33	1.00
3000_4	CONDUIT	39.223	0	02:13	7.00	1.33	1.00
3000_5	CONDUIT	39.235	0	02:13	7.25	1.10	0.98
DICB_375	CONDUIT	0.365	0	01:00	3.62	1.04	1.00
DICB_600	CONDUIT	1.302	0	01:00	5.07	1.06	1.00
2100_CEN	CONDUIT	17.937	0	01:00	7.72	0.83	1.00
OVERLAND_2	CONDUIT	0.000	0	00:00	0.00	0.00	0.15
OVERLAND_4	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
LINK	DUMMY	0.000	0	00:00			
OVERLAND_1	CONDUIT	2.359	0	02:10	1.13	0.12	0.35

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
2100	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.49	0.0001
600	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.46	0.0001
1500_1	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.98	0.0001
1500_2	1.00	0.02	0.00	0.00	0.03	0.01	0.00	0.95	1.31	0.0001
3000_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.44	0.0001
3000_2	1.00	0.00	0.00	0.00	0.06	0.94	0.00	0.00	1.02	0.0001
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.40	0.0001
3000_4	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	1.75	0.0001

Existing Condition Output

3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.97	0.0001
DICB_375	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.06	0.0001
DICB_600	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.30	0.0001
2100_CEN	1.00	0.00	0.00	0.00	0.03	0.06	0.00	0.91	1.99	0.0001
OVERLAND_2	1.00	0.25	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_1	1.00	0.25	0.74	0.00	0.00	0.00	0.00	0.00	0.01	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.01	0.01	0.01	0.16	0.01
600	0.02	0.02	0.02	0.13	0.02
1500_1	0.20	0.20	0.20	0.07	0.03
1500_2	0.23	0.23	0.23	0.01	0.01
3000_1	0.24	0.24	0.24	0.26	0.20
3000_2	0.23	0.23	0.24	0.26	0.21
3000_3	0.24	0.24	0.24	0.24	0.20
3000_4	0.06	0.06	0.06	0.37	0.06
3000_5	0.01	0.01	0.01	0.15	0.01
DICB_375	0.06	0.06	0.06	0.05	0.04
DICB_600	0.07	0.07	0.07	0.01	0.01
2100_CEN	0.30	0.30	0.30	0.01	0.01
LINK	8.00	8.00	8.00	8.00	0.01

Analysis begun on: Wed Mar 17 10:03:40 2010
Analysis ended on: Wed Mar 17 10:03:42 2010

Existing Condition Output

25 Year Chicago Storm - 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 08:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Existing Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link DICB_375
WARNING 03: negative offset ignored for Link DICB_600
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link LINK
WARNING 03: negative offset ignored for Link LINK
WARNING 02: maximum depth increased for Node EX._MH_5

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        11.608        68.220
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.635        27.239
Surface Runoff ...........         6.928        40.715
Final Surface Storage ....         0.097         0.572
Continuity Error (%) .....        -0.447

**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         6.934        69.337
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        44.654       446.546
External Outflow .........        51.316       513.165
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.284         2.840
Continuity Error (%) .....        -0.024

************************
Highest Continuity Errors
************************
Node EX_PARK (20.68%)

**************************
Time-Step Critical Elements
**************************
Link 2100_CEN (97.49%)
Link DICB_600 (2.03%)
```

Existing Condition Output

```
*******************************
Highest Flow Instability Indexes
*******************************
Link 2100_CEN (1)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     0.79 sec
Maximum Time Step           :     4.67 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.03


**************************
Subcatchment Runoff Summary
**************************

---------------------------------------------------------------------------------------------
                        Total    Total    Total    Total    Total       Total     Peak  Runoff
                       Precip    Runon     Evap    Infil   Runoff      Runoff   Runoff   Coeff
Subcatchment               mm       mm       mm       mm       mm    10^6 ltr      CMS
---------------------------------------------------------------------------------------------
A1                     68.220    0.000    0.000    7.882   60.245       9.663    6.369   0.883
A2                     68.220    0.000    0.000   30.228   38.569       1.315    1.258   0.565
A3                     68.220    0.000    0.000   29.231   38.684      58.302   27.335   0.567
---------------------------------------------------------------------------------------------
System                 68.220    0.000    0.000   27.239   40.715      69.280   34.962   0.597


******************
Node Depth Summary
******************

-------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max
                                Depth    Depth      HGL   Occurrence
Node                 Type      Meters   Meters   Meters  days hr:min
-------------------------------------------------------------------
EX._MH_3             JUNCTION    0.23     6.29   174.16     0  02:10
CHAMBER_9            JUNCTION    0.54     7.65   174.12     0  02:10
CHAMBER_8            JUNCTION    0.78     7.13   173.18     0  02:10
CHAMBER_7            JUNCTION    0.77     7.80   173.33     0  02:07
CHAMBER_6            JUNCTION    1.51     5.85   170.32     0  02:07
```

Existing Condition Output

```
CHAMBER_5            JUNCTION     1.32      3.12    164.94      0  02:10
TRIBUTARY_3          JUNCTION     0.30      2.03    173.58      0  02:10
TRIBUTARY_2          JUNCTION     0.46      2.41    173.56      0  02:10
CENTRE_STREET        JUNCTION     1.31      5.46    170.46      0  02:07
to_YONGE             JUNCTION     0.00      0.00    173.50      0  02:11
EX._2100x2100x1350_TEE JUNCTION     0.36      2.38    176.46      0  02:10
EX._MH_5             JUNCTION     0.07      2.34    176.23      0  02:10
EX._MH_4             JUNCTION     0.24      5.67    174.14      0  02:11
EAST_DON             OUTFALL      1.32      2.67    163.38      0  02:10
MARKHAM              OUTFALL      0.00      0.00    173.00      0  00:00
EX_PARK              STORAGE      0.38      0.62    176.12      0  02:14


********************
Node InFlow Summary
********************

-------------------------------------------------------------------------------------
                                Maximum  Maximum                    Lateral       Total
                                Lateral    Total  Time of Max       Inflow      Inflow
                                 Inflow   Inflow   Occurrence       Volume      Volume
Node                 Type           CMS      CMS  days hr:min    10^6 ltr    10^6 ltr
-------------------------------------------------------------------------------------
EX._MH_3             JUNCTION     0.000    6.795     0  02:09       0.000      10.465
CHAMBER_9            JUNCTION     0.000   25.914     0  02:09       0.000      66.733
CHAMBER_8            JUNCTION     0.000   25.606     0  02:10       0.000     108.297
CHAMBER_7            JUNCTION     0.000   25.614     0  02:11       0.000     108.161
CHAMBER_6            JUNCTION     0.000   40.746     0  02:11       0.000     512.844
CHAMBER_5            JUNCTION     0.000   40.823     0  02:11       0.000     511.922
TRIBUTARY_3          JUNCTION     0.350    0.350     0  01:00       9.449       9.449
TRIBUTARY_2          JUNCTION     1.190    1.190     0  01:00      32.128      32.127
CENTRE_STREET        JUNCTION    15.000   15.000     0  01:00     404.973     404.968
to_YONGE             JUNCTION     0.000    4.244     0  02:11       0.000       1.830
EX._2100x2100x1350_TEE JUNCTION    27.302   27.302     0  02:10      58.322      58.336
EX._MH_5             JUNCTION     1.254    1.254     0  02:09       1.322       1.324
EX._MH_4             JUNCTION     6.353    6.353     0  02:10       9.670       9.677
EAST_DON             OUTFALL      0.000   40.834     0  02:11       0.000     511.333
MARKHAM              OUTFALL      0.000    4.244     0  02:11       0.000       1.830
EX_PARK              STORAGE      0.000    7.024     0  02:10       0.000       2.111


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
-------------------------------------------------------------------------
```

Existing Condition Output

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_3	JUNCTION	0.07	0.415	3.345
CHAMBER_8	JUNCTION	0.15	1.659	1.544
CHAMBER_7	JUNCTION	0.33	5.134	2.957
CHAMBER_6	JUNCTION	0.36	3.184	4.480
CHAMBER_5	JUNCTION	0.16	0.450	6.240
TRIBUTARY_3	JUNCTION	0.15	1.659	0.416
TRIBUTARY_2	JUNCTION	0.17	1.811	0.439
CENTRE_STREET	JUNCTION	0.38	3.362	4.538

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EX_PARK	0.233	2	0.466	4	0 02:14	2.493

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	17.462	40.834	511.333
MARKHAM	74.24	0.032	4.244	1.830
System	87.11	17.494	44.912	513.163

Existing Condition Output

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	20.187	0	02:10	5.88	1.29	0.97
600	CONDUIT	1.182	0	02:10	4.18	1.70	1.00
1500_1	CONDUIT	5.639	0	02:09	3.19	1.33	1.00
1500_2	CONDUIT	6.062	0	02:09	3.63	0.99	1.00
3000_1	CONDUIT	24.070	0	02:10	4.30	1.49	1.00
3000_2	CONDUIT	25.614	0	02:11	4.57	1.43	1.00
3000_3	CONDUIT	25.626	0	02:11	4.58	1.41	1.00
3000_4	CONDUIT	40.823	0	02:11	7.29	1.38	1.00
3000_5	CONDUIT	40.834	0	02:11	7.29	1.15	1.00
DICB_375	CONDUIT	0.378	0	02:09	3.62	1.08	1.00
DICB_600	CONDUIT	1.302	0	01:00	5.07	1.06	1.00
2100_CEN	CONDUIT	17.937	0	01:00	7.72	0.83	1.00
OVERLAND_2	CONDUIT	0.000	0	00:00	0.00	0.00	0.31
OVERLAND_4	CONDUIT	2.493	0	02:14	0.80	0.08	0.21
OVERLAND_3	CONDUIT	3.198	0	02:11	1.46	0.03	0.07
LINK	DUMMY	4.244	0	02:11			
OVERLAND_1	CONDUIT	7.024	0	02:10	1.22	0.37	0.78

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
2100	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.50	0.0001
600	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.48	0.0001
1500_1	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.97	0.0001
1500_2	1.00	0.02	0.00	0.00	0.03	0.01	0.00	0.94	1.31	0.0001
3000_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.46	0.0001
3000_2	1.00	0.00	0.00	0.00	0.07	0.93	0.00	0.00	1.02	0.0001
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.41	0.0001
3000_4	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	1.74	0.0001
3000_5	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	1.96	0.0001

Existing Condition Output

DICB_375	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.05	0.0001
DICB_600	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	2.30	0.0001
2100_CEN	1.00	0.00	0.00	0.00	0.03	0.07	0.00	0.90	1.99	0.0001
OVERLAND_2	1.00	0.25	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_4	1.00	0.26	0.00	0.00	0.00	0.00	0.00	0.74	0.28	0.0000
OVERLAND_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_1	1.00	0.25	0.74	0.00	0.01	0.00	0.00	0.00	0.01	0.0000

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.01	0.01	0.01	0.26	0.01
600	0.12	0.12	0.12	0.16	0.12
1500_1	0.29	0.29	0.29	0.09	0.06
1500_2	0.32	0.32	0.32	0.01	0.02
3000_1	0.32	0.32	0.32	0.34	0.29
3000_2	0.32	0.32	0.32	0.34	0.30
3000_3	0.32	0.32	0.32	0.32	0.29
3000_4	0.16	0.16	0.16	0.45	0.16
3000_5	0.10	0.10	0.10	0.25	0.10
DICB_375	0.15	0.15	0.15	0.12	0.11
DICB_600	0.17	0.17	0.17	0.01	0.01
2100_CEN	0.38	0.38	0.38	0.01	0.01
LINK	8.00	8.00	8.00	8.00	0.01

Analysis begun on: Wed Mar 17 10:04:09 2010
Analysis ended on: Wed Mar 17 10:04:10 2010

Existing Condition Output

50 Year Chicago Storm - 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 08:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Existing Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link DICB_375
WARNING 03: negative offset ignored for Link DICB_600
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link LINK
WARNING 03: negative offset ignored for Link LINK
WARNING 02: maximum depth increased for Node EX._MH_5

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        13.365        78.542
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.764        27.996
Surface Runoff ...........         8.573        50.379
Final Surface Storage ....         0.098         0.574
Continuity Error (%) .....        -0.519

**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         8.576        85.765
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        44.654       446.546
External Outflow .........        52.960       529.608
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.284         2.841
Continuity Error (%) .....        -0.026

************************
Highest Continuity Errors
************************
Node EX_PARK (6.22%)

**************************
Time-Step Critical Elements
**************************
Link 2100_CEN (97.08%)
Link DICB_600 (2.17%)
```

Existing Condition Output

```
*******************************
Highest Flow Instability Indexes
*******************************
Link 2100_CEN (1)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     0.80 sec
Maximum Time Step           :     4.57 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.04


**************************
Subcatchment Runoff Summary
**************************

---------------------------------------------------------------------------------------------
                        Total     Total     Total     Total     Total       Total      Peak  Runoff
                       Precip     Runon      Evap     Infil    Runoff      Runoff    Runoff   Coeff
Subcatchment               mm        mm        mm        mm        mm    10^6 ltr       CMS
---------------------------------------------------------------------------------------------
A1                     78.542     0.000     0.000     8.161    70.448      11.300     7.737   0.897
A2                     78.542     0.000     0.000    31.238    48.124       1.641     1.564   0.613
A3                     78.542     0.000     0.000    30.034    48.295      72.785    35.538   0.615
---------------------------------------------------------------------------------------------
System                 78.542     0.000     0.000    27.996    50.379      85.726    44.840   0.641


******************
Node Depth Summary
******************

-------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max
                                Depth    Depth      HGL   Occurrence
Node                 Type      Meters   Meters   Meters  days hr:min
-------------------------------------------------------------------
EX._MH_3             JUNCTION     0.25     6.40   174.27     0  02:08
CHAMBER_9            JUNCTION     0.57     7.79   174.26     0  02:08
CHAMBER_8            JUNCTION     0.81     7.27   173.32     0  02:08
CHAMBER_7            JUNCTION     0.79     9.27   174.80     0  02:05
CHAMBER_6            JUNCTION     1.53     6.21   170.68     0  02:05
```

Existing Condition Output

```
CHAMBER_5            JUNCTION     1.33      3.46    165.28      0  02:08
TRIBUTARY_3          JUNCTION     0.30      2.17    173.72      0  02:08
TRIBUTARY_2          JUNCTION     0.47      2.55    173.70      0  02:08
CENTRE_STREET        JUNCTION     1.32      5.82    170.82      0  02:05
to_YONGE             JUNCTION     0.00      0.00    173.50      0  02:11
EX._2100x2100x1350_TEE JUNCTION     0.38      2.55    176.63      0  02:10
EX._MH_5             JUNCTION     0.08      2.65    176.54      0  02:10
EX._MH_4             JUNCTION     0.26      5.74    174.21      0  02:10
EAST_DON             OUTFALL      1.33      2.67    163.38      0  02:08
MARKHAM              OUTFALL      0.00      0.00    173.00      0  00:00
EX_PARK              STORAGE      0.38      0.75    176.25      0  02:12


********************
Node InFlow Summary
********************

-------------------------------------------------------------------------------------
                                Maximum  Maximum                    Lateral       Total
                                Lateral    Total  Time of Max      Inflow      Inflow
                                 Inflow   Inflow   Occurrence      Volume      Volume
Node                 Type           CMS      CMS  days hr:min    10^6 ltr    10^6 ltr
-------------------------------------------------------------------------------------
EX._MH_3             JUNCTION     0.000    7.463     0  02:07       0.000      11.111
CHAMBER_9            JUNCTION     0.000   26.584     0  02:07       0.000      77.424
CHAMBER_8            JUNCTION     0.000   25.909     0  02:11       0.000     118.983
CHAMBER_7            JUNCTION     0.000   25.913     0  02:11       0.000     118.847
CHAMBER_6            JUNCTION     0.000   40.989     0  02:09       0.000     523.526
CHAMBER_5            JUNCTION     0.000   41.116     0  02:09       0.000     522.611
TRIBUTARY_3          JUNCTION     0.350    0.350     0  01:00       9.449       9.449
TRIBUTARY_2          JUNCTION     1.190    1.190     0  01:00      32.128      32.127
CENTRE_STREET        JUNCTION    15.000   15.000     0  01:00     404.973     404.968
to_YONGE             JUNCTION     0.000   14.312     0  02:11       0.000       7.586
EX._2100x2100x1350_TEE JUNCTION    35.467   35.467     0  02:10      72.794      72.809
EX._MH_5             JUNCTION     1.562    1.562     0  02:09       1.645       1.647
EX._MH_4             JUNCTION     7.726    7.726     0  02:09      11.300      11.308
EAST_DON             OUTFALL      0.000   41.135     0  02:09       0.000     522.018
MARKHAM              OUTFALL      0.000   14.313     0  02:11       0.000       7.587
EX_PARK              STORAGE      0.000   13.971     0  02:10       0.000       6.586


**********************
Node Surcharge Summary
**********************

Surcharging occurs when water rises above the top of the highest conduit.
-------------------------------------------------------------------------
```

Existing Condition Output

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_3	JUNCTION	0.16	0.531	3.229
CHAMBER_8	JUNCTION	0.25	1.799	1.404
CHAMBER_7	JUNCTION	0.44	6.605	1.486
CHAMBER_6	JUNCTION	0.48	3.542	4.122
CHAMBER_5	JUNCTION	0.26	0.791	5.899
TRIBUTARY_3	JUNCTION	0.25	1.799	0.276
TRIBUTARY_2	JUNCTION	0.27	1.951	0.299
CENTRE_STREET	JUNCTION	0.50	3.718	4.182

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EX_PARK	0.235	2	0.694	6	0 02:12	9.818

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	17.597	41.135	522.018
MARKHAM	74.33	0.091	14.313	7.587
System	87.16	17.688	55.202	529.605

Existing Condition Output

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	21.666	0	02:10	6.29	1.39	0.98
600	CONDUIT	1.322	0	02:07	4.68	1.90	1.00
1500_1	CONDUIT	6.156	0	02:07	3.48	1.45	1.00
1500_2	CONDUIT	6.575	0	02:07	3.72	1.08	1.00
3000_1	CONDUIT	24.383	0	02:08	4.35	1.51	1.00
3000_2	CONDUIT	25.913	0	02:11	4.63	1.45	1.00
3000_3	CONDUIT	25.915	0	02:11	4.63	1.42	1.00
3000_4	CONDUIT	41.116	0	02:09	7.34	1.39	1.00
3000_5	CONDUIT	41.135	0	02:09	7.35	1.16	1.00
DICB_375	CONDUIT	0.391	0	02:07	3.62	1.11	1.00
DICB_600	CONDUIT	1.318	0	02:07	5.07	1.07	1.00
2100_CEN	CONDUIT	17.937	0	01:00	7.72	0.83	1.00
OVERLAND_2	CONDUIT	0.286	0	02:10	0.05	0.00	0.38
OVERLAND_4	CONDUIT	9.818	0	02:12	1.35	0.31	0.47
OVERLAND_3	CONDUIT	6.045	0	02:10	1.92	0.06	0.10
LINK	DUMMY	14.313	0	02:11			
OVERLAND_1	CONDUIT	13.686	0	02:10	1.75	0.72	0.95

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
2100	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.50	0.0001
600	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.48	0.0001
1500_1	1.00	0.02	0.00	0.00	0.03	0.00	0.00	0.95	0.97	0.0001
1500_2	1.00	0.02	0.00	0.00	0.04	0.01	0.00	0.94	1.31	0.0001
3000_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.47	0.0001
3000_2	1.00	0.00	0.00	0.00	0.07	0.93	0.00	0.00	1.01	0.0001
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.42	0.0001
3000_4	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	1.74	0.0001
3000_5	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	1.95	0.0001

Existing Condition Output

DICB_375	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	2.04	0.0001
DICB_600	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	2.29	0.0001
2100_CEN	1.00	0.00	0.00	0.00	0.04	0.07	0.00	0.89	1.98	0.0001
OVERLAND_2	1.00	0.25	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_4	1.00	0.26	0.00	0.00	0.00	0.00	0.00	0.74	0.29	0.0000
OVERLAND_3	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.0000
OVERLAND_1	1.00	0.25	0.74	0.00	0.01	0.00	0.00	0.00	0.01	0.0000

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
2100	0.01	0.01	0.01	0.37	0.01
600	0.17	0.17	0.17	0.19	0.16
1500_1	0.40	0.40	0.40	0.07	0.05
1500_2	0.43	0.43	0.43	0.01	0.02
3000_1	0.43	0.43	0.43	0.44	0.39
3000_2	0.43	0.43	0.43	0.45	0.40
3000_3	0.43	0.43	0.43	0.42	0.39
3000_4	0.26	0.26	0.26	0.55	0.26
3000_5	0.18	0.18	0.19	0.35	0.18
DICB_375	0.25	0.25	0.25	0.14	0.14
DICB_600	0.27	0.27	0.27	0.01	0.01
2100_CEN	0.50	0.50	0.50	0.01	0.01
LINK	8.00	8.00	8.00	8.00	0.01

Analysis begun on: Wed Mar 17 10:04:41 2010
Analysis ended on: Wed Mar 17 10:04:43 2010

Existing Condition Output

100 Year Chicago Storm - 6 Hours

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
  --------------------------------------------------------------


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Starting Date ............ DEC-22-2009 00:00:00
  Ending Date .............. DEC-22-2009 08:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:05:00
  Wet Time Step ............ 00:05:00
  Dry Time Step ............ 01:00:00
  Routing Time Step ........ 30.00 sec

  WARNING 03: negative offset ignored for Link 2100
  WARNING 03: negative offset ignored for Link 600
  WARNING 03: negative offset ignored for Link 1500_1
  WARNING 03: negative offset ignored for Link 1500_2
  WARNING 03: negative offset ignored for Link 3000_1
  WARNING 03: negative offset ignored for Link 3000_1
  WARNING 03: negative offset ignored for Link 3000_2
  WARNING 03: negative offset ignored for Link 3000_2
  WARNING 03: negative offset ignored for Link 3000_3
  WARNING 03: negative offset ignored for Link 3000_3
  WARNING 03: negative offset ignored for Link 3000_4
  WARNING 03: negative offset ignored for Link 3000_4
  WARNING 03: negative offset ignored for Link 3000_5
```

Existing Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link DICB_375
WARNING 03: negative offset ignored for Link DICB_600
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link LINK
WARNING 03: negative offset ignored for Link LINK
WARNING 02: maximum depth increased for Node EX._MH_5

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        14.349        84.328
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.804        28.230
Surface Runoff ...........         9.526        55.985
Final Surface Storage ....         0.098         0.574
Continuity Error (%) .....        -0.545

**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         9.525        95.251
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        44.653       446.540
External Outflow .........        53.909       539.100
Internal Outflow .........         0.000         0.001
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.284         2.841
Continuity Error (%) .....        -0.028

************************
Highest Continuity Errors
************************
Node EX_PARK (4.30%)

**************************
Time-Step Critical Elements
**************************
Link 2100_CEN (96.93%)
Link DICB_600 (2.29%)
```

Existing Condition Output

```
*******************************
Highest Flow Instability Indexes
*******************************
Link 2100_CEN (2)


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.50 sec
Average Time Step           :     0.80 sec
Maximum Time Step           :    10.01 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.03


**************************
Subcatchment Runoff Summary
**************************

-----------------------------------------------------------------------------------------------
                        Total    Total    Total    Total    Total       Total     Peak  Runoff
                       Precip    Runon     Evap    Infil   Runoff      Runoff   Runoff   Coeff
Subcatchment               mm       mm       mm       mm       mm    10^6 ltr      CMS
-----------------------------------------------------------------------------------------------
A1                     84.328    0.000    0.000    8.244   76.192      12.221    8.371   0.904
A2                     84.328    0.000    0.000   31.544   53.707       1.831    1.707   0.637
A3                     84.328    0.000    0.000   30.282   53.886      81.211   39.897   0.639
-----------------------------------------------------------------------------------------------
System                 84.328    0.000    0.000   28.230   55.985      95.264   49.975   0.664


******************
Node Depth Summary
******************

-------------------------------------------------------------------
                              Average  Maximum  Maximum  Time of Max
                                Depth    Depth      HGL   Occurrence
Node                 Type      Meters   Meters   Meters  days hr:min
-------------------------------------------------------------------
EX._MH_3             JUNCTION     0.26     6.49   174.36     0  02:07
CHAMBER_9            JUNCTION     0.59     7.87   174.34     0  02:07
CHAMBER_8            JUNCTION     0.82     7.41   173.46     0  02:06
CHAMBER_7            JUNCTION     0.80    10.76   176.28     0  02:04
CHAMBER_6            JUNCTION     1.53     8.05   172.52     0  02:05
```

Existing Condition Output

CHAMBER_5	JUNCTION	1.33	3.28	165.10	0	02:07
TRIBUTARY_3	JUNCTION	0.30	2.24	173.79	0	02:08
TRIBUTARY_2	JUNCTION	0.47	2.62	173.77	0	02:08
CENTRE_STREET	JUNCTION	1.32	7.70	172.70	0	02:05
to_YONGE	JUNCTION	0.00	0.01	173.51	0	02:11
EX._2100x2100x1350_TEE JUNCTION		0.39	2.77	176.85	0	02:10
EX._MH_5	JUNCTION	0.08	2.66	176.55	0	02:10
EX._MH_4	JUNCTION	0.27	5.75	174.22	0	02:10
EAST_DON	OUTFALL	1.33	2.67	163.38	0	02:07
MARKHAM	OUTFALL	0.00	0.00	173.00	0	00:00
EX_PARK	STORAGE	0.38	0.81	176.31	0	02:12

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_3	JUNCTION	0.000	7.662	0 02:06	0.000	11.369
CHAMBER_9	JUNCTION	0.000	26.906	0 02:06	0.000	82.883
CHAMBER_8	JUNCTION	0.000	26.113	0 02:10	0.000	124.441
CHAMBER_7	JUNCTION	0.000	26.125	0 02:10	0.000	124.302
CHAMBER_6	JUNCTION	0.000	41.081	0 02:08	0.000	528.974
CHAMBER_5	JUNCTION	0.000	41.211	0 02:08	0.000	528.062
TRIBUTARY_3	JUNCTION	0.350	0.350	0 01:00	9.449	9.449
TRIBUTARY_2	JUNCTION	1.190	1.190	0 01:00	32.127	32.127
CENTRE_STREET	JUNCTION	15.000	15.000	0 01:00	404.967	404.961
to_YONGE	JUNCTION	0.000	19.834	0 02:11	0.000	11.621
EX._2100x2100x1350_TEE JUNCTION		39.805	39.805	0 02:10	81.174	81.198
EX._MH_5	JUNCTION	1.699	1.699	0 02:09	1.828	1.832
EX._MH_4	JUNCTION	8.331	8.331	0 02:09	12.206	12.220
EAST_DON	OUTFALL	0.000	41.230	0 02:08	0.000	527.476
MARKHAM	OUTFALL	0.000	19.841	0 02:11	0.000	11.622
EX_PARK	STORAGE	0.000	17.722	0 02:10	0.000	9.825

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Existing Condition Output

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_3	JUNCTION	0.21	0.616	3.144
CHAMBER_8	JUNCTION	0.30	1.939	1.264
CHAMBER_7	JUNCTION	0.50	8.091	0.000
CHAMBER_6	JUNCTION	0.53	5.381	2.283
CHAMBER_5	JUNCTION	0.31	0.611	6.079
TRIBUTARY_3	JUNCTION	0.30	1.869	0.206
TRIBUTARY_2	JUNCTION	0.31	2.022	0.228
CENTRE_STREET	JUNCTION	0.55	5.600	2.300
EX._2100x2100x1350_TEE	JUNCTION	0.04	0.166	2.154

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate CMS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Volume ha-mm
CHAMBER_7	0.01	1.103	0 02:04	0.001	0.00

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
EX_PARK	0.236	2	0.806	7	0 02:12	14.102

****
Outfall Loading Summary
****

Flow	Avg.	Max.	Total

Existing Condition Output

Outfall Node	Freq. Pcnt.	Flow CMS	Flow CMS	Volume 10^6 ltr
EAST_DON	99.99	17.660	41.230	527.476
MARKHAM	74.31	0.115	19.841	11.622
System	87.15	17.775	60.877	539.098

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days	hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	22.380	0	02:10	6.46	1.43	1.00
600	CONDUIT	1.337	0	02:07	4.73	1.92	1.00
1500_1	CONDUIT	6.325	0	02:06	3.58	1.49	1.00
1500_2	CONDUIT	6.706	0	02:06	3.79	1.10	1.00
3000_1	CONDUIT	24.581	0	02:10	4.39	1.52	1.00
3000_2	CONDUIT	26.125	0	02:10	4.67	1.46	1.00
3000_3	CONDUIT	26.129	0	02:10	4.67	1.44	1.00
3000_4	CONDUIT	41.211	0	02:08	7.36	1.40	1.00
3000_5	CONDUIT	41.230	0	02:08	7.36	1.16	1.00
DICB_375	CONDUIT	0.423	0	02:06	3.83	1.20	1.00
DICB_600	CONDUIT	1.413	0	02:06	5.07	1.15	1.00
2100_CEN	CONDUIT	17.937	0	01:00	7.72	0.83	1.00
OVERLAND_2	CONDUIT	0.445	0	02:10	0.07	0.01	0.42
OVERLAND_4	CONDUIT	14.102	0	02:12	1.54	0.44	0.59
OVERLAND_3	CONDUIT	6.871	0	02:10	2.01	0.07	0.11
LINK	DUMMY	19.841	0	02:11			
OVERLAND_1	CONDUIT	17.278	0	02:10	2.09	0.91	1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
2100	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.50	0.0001

Existing Condition Output

600	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.98	1.48	0.0001
1500_1	1.00	0.02	0.00	0.00	0.03	0.00	0.00	0.95	0.97	0.0001
1500_2	1.00	0.02	0.00	0.00	0.04	0.01	0.00	0.93	1.30	0.0001
3000_1	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.47	0.0001
3000_2	1.00	0.00	0.00	0.00	0.08	0.92	0.00	0.00	1.01	0.0001
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.42	0.0001
3000_4	1.00	0.00	0.00	0.00	0.02	0.98	0.00	0.00	1.73	0.0001
3000_5	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	1.95	0.0001
DICB_375	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	2.04	0.0001
DICB_600	1.00	0.00	0.00	0.00	0.01	0.00	0.00	0.99	2.29	0.0001
2100_CEN	1.00	0.00	0.00	0.00	0.04	0.08	0.00	0.88	1.97	0.0001
OVERLAND_2	1.00	0.25	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND_4	1.00	0.26	0.00	0.00	0.00	0.00	0.00	0.74	0.29	0.0000
OVERLAND_3	1.00	0.26	0.74	0.00	0.00	0.00	0.00	0.00	0.01	0.0000
OVERLAND_1	1.00	0.25	0.73	0.00	0.01	0.00	0.00	0.00	0.01	0.0001

****
Conduit Surcharge Summary
****

	Hours Full			Hours Above Full	Hours Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
2100	0.04	0.04	0.05	0.44	0.04
600	0.18	0.18	0.18	0.20	0.18
1500_1	0.46	0.46	0.46	0.07	0.05
1500_2	0.49	0.49	0.49	0.04	0.04
3000_1	0.49	0.49	0.49	0.50	0.45
3000_2	0.49	0.49	0.49	0.50	0.46
3000_3	0.49	0.49	0.49	0.48	0.45
3000_4	0.31	0.31	0.31	0.61	0.31
3000_5	0.23	0.23	0.23	0.41	0.23
DICB_375	0.30	0.30	0.30	0.16	0.16
DICB_600	0.31	0.31	0.31	0.01	0.01
2100_CEN	0.55	0.55	0.55	0.01	0.01
LINK	8.00	8.00	8.00	8.00	0.01
OVERLAND_1	0.04	0.04	0.05	0.01	0.01

Analysis begun on: Wed Mar 17 10:05:21 2010
Analysis ended on: Wed Mar 17 10:05:23 2010

Proposed Condition Input

```
[TITLE]

[OPTIONS]
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
START_DATE           12/22/2009
START_TIME           00:00:00
REPORT_START_DATE    12/22/2009
REPORT_START_TIME    00:00:00
END_DATE             12/22/2009
END_TIME             12:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:10:00
WET_STEP             00:15:00
DRY_STEP             01:00:00
ROUTING_STEP         0:00:30
ALLOW_PONDING        YES
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
CONSTANT     0.0

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAIN             INTENSITY 0:10   1.0    TIMESERIES 50YR_6HR_CHI

[SUBCATCHMENTS]
;;                                                  Total    Pcnt.             Pcnt.    Curb     Snow
;;Name           Raingage         Outlet           Area     Imperv   Width    Slope    Length   Pack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- --------
;DRAINAGE AREA 1
A1               RAIN             EX._MH_4         16.04    82.4     490      2.4      0
```

Proposed Condition Input

```
;DRAINAGE AREA 2
A2                RAIN              EX._MH_5          3.41     33        225       2.4       0
;DRAINAGE AREA 3
A3                RAIN              EX._2100x2100x1350_TEE 150.71   40.6      1500      0.9       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1                0.013      0.024      1          1.5        25         OUTLET
A2                0.013      0.024      1          1.5        25         OUTLET
A3                0.013      0.024      1          1.5        25         OUTLET

[INFILTRATION]
;;Subcatchment   MaxRate    MinRate    Decay      DryTime    MaxInfil
;;-------------- ---------- ---------- ---------- ---------- ----------
A1                50         7.5        2          0          0
A2                50         7.5        2          0          0
A3                50         7.5        2          0          0

[JUNCTIONS]
;;                Invert     Max.       Init.      Surcharge  Ponded
;;Name            Elev.      Depth      Depth      Depth      Area
;;-------------- ---------- ---------- ---------- ---------- ----------
EX._MH_4          168.47     7.53       0          0          0
EX._MH_5          173.89     3.11       0          0          0
EX._2100x2100x1350_TEE 174.08     4.92       0          0          0
EX._MH_3          167.87     9.63       0          0          0
;Gallanough Park
CHAMBER_9         166.47     12.03      0          0          0
;ARNOLD AVENUE
CHAMBER_8         166.05     8.678      0          0          0
;THORNRIDGE DRIVE
CHAMBER_7         165.522    10.761     0          0          0
;CENTRE STREET (HIGHWAY 7B)
CHAMBER_6         164.466    10.334     0          0          0
CHAMBER_5         161.822    9.36       0          0          0
;INPUT FLOW FROM 2100mm DIA. CENTRE STREET.
CENTRE_STREET     165        10         0          0          0
THORNRIDGE        0          0          0          0          0
YONGE             172.5      0          0          0          0

[OUTFALLS]
;;                Invert     Outfall    Stage/Table      Tide
;;Name            Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
EAST_DON          160.705    FREE                        NO
MARKHAM           172        FREE                        NO
```

Proposed Condition Input

```
[STORAGE]
;;               Invert   Max.     Init.    Shape      Shape                      Ponded   Evap.
;;Name          Elev.    Depth    Depth    Curve      Params                     Area     Frac.    Infiltration Parameters
;;-------------- -------- -------- -------- ---------- -------- -------- -------- -------- -------- ----------------------
Pond             173.5    4        0        TABULAR    POND                       0        0

[CONDUITS]
;;               Inlet            Outlet                        Manning    Inlet      Outlet     Init.      Max.
;;Name          Node             Node             Length       N          Offset     Offset     Flow       Flow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
2100             EX._2100x2100x1350_TEE Pond             53         0.013      *          174        0          0
600              EX._MH_5         Pond             15         0.013      *          *          0          0
1500_1           EX._MH_4         EX._MH_3         102.28     0.013      *          168.100    0          0
1500_2           EX._MH_3         CHAMBER_9        32.14      0.013      *          167.630    0          0
3000_1           CHAMBER_9        CHAMBER_8        174.50     0.013      *          *          0          0
3000_2           CHAMBER_8        CHAMBER_7        179.2      0.013      166.059    *          0          0
3000_3           CHAMBER_7        CHAMBER_6        345.2      0.013      *          *          0          0
3000_4           CHAMBER_6        CHAMBER_5        328        0.013      *          *          0          0
3000_5           CHAMBER_5        EAST_DON         95.5       0.013      *          *          0          0
;2100 mm diameter @ 0.6% slope (slope is estimated
;based on P/P drawing).  Resulting full flow
;input to the Brooke Street trunk sewer is 13.43 cms.
;This model uses 15 cms for all storm events to match
;the Genivar report.
2100_CEN         CENTRE_STREET    CHAMBER_6        10         0.013      *          164.846    0          0
;1200mm by-pass @ 1.2%
BY-PASS          THORNRIDGE       CHAMBER_7        350        0.013      175.2      170        0          0
Major_Flow       EX._2100x2100x1350_TEE Pond             50         0.03       176.18     *          0          0
Major_Flow_2     EX._MH_5         Pond             10         0.013      *          *          0          0
Major_Flow_3     EX._MH_4         YONGE            50         0.03       173        172.5      0          0
to_MARKHAM       YONGE            MARKHAM          50         0.03       172.5      172.0      0          0
OVERLAND         Pond             YONGE            150        0.03       176        174.5      0          0

[OUTLETS]
;;               Inlet            Outlet           Outflow    Outlet          Qcoeff/                    Flap
;;Name          Node             Node             Height     Type            QTable           Qexpon    Gate
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- ----
CONTROL          Pond             CHAMBER_9        *          TABULAR/HEAD    POND_OUTLET                 NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels
;;-------------- ------------ ---------------- ---------- ---------- ---------- ----------
2100             CIRCULAR     2.1              0          0          0          1
600              CIRCULAR     .6               0          0          0          1
1500_1           CIRCULAR     1.5              0          0          0          1
1500_2           CIRCULAR     1.5              0          0          0          1
```

Proposed Condition Input

```
3000_1           CIRCULAR     2.7              0          0          0          1
3000_2           CIRCULAR     2.7              0          0          0          1
3000_3           CIRCULAR     2.7              0          0          0          1
3000_4           CIRCULAR     2.7              0          0          0          1
3000_5           CIRCULAR     2.7              0          0          0          1
2100_CEN         CIRCULAR     2.1              0          0          0          1
BY-PASS          CIRCULAR     1.2              0          0          0          1
Major_Flow       TRAPEZOIDAL  .5               15         3          3          1
Major_Flow_2     CIRCULAR     1                0          0          0          1
Major_Flow_3     TRAPEZOIDAL  .5               15         3          3          1
to_MARKHAM       TRAPEZOIDAL  0.5              30         3          3          1
OVERLAND         TRAPEZOIDAL  .5               20         3          3          1

[LOSSES]
;;Link           Inlet      Outlet     Average    Flap Gate
;;-------------- ---------- ---------- ---------- ----------

[INFLOWS]
;;                                                Param    Units    Scale    Baseline Baseline
;;Node           Parameter        Time Series      Type     Factor   Factor   Value    Pattern
;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
CENTRE_STREET    FLOW             ""               FLOW     1.0      1.0      15       Pattern
THORNRIDGE       FLOW             ""               FLOW     1.0      1.0      5        Pattern

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
POND_OUTLET      Rating     0          0
POND_OUTLET                 3          15
POND_OUTLET                 3.5        20

POND_OVERFLOW    Rating     0          0
POND_OVERFLOW               .5         14.6

POND             Storage    0          104
POND                        0.5        1838
POND                        1.3        2559
POND                        3.0        4499
POND                        3.5        6400

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
2YR_6HR_CHI      FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\2YR 6HR CHI.DAT"
```

Proposed Condition Input

```
5YR_6HR_CHI      FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\5YR 6HR CHI.DAT"

10YR_6HR_CHI     FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\10YR 6HR CHI.DAT"

25YR_6HR_CHI     FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\25YR 6HR CHI.DAT"

50YR_6HR_CHI     FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\50YR 6HR CHI.DAT"

100YR_6HR_CHI    FILE "S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM
Facility Class EA\Reports\Project File.Rev 0\06-Models & Calcs\Gallanough SWMM5\STORM\100YR 6HR CHI.DAT"

[PATTERNS]
;;Name           Type       Multipliers
;;-------------- ---------- -----------
Pattern          HOURLY     .5    1     1     1     1     1
Pattern                     1     1     1     1     1     1
Pattern                     1     1     1     1     1     1
Pattern                     1     1     1     1     1     1

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]
Subcatch  A1               A1
Subcatch  A2               A2
Subcatch  A3               A3

[MAP]
DIMENSIONS -302.481 1707.328 9291.031 14317.868
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
EX._MH_4         9800.809           8000.565
EX._MH_5         7033.229           5738.369
EX._2100x2100x1350_TEE 2544.936           5894.797
EX._MH_3         6979.081           7988.532
CHAMBER_9        4045.506           7978.411
```

Proposed Condition Input

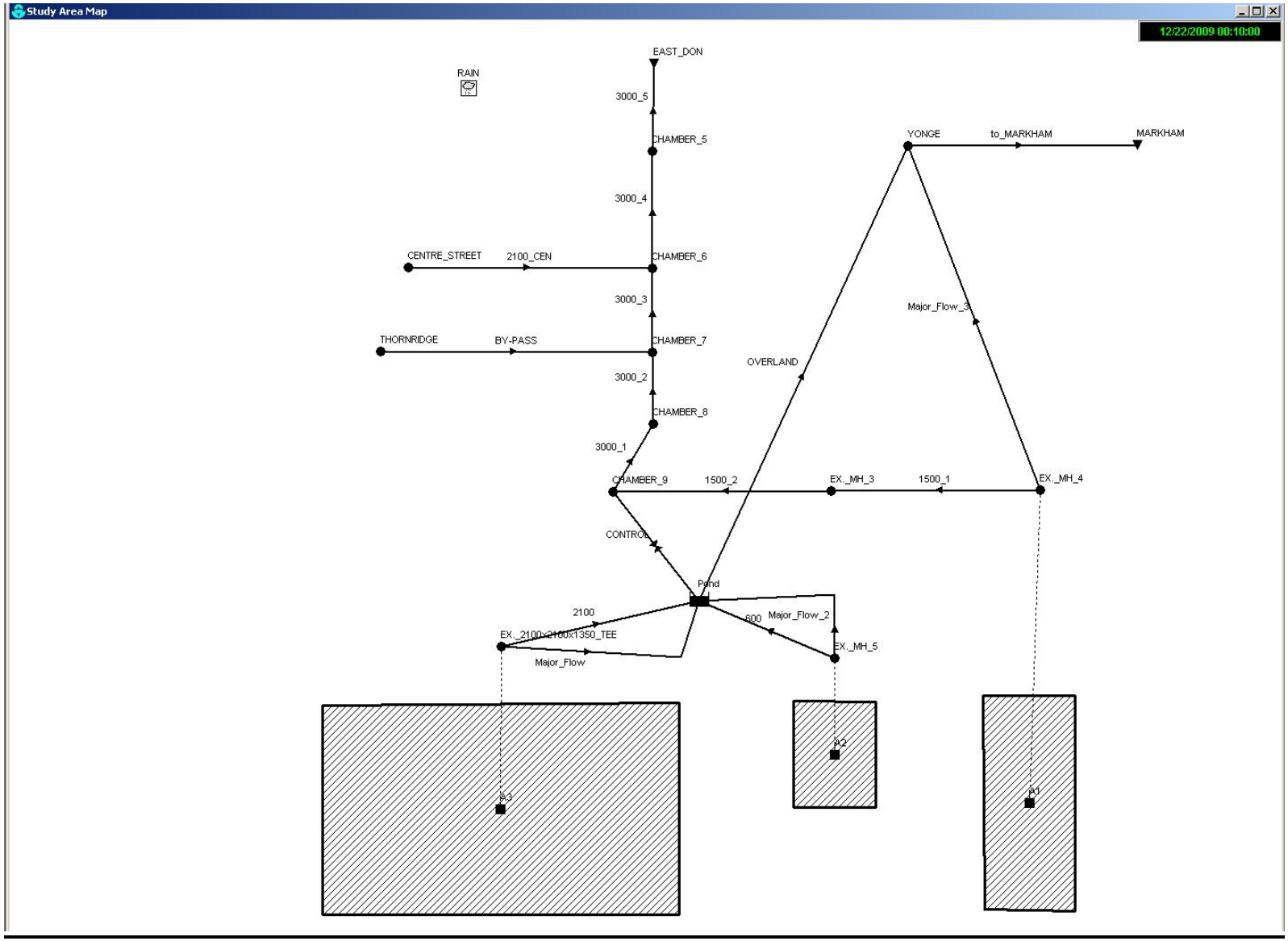
```
CHAMBER_8        4591.688           8891.699
CHAMBER_7        4582.734           9849.756
CHAMBER_6        4582.734           10986.889
CHAMBER_5        4582.734           12562.759
CENTRE_STREET    1287.733           10995.843
THORNRIDGE       920.486            9865.674
YONGE            8019.932           12633.254
EAST_DON         4600.642           13744.662
MARKHAM          11112.402          12645.287
Pond             5204.220           6508.478

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Major_Flow       4963.560           5750.402
Major_Flow_2     7033.229           6592.709

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1               10271.872          5237.026
A1               10271.872          2336.262
A1               9050.498           2355.346
A1               9031.414           5227.484
A2               7586.664           5147.302
A2               7586.664           3725.546
A2               6479.794           3725.546
A2               6479.794           5156.844
A3               133.588            5104.962
A3               133.588            2280.534
A3               4942.748           2290.076
A3               4942.748           5133.588

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAIN             2123.782           13391.330
```

Proposed Condition Output



Proposed Condition Output

2 Year Chicago Storm – 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Proposed Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link Major_Flow
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link to_MARKHAM
WARNING 03: negative offset ignored for Link CONTROL
WARNING 01: wet weather time step reduced to recording interval for Rain Gage RAIN

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         6.492        38.152
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         3.430        20.156
Surface Runoff ...........         3.050        17.922
Final Surface Storage ....         0.068         0.398
Continuity Error (%) .....        -0.849


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         3.059        30.594
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        82.792       827.926
External Outflow .........        85.552       855.526
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.296         2.959
Continuity Error (%) .....         0.004


***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (99.88%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Proposed Condition Output

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.76 sec
Maximum Time Step : 1.66 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	38.152	0.000	0.000	5.794	32.485	5.211	2.826	0.851
A2	38.152	0.000	0.000	22.354	16.264	0.555	0.452	0.426
A3	38.152	0.000	0.000	21.635	16.409	24.731	9.692	0.430
System	38.152	0.000	0.000	20.156	17.922	30.496	12.970	0.470

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_4	JUNCTION	0.11	0.89	169.36	0 02:10
EX._MH_5	JUNCTION	0.05	1.02	174.91	0 02:19
EX._2100x2100x1350_TEE	JUNCTION	0.27	1.64	175.72	0 02:10
EX._MH_3	JUNCTION	0.09	0.72	168.59	0 02:10
CHAMBER_9	JUNCTION	0.26	1.42	167.89	0 02:14
CHAMBER_8	JUNCTION	0.48	1.45	167.50	0 02:15
CHAMBER_7	JUNCTION	0.99	1.77	167.30	0 02:17
CHAMBER_6	JUNCTION	1.60	2.10	166.56	0 02:18
CHAMBER_5	JUNCTION	1.42	1.80	163.63	0 02:18
CENTRE_STREET	JUNCTION	1.28	1.85	166.85	0 01:00
THORNRIDGE	JUNCTION	176.07	176.24	176.24	0 01:35

Proposed Condition Output

YONGE	JUNCTION	0.00	0.00	172.50	0	00:00
EAST_DON	OUTFALL	1.42	1.80	162.51	0	02:18
MARKHAM	OUTFALL	0.00	0.00	172.00	0	00:00
Pond	STORAGE	0.12	1.41	174.91	0	02:19

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_4	JUNCTION	2.825	2.825	0	02:10	5.228	5.228
EX._MH_5	JUNCTION	0.452	0.917	0	02:10	0.565	0.756
EX._2100x2100x1350_TEE	JUNCTION	9.692	9.692	0	02:10	24.800	24.800
EX._MH_3	JUNCTION	0.000	2.806	0	02:10	0.000	5.228
CHAMBER_9	JUNCTION	0.000	8.842	0	02:15	0.000	30.592
CHAMBER_8	JUNCTION	0.000	8.844	0	02:15	0.000	30.680
CHAMBER_7	JUNCTION	0.000	13.867	0	02:16	0.000	237.003
CHAMBER_6	JUNCTION	0.000	28.851	0	02:17	0.000	857.317
CHAMBER_5	JUNCTION	0.000	28.833	0	02:18	0.000	856.198
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	620.947	620.942
THORNRIDGE	JUNCTION	5.000	5.000	0	01:00	206.982	206.981
YONGE	JUNCTION	0.000	0.000	0	00:00	0.000	0.000
EAST_DON	OUTFALL	0.000	28.837	0	02:18	0.000	855.522
MARKHAM	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
Pond	STORAGE	0.000	10.615	0	02:10	0.000	25.556

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_5	JUNCTION	0.08	0.020	2.090

****

Proposed Condition Output

Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond	0.122	1	2.533	17	0 02:19	7.078

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	19.941	28.837	855.522
MARKHAM	0.00	0.000	0.000	0.000
System	50.00	19.941	28.837	855.522

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	9.728	0 02:10	3.53	1.44	0.75
600	CONDUIT	0.474	0 02:10	1.70	0.48	1.00
1500_1	CONDUIT	2.806	0 02:10	2.64	0.66	0.58
1500_2	CONDUIT	2.818	0 02:10	3.39	0.46	0.48
3000_1	CONDUIT	8.844	0 02:15	2.88	0.53	0.53

Proposed Condition Output

3000_2	CONDUIT	8.867	0	02:16	2.50	0.48	0.59
3000_3	CONDUIT	13.851	0	02:17	3.16	0.74	0.72
3000_4	CONDUIT	28.833	0	02:18	6.51	0.95	0.72
3000_5	CONDUIT	28.837	0	02:18	7.09	0.79	0.67
2100_CEN	CONDUIT	17.934	0	01:00	7.73	0.83	0.80
BY-PASS	CONDUIT	5.000	0	02:57	4.73	1.05	0.91
Major_Flow	CONDUIT	0.000	0	00:00	0.00	0.00	0.50
Major_Flow_2	CONDUIT	0.898	0	02:10	1.44	0.19	1.00
Major_Flow_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
to_MARKHAM	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
CONTROL	DUMMY	7.051	0	02:19			

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
2100	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.89	0.0001
600	1.00	0.01	0.37	0.00	0.52	0.10	0.00	0.00	0.36	0.0000
1500_1	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	1.03	0.0000
1500_2	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	1.36	0.0000
3000_1	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.37	0.0000
3000_2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.14	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.0000
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.74	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.95	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.00	0.11	0.00	0.89	2.02	0.0000
BY-PASS	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	0.0000
Major_Flow	1.00	0.01	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
Major_Flow_2	1.00	0.01	0.37	0.00	0.52	0.11	0.00	0.00	0.43	0.0000
Major_Flow_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
to_MARKHAM	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

****
Conduit Surcharge Summary
****

	Hours	Hours

Proposed Condition Output

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Above Full Normal Flow	Capacity Limited
2100	0.01	0.01	0.01	0.22	0.01
600	0.42	0.42	0.42	0.01	0.01
BY-PASS	0.01	0.01	0.01	10.97	0.01
Major_Flow_2	0.08	0.08	0.08	0.01	0.01

Analysis begun on: Wed Mar 17 10:38:00 2010
Analysis ended on: Wed Mar 17 10:38:02 2010

Proposed Condition Output

5 Year Chicago Storm - 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
```

Proposed Condition Output

```
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link Major_Flow
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link to_MARKHAM
WARNING 03: negative offset ignored for Link CONTROL
WARNING 01: wet weather time step reduced to recording interval for Rain Gage RAIN

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         8.580        50.425
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.040        23.745
Surface Runoff ...........         4.568        26.844
Final Surface Storage ....         0.068         0.399
Continuity Error (%) .....        -1.115


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         4.582        45.821
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        82.792       827.925
External Outflow .........        87.072       870.730
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.296         2.959
Continuity Error (%) .....         0.007


**************************
Time-Step Critical Elements
**************************
Link 2100_CEN (99.98%)


******************************
Highest Flow Instability Indexes
******************************
```

Proposed Condition Output

All links are stable.

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.76 sec
Maximum Time Step : 1.66 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	50.425	0.000	0.000	6.672	44.199	7.090	4.244	0.877
A2	50.425	0.000	0.000	25.733	25.712	0.877	0.770	0.510
A3	50.425	0.000	0.000	25.517	25.022	37.711	16.204	0.496
System	50.425	0.000	0.000	23.745	26.844	45.677	21.218	0.532

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_4	JUNCTION	0.13	1.16	169.63	0 02:10
EX._MH_5	JUNCTION	0.10	1.80	175.69	0 02:20
EX._2100x2100x1350_TEE	JUNCTION	0.32	2.17	176.25	0 02:10
EX._MH_3	JUNCTION	0.11	0.92	168.79	0 02:10
CHAMBER_9	JUNCTION	0.31	1.88	168.35	0 02:15
CHAMBER_8	JUNCTION	0.52	1.95	168.00	0 02:17
CHAMBER_7	JUNCTION	1.03	2.27	167.79	0 02:17
CHAMBER_6	JUNCTION	1.62	2.49	166.96	0 02:18
CHAMBER_5	JUNCTION	1.43	2.02	163.84	0 02:19

Proposed Condition Output

CENTRE_STREET	JUNCTION	1.29	1.99	166.99	0	02:18
THORNRIDGE	JUNCTION	176.07	176.24	176.24	0	01:35
YONGE	JUNCTION	0.00	0.00	172.50	0	00:00
EAST_DON	OUTFALL	1.43	2.02	162.72	0	02:19
MARKHAM	OUTFALL	0.00	0.00	172.00	0	00:00
Pond	STORAGE	0.18	2.19	175.69	0	02:19

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_4	JUNCTION	4.243	4.243	0	02:10	7.109	7.109
EX._MH_5	JUNCTION	0.770	1.053	0	02:07	0.890	1.001
EX._2100x2100x1350_TEE	JUNCTION	16.199	16.199	0	02:10	37.822	37.822
EX._MH_3	JUNCTION	0.000	4.217	0	02:10	0.000	7.109
CHAMBER_9	JUNCTION	0.000	13.395	0	02:15	0.000	45.796
CHAMBER_8	JUNCTION	0.000	13.386	0	02:15	0.000	45.878
CHAMBER_7	JUNCTION	0.000	18.327	0	02:15	0.000	252.195
CHAMBER_6	JUNCTION	0.000	33.222	0	02:18	0.000	872.518
CHAMBER_5	JUNCTION	0.000	33.522	0	02:18	0.000	871.403
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	620.946	620.941
THORNRIDGE	JUNCTION	5.000	5.000	0	01:00	206.982	206.980
YONGE	JUNCTION	0.000	0.000	0	00:00	0.000	0.000
EAST_DON	OUTFALL	0.000	33.268	0	02:19	0.000	870.726
MARKHAM	OUTFALL	0.000	0.000	0	00:00	0.000	0.000
Pond	STORAGE	0.000	16.878	0	02:10	0.000	38.785

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_5	JUNCTION	0.54	0.804	1.306

Proposed Condition Output

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond	0.267	2	4.987	34	0 02:19	10.968

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	20.319	33.268	870.726
MARKHAM	0.00	0.000	0.000	0.000
System	50.00	20.319	33.268	870.726

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth
2100	CONDUIT	14.766	0 02:10	4.40	2.19	0.93
600	CONDUIT	0.482	0 02:07	1.71	0.49	1.00
1500_1	CONDUIT	4.217	0 02:10	3.03	0.99	0.74

Proposed Condition Output

1500_2	CONDUIT	4.233	0	02:10	3.74	0.69	0.61
3000_1	CONDUIT	13.386	0	02:15	3.14	0.80	0.71
3000_2	CONDUIT	13.327	0	02:15	2.82	0.72	0.78
3000_3	CONDUIT	18.222	0	02:18	3.46	0.97	0.88
3000_4	CONDUIT	33.522	0	02:18	6.57	1.10	0.83
3000_5	CONDUIT	33.268	0	02:19	7.25	0.91	0.75
2100_CEN	CONDUIT	17.934	0	01:00	7.73	0.83	0.97
BY-PASS	CONDUIT	5.000	0	03:13	4.73	1.05	0.91
Major_Flow	CONDUIT	1.393	0	02:10	0.31	0.04	0.57
Major_Flow_2	CONDUIT	1.028	0	02:07	1.55	0.22	1.00
Major_Flow_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
to_MARKHAM	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
OVERLAND	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
CONTROL	DUMMY	10.968	0	02:19			

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----						Avg.	Avg.
	/Actual		Up	Down	Sub	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Number	Change
2100	1.00	0.01	0.00	0.00	0.03	0.00	0.96	0.89	0.0001
600	1.00	0.01	0.37	0.00	0.54	0.08	0.00	0.00	0.32	0.0000
1500_1	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	1.03	0.0000
1500_2	1.00	0.01	0.00	0.00	0.00	0.03	0.00	0.96	1.36	0.0000
3000_1	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.40	0.0000
3000_2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.0000
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.73	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.94	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.03	0.11	0.00	0.86	1.99	0.0000
BY-PASS	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	0.0000
Major_Flow	1.00	0.01	0.98	0.00	0.01	0.00	0.00	0.00	0.00	0.0000
Major_Flow_2	1.00	0.01	0.37	0.00	0.53	0.09	0.00	0.00	0.38	0.0000
Major_Flow_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
to_MARKHAM	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
OVERLAND	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

****
Conduit Surcharge Summary
****

Proposed Condition Output

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.01	0.01	0.01	0.45	0.01
600	0.72	0.72	0.72	0.01	0.01
3000_4	0.01	0.01	0.01	0.37	0.01
BY-PASS	0.01	0.01	0.01	10.97	0.01
Major_Flow_2	0.54	0.54	0.54	0.01	0.01

Analysis begun on: Wed Mar 17 10:40:07 2010
Analysis ended on: Wed Mar 17 10:40:10 2010

Proposed Condition Output

10 Year Chicago Storm - 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Proposed Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link Major_Flow
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link to_MARKHAM
WARNING 03: negative offset ignored for Link CONTROL
WARNING 01: wet weather time step reduced to recording interval for Rain Gage RAIN

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        10.077        59.218
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.364        25.648
Surface Runoff ...........         5.774        33.933
Final Surface Storage ....         0.068         0.401
Continuity Error (%) .....        -1.289


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         5.791        57.912
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        82.793       827.934
External Outflow .........        88.289       882.902
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.296         2.959
Continuity Error (%) .....        -0.002


***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (99.09%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Proposed Condition Output

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.79 sec
Maximum Time Step : 6.18 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.01

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	59.218	0.000	0.000	7.291	52.589	8.435	5.261	0.888
A2	59.218	0.000	0.000	28.054	32.530	1.109	1.002	0.549
A3	59.218	0.000	0.000	27.547	31.979	48.196	21.373	0.540
System	59.218	0.000	0.000	25.648	33.933	57.741	27.636	0.573

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_4	JUNCTION	0.13	1.38	169.85	0 02:10
EX._MH_5	JUNCTION	0.08	2.22	176.11	0 02:19
EX._2100x2100x1350_TEE	JUNCTION	0.31	2.26	176.34	0 02:10
EX._MH_3	JUNCTION	0.11	2.75	170.62	0 02:17
CHAMBER_9	JUNCTION	0.31	4.01	170.48	0 02:17
CHAMBER_8	JUNCTION	0.51	3.73	169.78	0 02:17
CHAMBER_7	JUNCTION	1.02	3.44	168.96	0 02:18
CHAMBER_6	JUNCTION	1.62	3.26	167.72	0 02:19
CHAMBER_5	JUNCTION	1.43	2.13	163.95	0 02:19
CENTRE_STREET	JUNCTION	1.29	3.88	168.88	0 02:38
THORNRIDGE	JUNCTION	176.07	176.24	176.24	0 02:17

Proposed Condition Output

YONGE	JUNCTION	0.00	0.09	172.59	0	02:19
EAST_DON	OUTFALL	1.43	2.13	162.83	0	02:20
MARKHAM	OUTFALL	0.00	0.06	172.06	0	02:20
Pond	STORAGE	0.16	2.61	176.11	0	02:19

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_4	JUNCTION	5.261	5.261	0	02:10	8.450	8.456
EX._MH_5	JUNCTION	1.002	1.100	0	02:05	1.123	1.232
EX._2100x2100x1350_TEE	JUNCTION	21.373	21.373	0	02:10	48.310	48.332
EX._MH_3	JUNCTION	0.000	5.200	0	02:10	0.000	8.414
CHAMBER_9	JUNCTION	0.000	16.388	0	02:14	0.000	57.217
CHAMBER_8	JUNCTION	0.000	16.134	0	02:14	0.000	57.284
CHAMBER_7	JUNCTION	0.000	20.825	0	02:16	0.000	263.607
CHAMBER_6	JUNCTION	0.000	35.279	0	02:19	0.000	883.792
CHAMBER_5	JUNCTION	0.000	35.288	0	02:19	0.000	882.939
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	620.953	620.948
THORNRIDGE	JUNCTION	5.000	5.000	0	01:00	206.984	206.983
YONGE	JUNCTION	0.000	1.478	0	02:19	0.000	0.636
EAST_DON	OUTFALL	0.000	35.300	0	02:20	0.000	882.261
MARKHAM	OUTFALL	0.000	1.447	0	02:20	0.000	0.636
Pond	STORAGE	0.000	22.283	0	02:10	0.000	49.518

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_5	JUNCTION	0.70	1.219	0.891
EX._MH_3	JUNCTION	0.05	1.017	6.883
CHAMBER_9	JUNCTION	0.19	1.314	8.016
CHAMBER_8	JUNCTION	0.24	1.018	4.951

Proposed Condition Output

CHAMBER_6	JUNCTION	0.38	0.558	7.076
CENTRE_STREET	JUNCTION	0.45	1.776	6.124

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond	0.215	1	6.573	45	0 02:19	14.524

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	20.169	35.300	882.261
MARKHAM	28.80	0.017	1.447	0.636
System	64.40	20.186	36.747	882.898

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum Velocity m/sec	Max/ Full Flow	Max/ Full Depth

Proposed Condition Output

2100	CONDUIT	15.826	0	02:10	4.68	2.35	1.00
600	CONDUIT	0.479	0	02:05	1.70	0.48	1.00
1500_1	CONDUIT	5.200	0	02:10	3.26	1.22	0.92
1500_2	CONDUIT	5.215	0	02:10	3.89	0.85	1.00
3000_1	CONDUIT	16.134	0	02:14	3.27	0.97	1.00
3000_2	CONDUIT	15.825	0	02:16	2.97	0.85	1.00
3000_3	CONDUIT	20.269	0	02:19	3.55	1.08	1.00
3000_4	CONDUIT	35.288	0	02:19	6.59	1.16	0.89
3000_5	CONDUIT	35.300	0	02:20	7.29	0.96	0.79
2100_CEN	CONDUIT	17.934	0	01:00	7.73	0.83	1.00
BY-PASS	CONDUIT	5.000	0	03:04	4.73	1.05	0.91
Major_Flow	CONDUIT	5.504	0	02:10	1.04	0.15	0.66
Major_Flow_2	CONDUIT	1.074	0	02:05	1.61	0.23	1.00
Major_Flow_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.09
to_MARKHAM	CONDUIT	1.447	0	02:20	0.65	0.05	0.15
OVERLAND	CONDUIT	1.478	0	02:19	0.76	0.07	0.19
CONTROL	DUMMY	13.046	0	02:19			

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
2100	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	0.88	0.0001
600	1.00	0.01	0.38	0.00	0.54	0.07	0.00	0.00	0.29	0.0000
1500_1	1.00	0.01	0.00	0.00	0.01	0.00	0.00	0.98	1.03	0.0001
1500_2	1.00	0.01	0.00	0.00	0.01	0.01	0.00	0.97	1.36	0.0000
3000_1	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.41	0.0000
3000_2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.16	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.0000
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.73	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.95	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.02	0.12	0.00	0.87	2.00	0.0001
BY-PASS	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	0.0000
Major_Flow	1.00	0.01	0.97	0.00	0.02	0.00	0.00	0.00	0.01	0.0000
Major_Flow_2	1.00	0.01	0.38	0.00	0.53	0.08	0.00	0.00	0.35	0.0000
Major_Flow_3	1.00	0.21	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
to_MARKHAM	1.00	0.21	0.00	0.00	0.79	0.00	0.00	0.00	0.19	0.0000
OVERLAND	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.0000

****

Proposed Condition Output

Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.06	0.06	0.06	0.57	0.06
600	0.88	0.88	0.88	0.01	0.01
1500_1	0.01	0.01	0.01	0.09	0.01
1500_2	0.13	0.13	0.13	0.01	0.01
3000_1	0.19	0.19	0.19	0.01	0.01
3000_2	0.24	0.24	0.24	0.01	0.01
3000_3	0.32	0.32	0.33	0.31	0.26
3000_4	0.01	0.01	0.01	0.56	0.01
2100_CEN	0.43	0.43	0.45	0.01	0.01
BY-PASS	0.01	0.01	0.01	10.97	0.01
Major_Flow_2	0.70	0.70	0.70	0.01	0.01

Analysis begun on: Wed Mar 17 10:41:07 2010
Analysis ended on: Wed Mar 17 10:41:10 2010

Proposed Condition Output

25 Year Chicago Storm - 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Proposed Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link Major_Flow
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link to_MARKHAM
WARNING 03: negative offset ignored for Link CONTROL
WARNING 01: wet weather time step reduced to recording interval for Rain Gage RAIN

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        11.608        68.220
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.635        27.236
Surface Runoff ...........         7.076        41.585
Final Surface Storage ....         0.068         0.402
Continuity Error (%) .....        -1.471


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         7.095        70.955
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        82.792       827.928
External Outflow .........        89.596       895.965
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.296         2.959
Continuity Error (%) .....        -0.005


***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (99.18%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Proposed Condition Output

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.80 sec
Maximum Time Step : 6.18 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.02

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	68.220	0.000	0.000	7.882	61.242	9.823	6.360	0.898
A2	68.220	0.000	0.000	30.224	39.708	1.354	1.252	0.582
A3	68.220	0.000	0.000	29.229	39.536	59.585	27.324	0.580
System	68.220	0.000	0.000	27.236	41.585	70.762	34.937	0.610

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_4	JUNCTION	0.14	2.75	171.22	0 02:14
EX._MH_5	JUNCTION	0.08	2.38	176.27	0 02:16
EX._2100x2100x1350_TEE	JUNCTION	0.33	2.45	176.53	0 02:14
EX._MH_3	JUNCTION	0.12	3.04	170.91	0 02:15
CHAMBER_9	JUNCTION	0.33	4.34	170.81	0 02:15
CHAMBER_8	JUNCTION	0.52	6.45	172.50	0 02:11
CHAMBER_7	JUNCTION	1.03	4.36	169.88	0 02:16
CHAMBER_6	JUNCTION	1.62	3.88	168.35	0 02:16
CHAMBER_5	JUNCTION	1.43	2.47	164.29	0 02:16
CENTRE_STREET	JUNCTION	1.29	3.64	168.64	0 02:43
THORNRIDGE	JUNCTION	176.06	176.24	176.24	0 02:14

Proposed Condition Output

YONGE	JUNCTION	0.00	0.21	172.71	0	02:16
EAST_DON	OUTFALL	1.43	2.55	163.25	0	02:17
MARKHAM	OUTFALL	0.00	0.18	172.18	0	02:16
Pond	STORAGE	0.17	2.77	176.27	0	02:16

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_4	JUNCTION	6.360	6.360	0 02:10	9.832	9.844
EX._MH_5	JUNCTION	1.252	1.252	0 02:10	1.367	1.467
EX._2100x2100x1350_TEE	JUNCTION	27.323	27.323	0 02:10	59.698	59.742
EX._MH_3	JUNCTION	0.000	6.338	0 02:10	0.000	9.764
CHAMBER_9	JUNCTION	0.000	18.605	0 02:11	0.000	66.419
CHAMBER_8	JUNCTION	0.000	18.402	0 02:11	0.000	66.478
CHAMBER_7	JUNCTION	0.000	24.142	0 02:12	0.000	272.822
CHAMBER_6	JUNCTION	0.000	37.616	0 02:16	0.000	893.032
CHAMBER_5	JUNCTION	0.000	37.643	0 02:16	0.000	892.182
CENTRE_STREET	JUNCTION	15.000	15.000	0 01:00	620.949	620.944
THORNRIDGE	JUNCTION	5.000	5.000	0 01:00	206.983	206.981
YONGE	JUNCTION	0.000	7.223	0 02:16	0.000	4.452
EAST_DON	OUTFALL	0.000	37.825	0 02:17	0.000	891.507
MARKHAM	OUTFALL	0.000	7.213	0 02:16	0.000	4.455
Pond	STORAGE	0.000	28.274	0 02:10	0.000	61.161

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_5	JUNCTION	0.81	1.381	0.729
EX._MH_3	JUNCTION	0.21	1.306	6.594
CHAMBER_9	JUNCTION	0.31	1.642	7.688
CHAMBER_8	JUNCTION	0.35	3.744	2.225

Proposed Condition Output

```
CHAMBER_6            JUNCTION        0.49          1.185        6.449
CENTRE_STREET        JUNCTION        0.56          1.543        6.357


**********
Node Flooding Summary
**********

No nodes were flooded.


**********
Storage Volume Summary
**********

-------------------------------------------------------------------------------------
                        Average     Avg       Maximum     Max    Time of Max    Maximum
                         Volume    Pcnt        Volume    Pcnt     Occurrence    Outflow
Storage Unit            1000 m3    Full       1000 m3    Full    days hr:min        CMS
-------------------------------------------------------------------------------------
Pond                      0.224       2         7.231      49       0  02:16     21.063


**********
Outfall Loading Summary
**********

------------------------------------------------------------
                     Flow       Avg.      Max.       Total
                     Freq.      Flow      Flow      Volume
Outfall Node         Pcnt.       CMS       CMS    10^6 ltr
------------------------------------------------------------
EAST_DON             99.99    20.214    37.825     891.507
MARKHAM              29.04     0.054     7.213       4.455
------------------------------------------------------------
System               64.52    20.268    45.024     895.961


**********
Link Flow Summary
**********

-------------------------------------------------------------------------------
                              Maximum  Time of Max   Maximum    Max/    Max/
                               |Flow|   Occurrence  Velocity    Full    Full
Link                 Type         CMS  days hr:min     m/sec    Flow   Depth
-------------------------------------------------------------------------------
```

Proposed Condition Output

2100	CONDUIT	17.236	0	02:10	5.06	2.56	1.00
600	CONDUIT	0.475	0	02:04	1.69	0.48	1.00
1500_1	CONDUIT	6.338	0	02:10	3.70	1.49	1.00
1500_2	CONDUIT	6.408	0	02:10	3.95	1.05	1.00
3000_1	CONDUIT	18.402	0	02:11	3.37	1.11	1.00
3000_2	CONDUIT	19.142	0	02:12	3.34	1.03	1.00
3000_3	CONDUIT	22.611	0	02:16	3.95	1.21	1.00
3000_4	CONDUIT	37.643	0	02:16	6.76	1.24	0.96
3000_5	CONDUIT	37.825	0	02:17	7.30	1.03	0.93
2100_CEN	CONDUIT	17.934	0	01:00	7.73	0.83	1.00
BY-PASS	CONDUIT	5.000	0	03:50	4.73	1.05	0.91
Major_Flow	CONDUIT	9.935	0	02:10	1.58	0.26	0.85
Major_Flow_2	CONDUIT	1.109	0	02:04	1.65	0.23	1.00
Major_Flow_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.21
to_MARKHAM	CONDUIT	7.213	0	02:16	1.21	0.23	0.39
OVERLAND	CONDUIT	7.223	0	02:16	1.39	0.34	0.50
CONTROL	DUMMY	13.841	0	02:16			

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
2100	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	0.88	0.0001
600	1.00	0.01	0.37	0.00	0.56	0.06	0.00	0.00	0.27	0.0000
1500_1	1.00	0.01	0.00	0.00	0.01	0.00	0.00	0.98	1.03	0.0001
1500_2	1.00	0.01	0.00	0.00	0.01	0.00	0.00	0.97	1.36	0.0000
3000_1	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
3000_2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.17	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.0000
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.73	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.95	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.02	0.14	0.00	0.84	2.00	0.0001
BY-PASS	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	0.0000
Major_Flow	1.00	0.01	0.97	0.00	0.01	0.00	0.00	0.00	0.01	0.0000
Major_Flow_2	1.00	0.01	0.37	0.00	0.55	0.07	0.00	0.00	0.32	0.0000
Major_Flow_3	1.00	0.20	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
to_MARKHAM	1.00	0.20	0.00	0.00	0.80	0.00	0.00	0.00	0.19	0.0000
OVERLAND	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.0000

****

Proposed Condition Output

Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.26	0.26	0.26	0.67	0.26
600	1.00	1.00	1.00	0.01	0.01
1500_1	0.17	0.17	0.17	0.13	0.03
1500_2	0.26	0.26	0.26	0.02	0.01
3000_1	0.31	0.31	0.31	0.14	0.09
3000_2	0.35	0.35	0.35	0.01	0.01
3000_3	0.44	0.44	0.44	0.41	0.37
3000_4	0.01	0.01	0.01	0.66	0.01
3000_5	0.01	0.01	0.01	0.11	0.01
2100_CEN	0.54	0.54	0.55	0.01	0.01
BY-PASS	0.01	0.01	0.01	10.97	0.01
Major_Flow_2	0.81	0.81	0.81	0.01	0.01

Analysis begun on: Wed Mar 17 10:42:13 2010
Analysis ended on: Wed Mar 17 10:42:16 2010

Proposed Condition Output

50 Year Chicago Storm - 6 Hours

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
--------------------------------------------------------------


*****************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Starting Date ............ DEC-22-2009 00:00:00
Ending Date .............. DEC-22-2009 12:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:10:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 01:00:00
Routing Time Step ........ 30.00 sec

WARNING 03: negative offset ignored for Link 2100
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 600
WARNING 03: negative offset ignored for Link 1500_1
WARNING 03: negative offset ignored for Link 1500_2
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_1
WARNING 03: negative offset ignored for Link 3000_2
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_3
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_4
WARNING 03: negative offset ignored for Link 3000_5
```

Proposed Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link Major_Flow
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link to_MARKHAM
WARNING 03: negative offset ignored for Link CONTROL
WARNING 01: wet weather time step reduced to recording interval for Rain Gage RAIN

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        13.365        78.542
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.763        27.993
Surface Runoff ...........         8.755        51.449
Final Surface Storage ....         0.068         0.402
Continuity Error (%) .....        -1.657


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         8.768        87.681
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        82.793       827.934
External Outflow .........        91.298       912.987
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.296         2.959
Continuity Error (%) .....        -0.036


***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (98.93%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Proposed Condition Output

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.80 sec
Maximum Time Step : 6.18 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.02

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	78.542	0.000	0.000	8.159	71.433	11.458	7.729	0.909
A2	78.542	0.000	0.000	31.231	49.232	1.679	1.559	0.627
A3	78.542	0.000	0.000	30.030	49.372	74.409	35.523	0.629
System	78.542	0.000	0.000	27.993	51.449	87.546	44.811	0.655

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_4	JUNCTION	0.14	4.38	172.85	0 02:13
EX._MH_5	JUNCTION	0.09	2.54	176.43	0 02:14
EX._2100x2100x1350_TEE	JUNCTION	0.34	2.76	176.84	0 02:12
EX._MH_3	JUNCTION	0.13	4.32	172.19	0 02:13
CHAMBER_9	JUNCTION	0.34	5.55	172.02	0 02:14
CHAMBER_8	JUNCTION	0.53	5.40	171.45	0 02:15
CHAMBER_7	JUNCTION	1.04	5.35	170.88	0 02:15
CHAMBER_6	JUNCTION	1.63	4.60	169.07	0 02:14
CHAMBER_5	JUNCTION	1.43	2.77	164.60	0 02:14
CENTRE_STREET	JUNCTION	1.30	6.29	171.29	0 02:49
THORNRIDGE	JUNCTION	176.06	176.24	176.24	0 02:12

Proposed Condition Output

YONGE	JUNCTION	0.00	0.33	172.83	0	02:14
EAST_DON	OUTFALL	1.43	2.57	163.28	0	02:15
MARKHAM	OUTFALL	0.00	0.30	172.30	0	02:14
Pond	STORAGE	0.18	2.92	176.42	0	02:14

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_4	JUNCTION	7.719	7.719	0 02:10	11.455	11.470
EX._MH_5	JUNCTION	1.557	1.557	0 02:10	1.685	1.785
EX._2100x2100x1350_TEE	JUNCTION	35.499	35.499	0 02:10	74.460	74.521
EX._MH_3	JUNCTION	0.000	7.439	0 02:09	0.000	11.367
CHAMBER_9	JUNCTION	0.000	20.808	0 02:11	0.000	75.622
CHAMBER_8	JUNCTION	0.000	20.688	0 02:11	0.000	75.661
CHAMBER_7	JUNCTION	0.000	25.611	0 02:11	0.000	281.982
CHAMBER_6	JUNCTION	0.000	47.000	0 02:48	0.000	902.344
CHAMBER_5	JUNCTION	0.000	39.628	0 02:15	0.000	901.704
CENTRE_STREET	JUNCTION	15.000	15.000	0 02:49	620.953	620.948
THORNRIDGE	JUNCTION	5.000	5.000	0 01:00	206.984	206.983
YONGE	JUNCTION	0.000	15.766	0 02:14	0.000	11.955
EAST_DON	OUTFALL	0.000	39.640	0 02:15	0.000	901.027
MARKHAM	OUTFALL	0.000	15.769	0 02:14	0.000	11.956
Pond	STORAGE	0.000	36.460	0 02:10	0.000	76.255

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_5	JUNCTION	0.94	1.542	0.568
EX._2100x2100x1350_TEE	JUNCTION	0.12	0.160	2.160
EX._MH_3	JUNCTION	0.31	2.592	5.308
CHAMBER_9	JUNCTION	0.42	2.845	6.485

Proposed Condition Output

CHAMBER_8	JUNCTION	0.47	2.695	3.274
CHAMBER_6	JUNCTION	0.63	1.901	5.733
CHAMBER_5	JUNCTION	0.07	0.075	6.585
CENTRE_STREET	JUNCTION	0.68	4.194	3.706

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond	0.250	2	7.888	54	0 02:14	30.366

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	20.274	39.640	901.027
MARKHAM	29.49	0.155	15.769	11.956
System	64.74	20.429	55.329	912.983

****
Link Flow Summary
****

	Maximum |Flow|	Time of Max Occurrence	Maximum Velocity	Max/ Full	Max/ Full

Proposed Condition Output

Link	Type	CMS	days	hr:min	m/sec	Flow	Depth
2100	CONDUIT	18.452	0	02:09	5.36	2.74	1.00
600	CONDUIT	0.471	0	02:03	1.67	0.48	1.00
1500_1	CONDUIT	7.439	0	02:09	4.23	1.75	1.00
1500_2	CONDUIT	7.133	0	02:09	4.07	1.17	1.00
3000_1	CONDUIT	20.688	0	02:11	3.61	1.24	1.00
3000_2	CONDUIT	20.611	0	02:11	3.60	1.11	1.00
3000_3	CONDUIT	24.857	0	02:13	4.34	1.33	1.00
3000_4	CONDUIT	39.628	0	02:15	6.93	1.30	1.00
3000_5	CONDUIT	39.640	0	02:15	7.30	1.08	0.98
2100_CEN	CONDUIT	29.658	0	02:48	8.56	1.38	1.00
BY-PASS	CONDUIT	5.000	0	04:01	4.73	1.05	0.91
Major_Flow	CONDUIT	17.032	0	02:10	2.06	0.45	1.00
Major_Flow_2	CONDUIT	1.263	0	02:09	1.67	0.27	1.00
Major_Flow_3	CONDUIT	0.000	0	00:00	0.00	0.00	0.33
to_MARKHAM	CONDUIT	15.769	0	02:14	1.62	0.49	0.63
OVERLAND	CONDUIT	15.766	0	02:14	1.83	0.73	0.81
CONTROL	DUMMY	14.601	0	02:14			

****
Flow Classification Summary
****

	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
2100	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	0.88	0.0001
600	1.00	0.01	0.37	0.00	0.55	0.06	0.00	0.00	0.26	0.0001
1500_1	1.00	0.01	0.00	0.00	0.01	0.00	0.00	0.98	1.03	0.0001
1500_2	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.97	1.36	0.0000
3000_1	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
3000_2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.0001
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.73	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.94	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.02	0.15	0.00	0.83	1.99	0.0002
BY-PASS	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	0.0000
Major_Flow	1.00	0.01	0.97	0.00	0.02	0.00	0.00	0.00	0.01	0.0000
Major_Flow_2	1.00	0.01	0.37	0.00	0.55	0.07	0.00	0.00	0.31	0.0000
Major_Flow_3	1.00	0.19	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
to_MARKHAM	1.00	0.19	0.00	0.00	0.81	0.00	0.00	0.00	0.19	0.0000
OVERLAND	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.0000

Proposed Condition Output

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.39	0.39	0.39	0.80	0.39
600	1.14	1.14	1.15	0.01	0.01
1500_1	0.26	0.26	0.27	0.19	0.11
1500_2	0.36	0.36	0.37	0.08	0.03
3000_1	0.42	0.42	0.42	0.20	0.16
3000_2	0.47	0.47	0.47	0.12	0.11
3000_3	0.56	0.56	0.56	0.52	0.49
3000_4	0.07	0.07	0.07	0.80	0.07
3000_5	0.01	0.01	0.01	0.21	0.01
2100_CEN	0.67	0.67	0.69	0.01	0.02
BY-PASS	0.01	0.01	0.01	10.97	0.01
Major_Flow	0.12	0.12	0.12	0.01	0.01
Major_Flow_2	0.94	0.94	0.94	0.01	0.01

Analysis begun on: Wed Mar 17 10:42:36 2010
Analysis ended on: Wed Mar 17 10:42:39 2010

Proposed Condition Output

100 Year Chicago Storm - 6 Hours

```
  EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.015)
  --------------------------------------------------------------


  ***********************************************************
  NOTE: The summary statistics displayed in this report are
  based on results found at every computational time step,
  not just on results from each reporting time step.
  ***********************************************************

  ****************
  Analysis Options
  ****************
  Flow Units ............... CMS
  Process Models:
    Rainfall/Runoff ........ YES
    Snowmelt ............... NO
    Groundwater ............ NO
    Flow Routing ........... YES
    Water Quality .......... NO
  Infiltration Method ...... HORTON
  Flow Routing Method ...... DYNWAVE
  Starting Date ............ DEC-22-2009 00:00:00
  Ending Date .............. DEC-22-2009 12:00:00
  Antecedent Dry Days ...... 0.0
  Report Time Step ......... 00:10:00
  Wet Time Step ............ 00:15:00
  Dry Time Step ............ 01:00:00
  Routing Time Step ........ 30.00 sec

  WARNING 03: negative offset ignored for Link 2100
  WARNING 03: negative offset ignored for Link 600
  WARNING 03: negative offset ignored for Link 600
  WARNING 03: negative offset ignored for Link 1500_1
  WARNING 03: negative offset ignored for Link 1500_2
  WARNING 03: negative offset ignored for Link 3000_1
  WARNING 03: negative offset ignored for Link 3000_1
  WARNING 03: negative offset ignored for Link 3000_2
  WARNING 03: negative offset ignored for Link 3000_3
  WARNING 03: negative offset ignored for Link 3000_3
  WARNING 03: negative offset ignored for Link 3000_4
  WARNING 03: negative offset ignored for Link 3000_4
  WARNING 03: negative offset ignored for Link 3000_5
```

Proposed Condition Output

```
WARNING 03: negative offset ignored for Link 3000_5
WARNING 03: negative offset ignored for Link 2100_CEN
WARNING 03: negative offset ignored for Link Major_Flow
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link Major_Flow_2
WARNING 03: negative offset ignored for Link to_MARKHAM
WARNING 03: negative offset ignored for Link CONTROL
WARNING 01: wet weather time step reduced to recording interval for Rain Gage RAIN

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......        14.349        84.328
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         4.803        28.228
Surface Runoff ...........         9.724        57.144
Final Surface Storage ....         0.068         0.402
Continuity Error (%) .....        -1.715


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         9.724        97.243
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........        82.792       827.930
External Outflow .........        92.216       922.169
Internal Outflow .........         0.000         0.000
Evaporation Loss .........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.296         2.959
Continuity Error (%) .....         0.005


***************************
Time-Step Critical Elements
***************************
Link 2100_CEN (98.86%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.
```

Proposed Condition Output

****
Routing Time Step Summary
****
Minimum Time Step : 0.50 sec
Average Time Step : 0.81 sec
Maximum Time Step : 6.19 sec
Percent in Steady State : 0.00
Average Iterations per Step : 2.02

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff CMS	Runoff Coeff
A1	84.328	0.000	0.000	8.242	77.108	12.368	8.362	0.914
A2	84.328	0.000	0.000	31.547	54.653	1.864	1.702	0.648
A3	84.328	0.000	0.000	30.280	55.076	83.005	39.879	0.653
System	84.328	0.000	0.000	28.228	57.144	97.237	49.943	0.678

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min
EX._MH_4	JUNCTION	0.15	4.62	173.09	0 02:13
EX._MH_5	JUNCTION	0.10	2.61	176.50	0 02:13
EX._2100x2100x1350_TEE	JUNCTION	0.34	2.98	177.06	0 02:11
EX._MH_3	JUNCTION	0.13	4.65	172.52	0 02:14
CHAMBER_9	JUNCTION	0.34	5.88	172.35	0 02:14
CHAMBER_8	JUNCTION	0.53	5.69	171.74	0 02:14
CHAMBER_7	JUNCTION	1.04	5.59	171.12	0 02:14
CHAMBER_6	JUNCTION	1.63	4.75	169.22	0 02:14
CHAMBER_5	JUNCTION	1.43	2.86	164.68	0 02:12
CENTRE_STREET	JUNCTION	1.30	4.30	169.30	0 02:13
THORNRIDGE	JUNCTION	176.06	176.24	176.24	0 02:11

Proposed Condition Output

YONGE	JUNCTION	0.00	0.39	172.89	0	02:13
EAST_DON	OUTFALL	1.43	2.58	163.29	0	02:15
MARKHAM	OUTFALL	0.00	0.37	172.37	0	02:13
Pond	STORAGE	0.19	2.99	176.49	0	02:13

****
Node InFlow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days	hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr
EX._MH_4	JUNCTION	8.357	8.357	0	02:10	12.354	12.369
EX._MH_5	JUNCTION	1.700	1.700	0	02:10	1.861	1.969
EX._2100x2100x1350_TEE	JUNCTION	39.865	39.865	0	02:10	82.948	83.009
EX._MH_3	JUNCTION	0.000	7.794	0	02:10	0.000	12.098
CHAMBER_9	JUNCTION	0.000	21.977	0	02:10	0.000	80.108
CHAMBER_8	JUNCTION	0.000	21.855	0	02:10	0.000	80.146
CHAMBER_7	JUNCTION	0.000	26.774	0	02:10	0.000	286.471
CHAMBER_6	JUNCTION	0.000	40.152	0	02:15	0.000	906.592
CHAMBER_5	JUNCTION	0.000	40.155	0	02:15	0.000	905.818
CENTRE_STREET	JUNCTION	15.000	15.000	0	01:00	620.950	620.945
THORNRIDGE	JUNCTION	5.000	5.000	0	01:00	206.983	206.982
YONGE	JUNCTION	0.000	21.253	0	02:13	0.000	17.024
EAST_DON	OUTFALL	0.000	40.160	0	02:15	0.000	905.140
MARKHAM	OUTFALL	0.000	21.265	0	02:13	0.000	17.025
Pond	STORAGE	0.000	41.371	0	02:10	0.000	84.924

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
EX._MH_5	JUNCTION	1.01	1.615	0.495
EX._2100x2100x1350_TEE	JUNCTION	0.17	0.383	1.937
EX._MH_3	JUNCTION	0.36	2.921	4.979
CHAMBER_9	JUNCTION	0.47	3.178	6.152

Proposed Condition Output

CHAMBER_8	JUNCTION	0.53	2.982	2.987
CHAMBER_6	JUNCTION	0.68	2.055	5.579
CHAMBER_5	JUNCTION	0.11	0.156	6.504
CENTRE_STREET	JUNCTION	0.74	2.196	5.704

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
Pond	0.264	2	8.191	56	0 02:13	35.385

****
Outfall Loading Summary
****

Outfall Node	Flow Freq. Pcnt.	Avg. Flow CMS	Max. Flow CMS	Total Volume 10^6 ltr
EAST_DON	99.99	20.298	40.160	905.140
MARKHAM	29.76	0.220	21.265	17.025
System	64.87	20.518	61.240	922.165

****
Link Flow Summary
****

	Maximum |Flow|	Time of Max Occurrence	Maximum Velocity	Max/ Full	Max/ Full

Proposed Condition Output

Link	Type	CMS	days	hr:min	m/sec	Flow	Depth
2100	CONDUIT	20.061	0	02:10	5.79	2.98	1.00
600	CONDUIT	0.470	0	02:03	1.67	0.48	1.00
1500_1	CONDUIT	7.794	0	02:10	4.41	1.83	1.00
1500_2	CONDUIT	7.716	0	02:10	4.37	1.26	1.00
3000_1	CONDUIT	21.855	0	02:10	3.82	1.31	1.00
3000_2	CONDUIT	21.774	0	02:10	3.80	1.17	1.00
3000_3	CONDUIT	25.187	0	02:12	4.40	1.34	1.00
3000_4	CONDUIT	40.155	0	02:15	7.01	1.32	1.00
3000_5	CONDUIT	40.160	0	02:15	7.30	1.10	0.98
2100_CEN	CONDUIT	18.577	0	02:51	7.73	0.86	1.00
BY-PASS	CONDUIT	5.000	0	04:05	4.73	1.05	0.91
Major_Flow	CONDUIT	19.669	0	02:10	2.38	0.52	1.00
Major_Flow_2	CONDUIT	1.372	0	02:10	1.75	0.29	1.00
Major_Flow_3	CONDUIT	0.883	0	02:13	0.24	0.05	0.48
to_MARKHAM	CONDUIT	21.265	0	02:13	1.80	0.67	0.76
OVERLAND	CONDUIT	20.443	0	02:13	2.01	0.95	0.95
CONTROL	DUMMY	14.942	0	02:13			

****
Flow Classification Summary
****

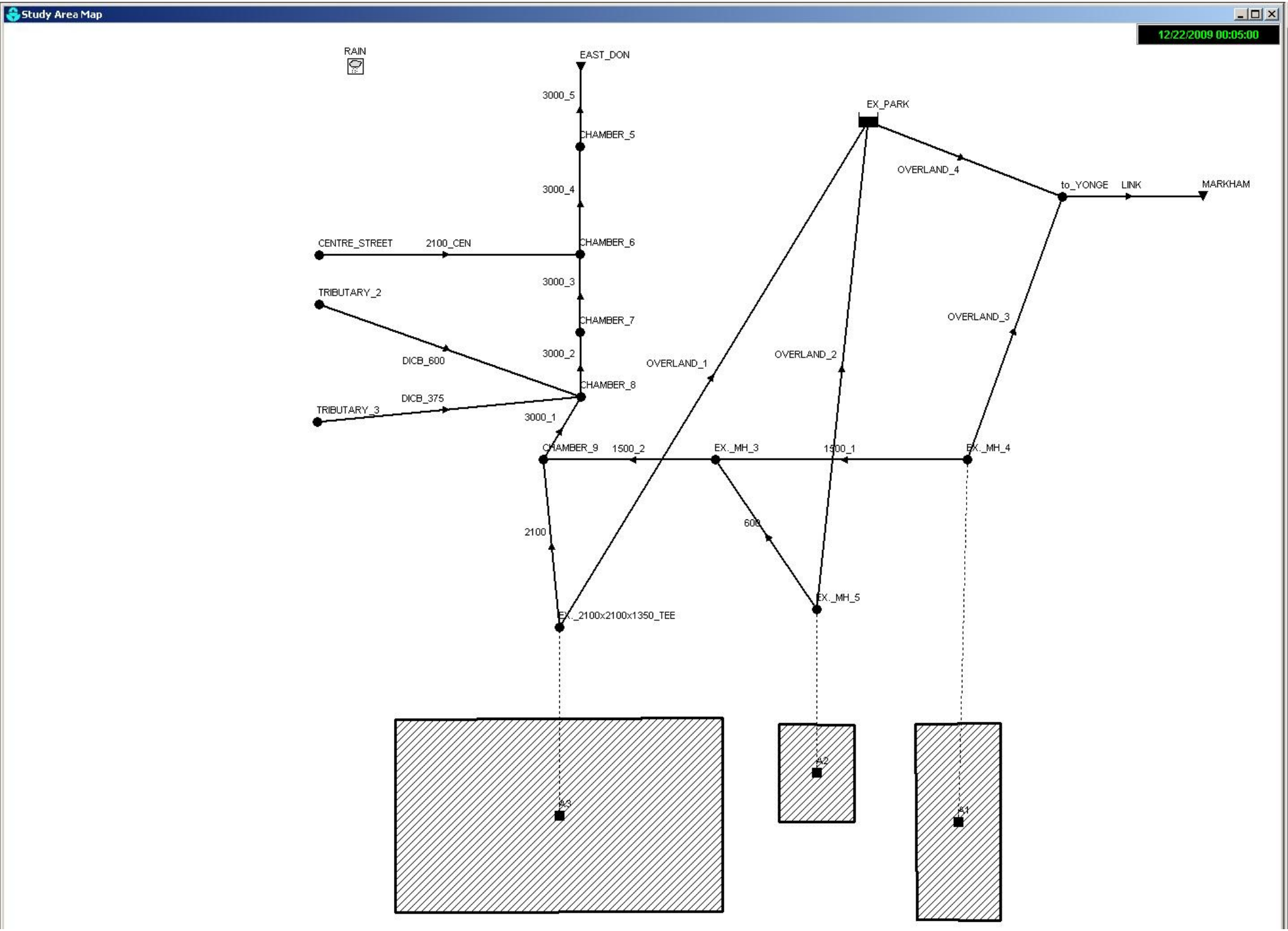
	Adjusted	--- Fraction of Time in Flow Class ----							Avg.	Avg.
	/Actual		Up	Down	Sub	Sup	Up	Down	Froude	Flow
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Number	Change
2100	1.00	0.01	0.00	0.00	0.02	0.00	0.00	0.96	0.88	0.0001
600	1.00	0.01	0.37	0.00	0.55	0.06	0.00	0.00	0.26	0.0001
1500_1	1.00	0.01	0.00	0.00	0.01	0.00	0.00	0.98	1.03	0.0001
1500_2	1.00	0.01	0.00	0.00	0.01	0.01	0.00	0.97	1.36	0.0001
3000_1	1.00	0.01	0.01	0.00	0.99	0.00	0.00	0.00	0.43	0.0000
3000_2	1.00	0.00	0.00	0.00	0.99	0.00	0.00	0.00	0.18	0.0000
3000_3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.62	0.0001
3000_4	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.73	0.0000
3000_5	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.94	0.0000
2100_CEN	1.00	0.00	0.00	0.00	0.02	0.15	0.00	0.83	1.99	0.0002
BY-PASS	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.25	0.0000
Major_Flow	1.00	0.01	0.97	0.00	0.02	0.00	0.00	0.00	0.01	0.0000
Major_Flow_2	1.00	0.01	0.37	0.00	0.55	0.07	0.00	0.00	0.31	0.0000
Major_Flow_3	1.00	0.19	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.0000
to_MARKHAM	1.00	0.19	0.00	0.00	0.81	0.00	0.00	0.00	0.20	0.0000
OVERLAND	1.00	0.99	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.0000

Proposed Condition Output

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
2100	0.45	0.45	0.45	0.86	0.45
600	1.22	1.22	1.22	0.01	0.01
1500_1	0.31	0.31	0.31	0.21	0.13
1500_2	0.42	0.42	0.42	0.08	0.04
3000_1	0.47	0.47	0.47	0.25	0.21
3000_2	0.53	0.53	0.53	0.15	0.13
3000_3	0.62	0.62	0.62	0.58	0.54
3000_4	0.11	0.11	0.11	0.84	0.11
3000_5	0.01	0.01	0.01	0.25	0.01
2100_CEN	0.72	0.72	0.74	0.01	0.01
BY-PASS	0.01	0.01	0.01	10.97	0.01
Major_Flow	0.17	0.17	0.17	0.01	0.01
Major_Flow_2	1.01	1.01	1.01	0.01	0.01

Analysis begun on: Wed Mar 17 10:35:24 2010
Analysis ended on: Wed Mar 17 10:35:27 2010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CHAMBER_5
EX_PARK
OVERLAND_4
to_YONGE
LINK
MARKHAM
3000_4
CENTRE_STREET
2100_CEN
CHAMBER_6
3000_3
TRIBUTARY_2
CHAMBER_7
OVERLAND_3
DICB_600
3000_2
OVERLAND_1
OVERLAND_2
CHAMBER_8
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CHAMBER_9
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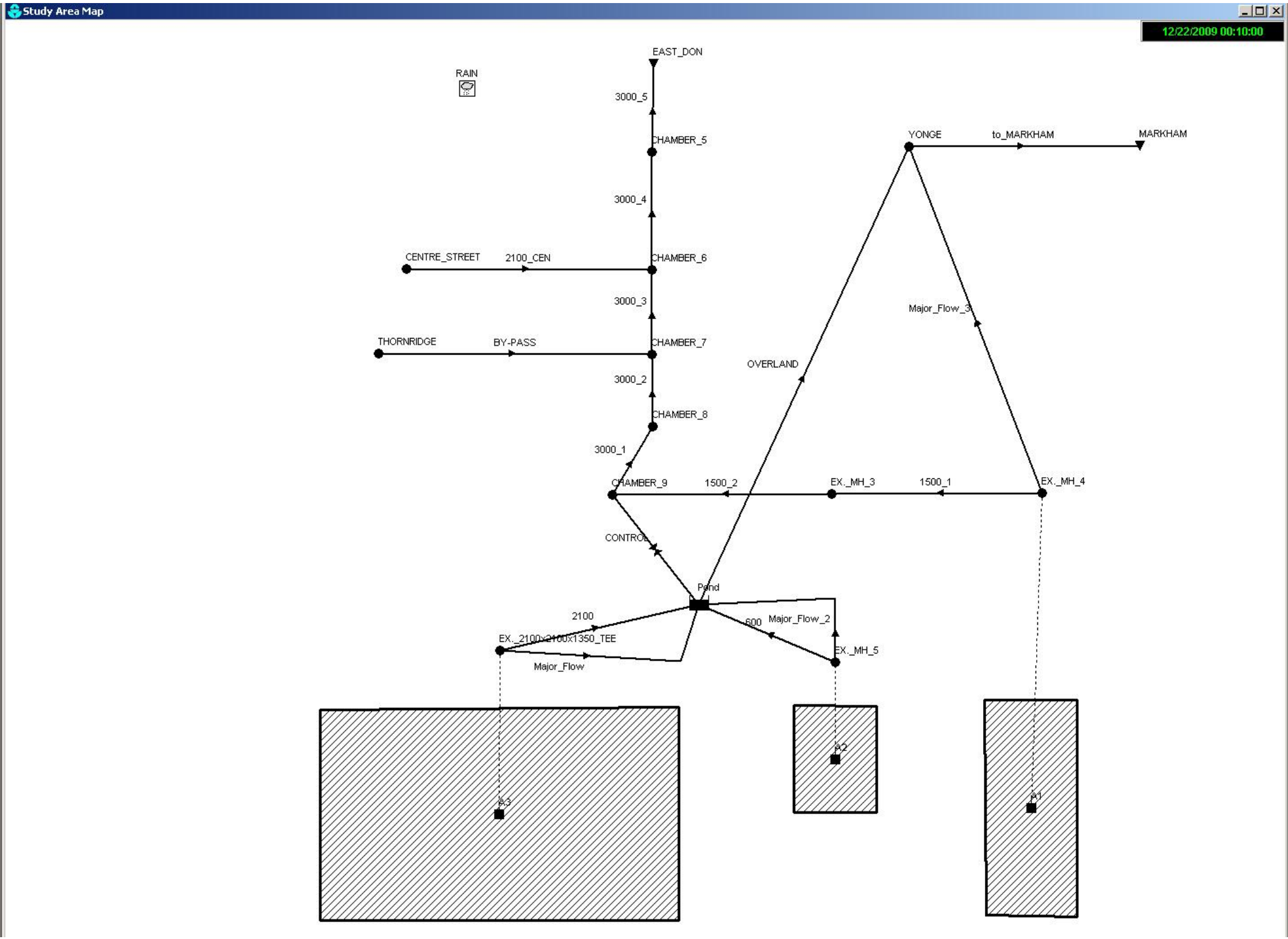
1500_1
EX._MH_4
2100
600
EX._MH_5
EX._2100x2100x1350_TEE
A3
A2
A1


Study Area Map
12/22/2009 00:10:00
EAST_DON
RAIN
3000_5
CHAMBER_5
YONGE
to_MARKHAM
MARKHAM
3000_4
CENTRE_STREET
2100_CEN
CHAMBER_6
3000_3
Major_Flow_3
THORNRIDGE
BY-PASS
CHAMBER_7
OVERLAND
3000_2
CHAMBER_8
3000_1
CHAMBER_9
1500_2
EX._MH_3
1500_1
EX._MH_4
CONTROL
Pond
2100
600
Major_Flow_2
EX._2100x2100x1350_TEE
EX._MH_5
Major_Flow
A3
A2
A1

Appendix C

Net Effects Analysis

Appendix C - Net Effects Analysis

Tables C1 - C4 provide the details of the potential effects, mitigation measures, and net effects associated with each of the alternatives.

TABLE C1 – Net Effects Analysis for Alternative 1 (Do Nothing)			
Evaluation Criteria	**Potential Effects**	**Mitigation/Compensation/Enhancement Measures**	**Net Effects**
Social			
Impacts to existing Park uses	▪ No effect	▪ N/A	▪ The nearby residents will continue to have full access to the Park for all present uses
Creation of new Park uses	▪ No effect	▪ N/A	▪ No improvement or reduction in Park uses
Potential for standing water	▪ No effect	▪ N/A	▪ No improvement or reduction in standing water in the park
Impacts to adjacent properties during and after construction	▪ N/A	▪ N/A	▪ Private and public properties will continue to be in danger of flooding from storm events greater than the 2 year storm
Economic Environment			
Capital construction cost	▪ N/A	▪ N/A	▪ Not applicable
Operation and maintenance cost	▪ No effect	▪ N/A	▪ Cost of maintenance will be same as before
Reduction in flood damages	▪ No effect	▪ N/A	▪ The Brooke Street Trunk Sewer will not alleviate flooding during storm events greater than the 2 year frequency
Natural Environment			
Impacts on general water quality	▪ No effect	▪ N/A	▪ Road runoff will continue to enter the tributary to the Don River ▪ Poor water quality due to sediment from the road runoff can lead to the poor health of downstream aquatic habitat
Impacts to the existing vegetation	▪ No effect	▪ N/A	▪ The existing vegetation in the Gallanough Park will not be disturbed due to construction
Functional			
Ease of construction	▪ N/A	▪ N/A	▪ No construction will occur
Ease of operations and maintenance	▪ No effect	▪ N/A	▪ The Park would require the same level of maintenance as before
Risk to adjacent or upstream properties	▪ No effect	▪ N/A	▪ No reduction in risk
Risk to downstream properties	▪ No effect	▪ N/A	▪ No reduction in risk

TABLE C2 – Net Effects Analysis for Alternative 2: Dry Pond

Evaluation Criteria	Potential Effects	Mitigation/Compensation/Enhancement Measures	Net Effects
Social			
Impacts to existing Park uses	▪ The residents will have reduced access to the Park space after rainfall events due to the soft (wet) grounds ▪ The Park will be temporarily inaccessible after extreme storm events due to the high water level ▪ Park use will be restricted during construction	▪ Hydrologic and hydraulic calculations will be optimized to minimize the detention time of water in the Park ▪ A low flow channel and low flow pipe can be provided to drain flows less than a 2 year event straight through the pond without storage ▪ Grading required for dry pond may provide other park uses	▪ The trails along the perimeter of the Park will not be impacted in terms of access and use ▪ The open ground at the center of the Park will not be usable during and immediately after an extreme rainfall event (greater than 2 year) ▪ Flows less than a 2 year event will not impact park usage
Creation of new Park uses	▪ Reduction in available space for existing uses ▪ Increased toboggan runs can be constructed ▪ New walking trails may be constructed	▪ Grading required for dry pond may provide other park uses ▪ Design can incorporate a small soccer field	▪ Some potential for new park uses included increased toboggan runs and walking trails
Potential for standing water	▪ Potential for standing water after storm events	▪ Warning signs can be installed around the Park to increase awareness of standing water hazard in the pond area ▪ Landscaping can be implemented in the Park to reduce public access to the ponding areas ▪ A low flow channel and low flow pipe can be provided to drain flows less than a 2 year event straight through the pond without storage	▪ Potential for periodic standing water after storm events remains ▪ Flows less than a 2 year event should not result in standing water
Impacts to adjacent properties during and after construction	▪ Some disturbance to private/public property ▪ Some disturbance to traffic movements for local residents ▪ Potential for noise, odour and dust nuisances ▪ Construction would be relatively short duration	▪ Proper health and safety protocols will be followed during construction ▪ Traffic management plan and restricted construction hours can be implemented to minimize disturbance ▪ Implement noise, odour and dust control plans	▪ Minimal disturbance to private/public property may occur ▪ Adequate level of service can be provided through traffic control ▪ Minimal potential for noise, odour and dust ▪ Construction would be relatively short duration
Economic			
Capital costs	▪ Cost for construction is approximately $800,000 ▪ Expensive underground chamber is not required	▪ Cost may be optimized through detailed design process	▪ Best value in terms of flood control improvement for money spent
Operation and maintenance cost	▪ The Park would require higher level of maintenance due to input of stormwater runoff into the Park ▪ Potential for debris entering into the pond and clogging structures	▪ Maintenance and operations would be considered during detailed design ▪ An operations and maintenance manual would be developed during detailed design	▪ Some maintenance will be required, however confined space entry is minimized ▪ Special equipment or personnel is not required for maintenance
Reduction in flood damages	▪ In conjunction with other identified improvements, the frequency of flooding events will be reduced	▪ Gallanough Park will detain and store storm runoff to decrease the frequency of flooding in the Thornhill Neighbourhood area ▪ Storage operations would be optimized during detailed design	▪ Existing risk of danger to the public and private properties is reduced ▪ The Brooke Street Trunk Sewer will continue to surcharge and flood the surrounding area, however, the level of storm intensity required to cause flood increases to 25 year from 5 year

TABLE C2 – Net Effects Analysis for Alternative 2: Dry Pond

Evaluation Criteria	Potential Effects	Mitigation/Compensation/Enhancement Measures	Net Effects
Natural Environment			
Impacts on general water quality	▪ Minimal changes to water quality are expected through temporary detention ▪ Some infiltration into the ground may occur during ponding	▪ None	▪ Minimal changes to water quality are expected through temporary detention ▪ Some infiltration into the ground may occur during ponding
Impacts to the existing vegetation	▪ Some trees will need to be removed to make room for the new inlet/outlet structures and new pipes	▪ Landscaping can be implemented to compensate the loss of existing vegetation ▪ A tree preservation plan will be completed during detailed design	▪ The loss of large diameter trees (< 300 mm) represents a net loss of vegetation in the Park ▪ Some compensation can be realized with landscaping and replanting ▪ Tree removal and damaged will be limited through a tree preservation plan
Functional			
Ease of construction	▪ The site is easily accessible ▪ Construction techniques are straight forward ▪ Some flow bypass operations will be required	▪ Typical construction management methods ▪ Develop a construction methodology that minimizes flow bypass requirements	▪ No issues with construction are anticipated
Ease of operations and maintenance	▪ Dry ponds are typically maintained by municipal staff, who are familiar with pond operations ▪ Removal of accumulated sediment required to maintain the park standards	▪ Operations and maintenance requirements will be considered during detailed design	▪ Minimal operations and maintenance
Risk to adjacent or upstream properties	▪ Ponding in the Park could impact foundation drainage for some home owners immediately adjacent to the Park	▪ Ponding level or volume can be adjusted during detail design to eliminate potential for negative impact	▪ Upstream properties will remain unaffected
Risk to downstream properties	▪ In conjunction with other improvements, flooding impacts to private properties in Thornhill Neighbourhood are reduced	▪ During detailed design, additional modelling and analysis will be completed to optimize the quantity control capabilities of Gallanough Park	▪ Private properties in Thornhill Neighbourhood area will experience less flooding events ▪ In the event of a flood event, the extent of flooding will be reduced ▪ Additional capacity within the Brooke Street Trunk Sewer will be realized, and it will be able to capture flows from the adjacent area

TABLE C3 – Net Effects Analysis for Alternative 3: Underground Storage

Evaluation Criteria	Potential Effects	Mitigation/Compensation/Enhancement Measures	Net Effects
Social			
Impacts to existing park uses	▪ No effects after construction ▪ Park use will be restricted during construction	▪ No mitigation undertaken	▪ The nearby residents will continue to have full access to the Park for all present uses
Creation of new park uses	▪ With new filled area, new park uses can be implemented	▪ Jogging/walking track, basketball nets, tobogganing hills and/or skating rink can be implemented	▪ High potential for new park uses
Potential for standing water	▪ Limited potential for standing water in the Park, as all storage is underground	▪ No mitigation undertaken	▪ Limited potential for standing water after storm events
Impacts to adjacent properties during and after construction	▪ Some disturbance to private/public property ▪ Some disturbance to traffic movements for local residents ▪ Potential for noise, odour and dust nuisances ▪ Construction would be long duration	▪ Proper health and safety protocols will be followed during construction ▪ Traffic management plan and restricted construction hours can be implemented to minimize disturbance ▪ Implement noise, odour and dust control plans	▪ Minimal disturbance to private/public property may occur ▪ Adequate level of service can be provided through traffic control ▪ Minimal potential for noise, odour and dust ▪ Construction would be long duration
Economic			
Capital construction cost	▪ Cost for construction is approximately $5.4 million ▪ Expensive underground chamber is required	▪ Cost may be optimized through detailed design process	▪ The most expensive alternative in terms of capital cost
Operation and maintenance cost	▪ Sedimentation is possible within the underground storage ▪ Maintenance would be expensive due to confined space entry and the use of uncommon equipment for maintenance	▪ Maintenance and operations would be considered during detailed design ▪ An operations and maintenance manual would be developed during detailed design	▪ Maintenance cost would be high due to confined space entry ▪ Special equipment and personnel is required for maintenance
Reduction in flood damages	▪ In conjunction with other identified improvements, the frequency of flooding events will be reduced	▪ Gallanough Park will detain and store storm runoff to decrease the frequency of flooding in the Thornhill Neighbourhood area ▪ Storage operations would be optimized during detailed design	▪ Existing risk of danger to the public and private properties is reduced ▪ The Brooke Street Trunk Sewer will continue to surcharge and flood the surrounding area, however, the level of storm intensity required to cause flood increases to 25 year from 5 year
Natural Environment			
Impacts on general water quality	▪ Limited improvement to water quality would be realized through sedimentation within the underground storage	▪ None	▪ Limited improvement to water quality would be realized through sedimentation within the underground storage
Impacts to the existing vegetation	▪ Some trees will need to be removed to make room for the new inlet/outlet structures and new pipes	▪ Landscaping can be implemented to compensate the loss of existing vegetation ▪ A tree preservation plan will be completed during detailed design	▪ The loss of large diameter trees (< 300 mm) represents a net loss of vegetation in the Park ▪ Some compensation can be realized with landscaping and replanting ▪ Tree removal and damaged will be limited through a tree preservation plan

TABLE C3 – Net Effects Analysis for Alternative 3: Underground Storage			
Evaluation Criteria	**Potential Effects**	**Mitigation/Compensation/Enhancement Measures**	**Net Effects**
Functional			
Ease of construction	▪ The site is easily accessible ▪ Difficulty of construction is increased, as cast-in-place concrete will be required ▪ Construction duration will increase	▪ Cost may be optimized through detailed design process	▪ More complicated construction methodologies ▪ Long construction duration
Ease of operations and maintenance	▪ Maintenance is difficult due to the limited access to the underground facility ▪ Maintenance activities require confined space entry, specialized equipment and personnel ▪ Inspections would likely require confined space entry	▪ Reduce maintenance and operations as much as possible during design ▪ An operations and maintenance manual would be developed during detailed design	▪ Difficult maintenance operations ▪ Frequent confined space entry
Risk to adjacent or upstream properties	▪ Ponding in the Park could impact foundation drainage for some home owners immediately adjacent to the Park	▪ Ponding level or volume can be adjusted during detail design to eliminate potential for negative impact	▪ Upstream properties will remain unaffected
Risk to downstream properties	▪ In conjunction with other improvements, flooding impacts to private properties in Thornhill Neighbourhood are reduced	▪ During detailed design, additional modelling and analysis will be completed to optimize the quantity control capabilities of Gallanough Park	▪ Private properties in Thornhill Neighbourhood area will experience less flooding events ▪ In the event of a flood event, the extent of flooding will be reduced ▪ Additional capacity within the Brooke Street Trunk Sewer will be realized, and it will be able to capture flows from the adjacent area

TABLE C4 – Net Effects Analysis for Alternative 4: Mix of Dry Pond and Underground Storage

Evaluation Criteria	Potential Effects	Mitigation/Compensation/Enhancement Measures	Net Effects
Social			
Impacts to existing park uses	▪ The residents will have reduced access to the Park space after extreme rainfall events due to the soft (wet) grounds ▪ The Park will be temporarily inaccessible after extreme storm events due to the high water level ▪ Park use will be restricted during construction	▪ Hydrologic and hydraulic calculations will be optimized to minimize the detention time of water in the Park ▪ Underground storage would provide control for smaller major events (ie. 5 year) without surface ponding ▪ Grading required for dry pond may provide other park uses	▪ The trails along the perimeter of the Park will not be impacted in terms of access and use ▪ The open ground at the center of the Park will not be usable during and immediately after an extreme rainfall event (greater than 5 year) ▪ Flows less than a 5 year event will not impact park usage
Creation of new park uses	▪ Reduction in available space for existing uses ▪ Increased toboggan runs can be constructed ▪ New walking trails may be constructed	▪ Grading required for dry pond may provide other park uses ▪ Design can incorporate a small soccer field	▪ Some potential for new park uses included increased toboggan runs and walking trails
Potential for standing water	▪ Potential for standing water after storm events greater than 5 year return period	▪ Warning signs can be installed around the Park to increase awareness of standing water hazard in the pond area ▪ Landscaping can be implemented in the Park to reduce public access to the ponding areas ▪ Underground storage would control flows less than a 5 year event straight through the pond without surface ponding	▪ Potential for periodic standing water after storm events remains ▪ Flows less than a 5 year event should not result in standing water
Impacts to adjacent properties during and after construction	▪ Some disturbance to private/public property ▪ Some disturbance to traffic movements for local residents ▪ Potential for noise, odour and dust nuisances ▪ Construction would be relatively short duration	▪ Proper health and safety protocols will be followed during construction ▪ Traffic management plan and restricted construction hours can be implemented to minimize disturbance ▪ Implement noise, odour and dust control plans	▪ Minimal disturbance to private/public property may occur ▪ Adequate level of service can be provided through traffic control ▪ Minimal potential for noise, odour and dust ▪ Construction would be relatively short duration
Economic			
Capital construction costs	▪ Cost for construction is approximately $4.4 million ▪ Expensive underground chamber is required	▪ Cost may be optimized through detailed design process	▪ The most expensive alternative in terms of capital cost
Operation and maintenance cost	▪ Sedimentation is possible within the underground storage ▪ Maintenance would be expensive due to confined space entry and the use of uncommon equipment for maintenance	▪ Maintenance and operations would be considered during detailed design ▪ An operations and maintenance manual would be developed during detailed design	▪ Maintenance cost would be high due to confined space entry ▪ Special equipment and personnel is required for maintenance
Reduction in flood damages	▪ In conjunction with other identified improvements, the frequency of flooding events will be reduced	▪ Gallanough Park will detain and store storm runoff to decrease the frequency of flooding in the Thornhill Neighbourhood area ▪ Storage operations would be optimized during detailed design	▪ Existing risk of danger to the public and private properties is reduced ▪ The Brooke Street Trunk Sewer will continue to surcharge and flood the surrounding area, however, the level of storm intensity required to cause flood increases to 25 year from 5 year

TABLE C4 – Net Effects Analysis for Alternative 4: Mix of Dry Pond and Underground Storage

Evaluation Criteria	Potential Effects	Mitigation/Compensation/Enhancement Measures	Net Effects
Natural Environment			
Impacts on general water quality	▪ Limited improvement to water quality would be realized through sedimentation within the underground storage	▪ None	▪ Limited improvement to water quality would be realized through sedimentation within the underground storage
Impacts to the existing vegetation	▪ Some trees will need to be removed to make room for the new inlet/outlet structures and new pipes	▪ Landscaping can be implemented to compensate the loss of existing vegetation ▪ A tree preservation plan will be completed during detailed design	▪ The loss of large diameter trees (< 300 mm) represents a net loss of vegetation in the Park ▪ Some compensation can be realized with landscaping and replanting ▪ Tree removal and damaged will be limited through a tree preservation plan
Functional			
Ease of construction	▪ The site is easily accessible ▪ Difficulty of construction is increased, as cast-in-place concrete will be required ▪ Construction duration will increase	▪ Cost may be optimized through detailed design process	▪ More complicated construction methodologies ▪ Long construction duration
Ease of operations and maintenance	▪ Maintenance is difficult due to the limited access to the underground facility ▪ Maintenance activities require confined space entry, specialized equipment and personnel ▪ Inspections would likely require confined space entry	▪ Reduce maintenance and operations as much as possible during design ▪ An operations and maintenance manual would be developed during detailed design	▪ Difficult maintenance operations ▪ Frequent confined space entry
Risk to adjacent or upstream properties	▪ Ponding in the Park could impact foundation drainage for some home owners immediately adjacent to the Park	▪ Ponding level or volume can be adjusted during detail design to eliminate potential for negative impact	▪ Upstream properties will remain unaffected
Risk to downstream properties	▪ In conjunction with other improvements, flooding impacts to private properties in Thornhill Neighbourhood are reduced	▪ During detailed design, additional modelling and analysis will be completed to optimize the quantity control capabilities of Gallanough Park	▪ Private properties in Thornhill Neighbourhood area will experience less flooding events ▪ In the event of a flood event, the extent of flooding will be reduced ▪ Additional capacity within the Brooke Street Trunk Sewer will be realized, and it will be able to capture flows from the adjacent area.

Appendix D

Conceptual Cost Estimates

Clarifica Water Resources
A division of Cole Engineering Group Ltd.
100 Renfrew Drive, Suite 100, Markham, ON. L3R 9R6
T:416.987.6161 F: 905.940.2064

Prepared By: Dan Lee, P.Eng.

CONCEPTUAL COST ESTIMATE

Gallanough Park SWM Facility Class EA

City of Vaughan
File Number: W09-287
Date: February 22, 2010
Summary

Capital Cost

Alternative	Description	Cost
1	Do Nothing	0
2	Dry Pond	$ 807,875.00
3	Underground Storage	$ 5,414,085.00
4	Dry Pond and Underground	$ 4,425,085.00

Annual Maintenance Cost

Type	Cost
Dry Pond	$ 3,400.00
Underground	$ 19,100.00

Maintenance Cost Net Present Value Analysis

Type	Cost
Dry Pond	$ 30,000.00
Underground	$ 170,000.00

Clarifica Water Resources A division of Cole Engineering Group Ltd.	**CONCEPTUAL COST ESTIMATE**
	Gallanough Park SWM Facility Class EA
100 Renfrew Drive, Suite 100, Markham, ON. L3R 9R6	City of Vaughan
T:416.987.6161 F: 905.940.2064	File Number: W09-287
	Date: February 22, 2010
Prepared By: Dan Lee, P.Eng.	Alternative 2: Surface Storage (10,000 m^3)

Item No.	Description	Quantity	Units	Unit Price	Item Price
Construction Costs					
1	Mobilization and demobilization	1	L.S.	$ 15,000.00	$ 15,000.00
2	Traffic control	1	L.S.	$ 35,000.00	$ 35,000.00
3	Erosion control	670	m	$ 30.00	$ 20,100.00
4	Plug existing 2100mm diameter storm sewer at both ends with double brick bulkhead walls.	2	each	$ 5,000.00	$ 10,000.00
5	Excavate and dispose earth to create new pond	8200	m^3	$ 20.00	$ 164,000.00
6	Dispose of existing 600 mm storm pipe 2.5m deep	65	m	$ 200.00	$ 13,000.00
7	Supply and place Tee joint	1	each	$ 20,000.00	$ 20,000.00
8	Supply and place 2100 mm pipe	70	m	$ 3,000.00	$ 210,000.00
9	Supply and place 600 mm pipe	35	m	$ 240.00	$ 8,400.00
10	Supply and place inlet headwall	2	each	$ 8,000.00	$ 16,000.00
11	Supply and place outlet control structure	2	each	$ 8,000.00	$ 16,000.00
12	Engineering	1	L.S.	$ 35,000.00	$ 35,000.00
13	Final grading and restoration	1	L.S.	$ 25,000.00	$ 25,000.00
14	Landscaping (trees)	50	each	$ 300.00	$ 15,000.00
15	Park amenities	1	L.S.	$100,000	$ 100,000.00
				Construction Cost - Subtotal	$ 702,500.00
				15 % Contingency	$ 105,375.00
				Construction Cost - Total	$ 807,875.00

Clarifica Water Resources A division of Cole Engineering Group Ltd.		**CONCEPTUAL COST ESTIMATE**			
		Gallanough Park SWM Facility Class EA			
100 Renfrew Drive, Suite 100, Markham, ON. L3R 9R6		City of Vaughan			
T:416.987.6161 F: 905.940.2064		File Number: W09-287			
		Date: February 22, 2010			
Prepared By: Dan Lee, P.Eng.		Alternative 3: Underground storage (9,000 m^3)			
Item No.	**Description**	**Quantity**	**Units**	**Unit Price**	**Item Price**
Construction Costs					
1	Mobilization and Demobilization	1	L.S.	$ 15,000.00	$ 15,000.00
2	Traffic control	1	L.S.	$ 35,000.00	$ 35,000.00
3	Erosion control	670	L.S.	$ 30.00	$ 20,100.00
4	Plug existing 2100mm diameter storm sewer at both ends with double brick bulkhead walls.	2	each	$ 5,000.00	$ 10,000.00
5	Dispose of existing 600 mm storm pipe 2.5m deep	65	m	$ 200.00	$ 13,000.00
6	Excavation and disposal of earth for underground tank	9000	m^3	$ 20.00	$ 180,000.00
7	Shoring for excavation	2000	m^2	$ 100.00	$ 200,000.00
8	Cast-in-place concrete underground tank including provisions for inlet/outlet connections	2500	m^3	$ 1,500.00	$ 3,750,000.00
9	Supply and place Tee joint	1	each	$ 20,000.00	$ 20,000.00
10	Supply and place 2100 mm pipe	50	m	$ 3,000.00	$ 150,000.00
11	Supply and place 600 mm pipe	20	m	$ 240.00	$ 4,800.00
12	Lower a section of sanitary sewer to accommodate new pond outlet pipe	1	L.S.	$ 30,000.00	$ 30,000.00
13	Engineering	1	L.S.	$ 40,000.00	$ 40,000.00
14	Final grading and restoration	1	L.S.	$ 25,000.00	$ 25,000.00
15	Landscaping (trees)	50	each	$ 300.00	$ 15,000.00
16	Park amenities	1	L.S.	$ 200,000.00	$ 200,000.00
				Construction Cost - Subtotal	$ 4,707,900.00
				15 % Contingency	$ 706,185.00
				Construction Cost - Total	$ 5,414,085.00

Clarifica Water Resources A division of Clarica Engineering Group Ltd.	**CONCEPTUAL COST ESTIMATE**
	Gallanough Park SWM Facility Class EA
100 Renfrew Drive, Suite 100, Markham, ON. L3R 9R6	City of Vaughan
T:416.987.6161 F: 905.940.2064	File Number: W09-287
	Date: February 22, 2010
Prepared By: Dan Lee, P.Eng.	Alternative 4: Combination of surface and underground storage ($3,900\ m^3$ UG + $7750\ m^3$ SS = $11,650\ m^3$)

Item No.	Description	Quantity	Units	Unit Price	Item Price
Construction Costs					
1	Mobilization and Demobilization	1	L.S.	$ 15,000.00	$ 15,000.00
2	Traffic control	1	L.S.	$ 35,000.00	$ 35,000.00
3	Erosion control	670	L.S.	$ 30.00	$ 20,100.00
4	Plug existing 2100mm diameter storm sewer at both ends with double brick bulkhead walls.	2	each	$ 5,000.00	$ 10,000.00
5	Dispose of existing 600 mm storm pipe 2.5m deep	65	m	$ 200.00	$ 13,000.00
6	Excavation and disposal of earth for surface pond and underground concrete chamber	13500	m^3	$ 20.00	$ 270,000.00
7	Excavation shoring	1000	m^2	$ 100.00	$ 100,000.00
8	Cast-in-place concrete underground tank including provisions for inlet/outlet connections	2000	m^3	$ 1,500.00	$ 3,000,000.00
9	Supply and place Tee joint	1	each	$ 20,000.00	$ 20,000.00
10	Supply and place 2100 mm pipe	50	m	$ 3,000.00	$ 150,000.00
11	Supply and place 600 mm pipe	20	m	$ 240.00	$ 4,800.00
12	Lower a section of sanitary sewer to accommodate new pond outlet pipe	1	L.S.	$ 30,000.00	$ 30,000.00
13	Engineering	1	L.S.	$ 40,000.00	$ 40,000.00
14	Final grading and restoration	1	L.S.	$ 25,000.00	$ 25,000.00
15	Landscaping (trees)	50	each	$ 300.00	$ 15,000.00
16	Park amenities	1	L.S.	$100,000	$ 100,000.00
				Construction Cost - Subtotal	$ 3,847,900.00
				15 % Contingency	$ 577,185.00
				Construction Cost - Total	$ 4,425,085.00

Appendix E

Notice of Study Commencement

CLASS ENVIRONMENTAL ASSESSMENT

STUDY FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

NOTICE OF STUDY COMMENCEMENT

The City of Vaughan has initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). The objective of the Study is to review alternatives for flood control within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park. Ultimately, the Class Environmental Assessment process will determine the preferred form of the proposed stormwater management facilities or features. Once the problem is fully documented, a set of alternative solutions will be evaluated and presented to the Public and Agencies for comment at various points throughout the Study.

A key component of the Study will be consultation with interested stakeholders (public, landowners and regulatory agencies). A Public Information Centre (PIC) will be held in February 2010 to provide interested parties with an opportunity to review and discuss issues related to the study. Details regarding the forthcoming PIC will be advertised as the study progresses. It is also proposed to establish a Project Advisory Group (PAG) to provide direct input and feedback through the Study process, including a one-day Design Charette. Members of the general public and organizations are invited to apply. **The deadline for submission to join the Project Advisory Group is December 20, 2009.**

The study will be conducted as a 'Schedule B' project in compliance with the Municipal Engineers Association document *"Municipal Class Environmental Assessment,"* (October 2000, amended 2007) which will address Phases 1 and 2 of the Class EA Process. We are interested in hearing any comments or input that you may have about this Study. Comments and information regarding the Study are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the Study and may be included in study documentation.

Please note that information related to this Study will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in Study documentation prepared for public review.

Further notices will be posted at www.vaughan.ca. If you require further information, or if you have specific comments related to this Study, please contact either of the following:

Pat Marcantonio, C.E.T.
Senior Engineering Assistant
City of Vaughan
Engineering Services
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
Tel: 905-832-8585 ext. 3111
E-mail: pat.marcantonio@vaughan.ca

Mark Bassingthwaite, P.Eng.
Project Manager
Clarifica, a division of Cole Engineering Group Ltd.
Consultant
100 Renfrew Drive, Suite 100
Markham, ON L3R 9R6
Tel: 905-940-6161 ext. 311
E-mail: mbassingthwaite@ColeEngineering.ca

This Notice first issued on Tuesday, November 24, 2009.

City Page Online

Page 1 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, November 26, 2009

MEETINGS OF COUNCIL

For a complete list of City of Vaughan meetings, click on this box.

Listen to Council proceedings live at www.vaughan.ca/radio

APPOINTMENTS

TO THE CITY OF VAUGHAN 2010 GENERAL MUNICIPAL ELECTION COMPLIANCE AUDIT COMMITTEE

The City of Vaughan is currently seeking interested applicants from professionals who are required to adhere to codes of standards of their profession, and other individuals with in depth knowledge of the campaign financing rules of the *Municipal Elections Act, 1996,* for appointment to the **City of Vaughan 2010 General Municipal Election Compliance Audit Committee**.

The purpose of the Municipal Election Compliance Audit Committee is to:

- consider compliance audit applications made by electors and decide whether they should be granted or rejected;
- appoint an auditor if the application is granted;
- receive the auditor's report;
- consider the auditor's report and decide if legal proceedings should be commenced; and
- give directions accordingly and recover the costs of conducting the compliance audit from the applicant if no apparent contraventions are found.

If you wish to be considered for an appointment, please submit your application, in writing, to:

JEFFREY A. ABRAMS, City Clerk
City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1

For further information, contact the City Clerk by email at jeffrey.abrams@vaughan.ca. For the Council Item and Terms of Reference, please click on this ad or visit www.vaughan.ca.

RFP09-488

EMAIL ARCHIVAL - MANAGED SERVICES

SEALED PROPOSALS, in the envelope provided, clearly marked as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2, (Rutherford & Creditstone), L4K 5E4, no later than:

15:00:00 hours (3:00:00 p.m.) Local Time
TUESDAY, JANUARY 5, 2010

The City of Vaughan is seeking a qualified proponent to provide a secure, efficient and effective solution for archiving the City's emails, calendar appointments and other electronic communication items.

As of **TUESDAY, DECEMBER 1, 2009**, the Request For Proposal Document may be obtained from the Purchasing Services Department, located at the address above, between 08:30 and 16:30 hours (8:30 a.m. to 4:30 p.m.), local time Monday to Friday or contact Purchasing Services at 905-832-8555 or Fax 905-832-8522.

All Proposals are subject to the terms and conditions of the Request for Proposal, and all other Contract provisions or data that is incorporated.

The Corporation of the City of Vaughan reserves the right to accept or reject all or part of any Proposal, and to accept the Proposal that is in the best interest of the City.

DIMITRY YAMPOLSKY
Chief Information Officer

GEORGE WILSON, C.P.P., C.P.M., CMM
Director of Purchasing Services

WATERMAIN PROTECTION PROGRAM

To DECEMBER 10

The City of Vaughan is installing sacrificial magnesium anodes to watermains to prevent corrosion damage and reduce the frequency of watermain breaks.

This program will be affecting the Thornhill area in the quadrant areas of Dufferin Street, Steeles Avenue, Yonge Street and Bathurst Street and is scheduled between **October 19 to December 10, 2009, weather permitting.**

Work will be performed by C.P. Systems under contract to the City. Click on this ad for more information about the program.

For further information, please contact Public Works Department at 905-832-8562.

PLANNING STUDY

FOR NORTHWEST QUADRANT: JANE STREET/MAJOR MACKENZIE DRIVE NOTICE OF COMMUNITY MEETING #2: SITE PLANNING WORKSHOP

MONDAY, NOVEMBER 30, 2009
6:30 p.m. to 9:00 p.m.
Vellore Hall
9545 Weston Road, Vaughan
(South of Major Mackenzie, East of Weston Road)

To register, please contact a Citizen Service Representative at Access Vaughan 905-832-2281

For more information please contact the Policy Planning Department 905-832-8585 or visit www.vaughan.ca

The subject lands are defined as the area between Highway 400 to the west, Jane Street to the east, La Maria Lane/Melia Lane to the north and Major Mackenzie Drive to the south. **A portion of this site has been identified by the Vaughan Health Care Foundation as its preferred location for a hospital for the City of Vaughan.**

The purpose of the Jane and Major Mackenzie Northwest Quadrant Planning Study is to develop a land use policy and urban design framework to guide development in the study area. The study will consider the appropriate land use, density and urban design recommendations for the area given the surrounding land uses and Vaughan's emerging Growth Management Strategy policy framework.

The study will consider those lands required for the Vaughan Health Campus of Care Master Plan, and determine the appropriate land uses for the remainder of the site. This second public meeting has been scheduled to present alternative land use options for public input.

Members of the community are encouraged to attend this meeting to provide their insight, and continue to play a role in the planning process.

Click on this ad for complete details and location map.

RFPQ09-448

PRE-QUALIFICATION OF JANITORIAL CONTRACTORS

SEALED SUBMISSIONS, in the envelope provided, clearly marked as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit 2 (Rutherford & Creditstone), Vaughan, Ontario, L4K 5E4, no later than:

15:00:00 Hours (3:00:00 p.m.) Local Time
THURSDAY, DECEMBER 10, 2009

The intent of this call is to invite pre-qualification submissions from qualified janitorial contractors, for establishing a pre-qualified bidder list for the provision of janitorial services to Vaughan Public Libraries and also various other facilities within the City of Vaughan.

A Pre-qualification Document may be obtained from the City of Vaughan, Purchasing Services Department at 70 Tigi Court, Unit #2, (Rutherford Rd. & Creditstone Rd.) Vaughan, Ontario L4K 5E4, Monday to Friday, between the hours of 8:30 a.m. to 4:30 p.m., or contact Purchasing Services at 905-832-8555.

All Submissions are subject to the terms and conditions of the Request for Pre-qualification. The Corporation of the City of Vaughan reserves the right to accept or reject all or part of any Submission, and to accept the Submission that is in the best interest to the City, or to cancel this Request for Pre-qualification at any time.

Late Pre-qualification Submissions will not be accepted.

MARGIE SINGLETON
Chief Executive Officer
Vaughan Public Libraries

GEORGE WILSON, C.P.P, C.P.M, CMM
Director of Purchasing Services
Corporation of the City of Vaughan

EMPLOYMENT OPPORTUNITIES at the City of Vaughan

Looking for employment opportunities with one of Ontario's fastest growing, most diverse cities?

Now accepting applications for Stand-By Crossing Guards for all areas of Vaughan!

Stand-by School Crossing guards are an important part of our Program as they are called to duty when permanent guards are absent to ensure the continued safety of our children.

- Starting pay is $12.25 per hour
- You may be eligible to receive a daily travel allowance

Candidates must:

- Exercise good judgement
- Possess alertness and observation skills
- Be able to understand and follow instructions (written and oral)
- Have the ability to actively supervise children while crossing.

Interested persons please call 905-832-8563 for more information or email resume@vaughan.ca.

Click on this ad to view our complete list of opportunities. Employment opportunities are also posted at all community centre bulletin boards.

Creative Together COMMUNITY FORUM

creative together
CULTURAL PLAN FOR VAUGHAN

The City of Vaughan is developing a Cultural Plan called ***Creative Together***. The purpose of the Plan is to establish a vision and actions to guide cultural development in Vaughan and to integrate culture in planning across municipal departments.

Click on this ad for more information on the plan.

We are now at a stage in our process where we need community input and feedback on a set of directions and priorities for *Creative Together*. Your input will help shape a draft Cultural Plan to be released early in the new year.

Results from the work to date including the cultural mapping work will be presented at the Forum.

WEDNESDAY, DECEMBER 9, 2009
6:30 p.m. to 9:00 p.m.
Vellore Hall, Cultural Interpretive Centre
9541 Weston Road, Woodbridge
(east side of Weston Road, north of Rutherford Road and south of Major Mackenzie Drive)

For questions and more information, please contact Angela Palermo, Cultural Services Manager at 905-832-8585 ext. 8139. ***We look forward to your input!***

To register your attendance please contact:

Nadia Vidiri 905 832-8585 ext. 7320
or nadia.vidiri@vaughan.ca
Susan Giankoulas 905-832-8585 ext. 3127
or susan.giankoulas@vaughan.ca

Can't make the forum?
See upcoming online survey at www.vaughan.ca.

CLASS ENVIRONMENTAL ASSESSMENT

STUDY FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

NOTICE OF STUDY COMMENCEMENT

The City of Vaughan has initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). The objective of the Study is to review alternatives for flood control within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park. Ultimately, the Class Environmental Assessment process will determine the preferred form of the proposed stormwater management facilities or features. Once the problem is fully documented, a set of alternative solutions will be evaluated and presented to the Public and Agencies for comment at various points throughout the Study.

A key component of the Study will be consultation with interested stakeholders (public, landowners and regulatory agencies). A Public Information Centre (PIC) will be held in February 2010 to provide interested parties with an opportunity to review and discuss issues related to the study. Details regarding the forthcoming PIC will be advertised as the study progresses. It is also proposed to establish a Project Advisory Group (PAG) to provide direct input and feedback through the Study process, including a one-day Design Charette. Members of the general public and organizations are invited to apply. **The deadline for submission to join the Project Advisory Group is December 20, 2009.**

The study will be conducted as a 'Schedule B' project in compliance with the Municipal Engineers Association document "Municipal Class Environmental Assessment," (October 2000, amended 2007) which will address Phases 1 and 2 of the Class EA Process. We are interested in hearing any comments or input that you may have about this Study. Comments and information regarding the Study are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the Study and may be included in study documentation.

Please note that information related to this Study will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in Study documentation prepared for public review.

Further notices will be posted at www.vaughan.ca. If you require further information, or if you have specific comments related to this Study, please contact either of the following:

Pat Marcantonio, C.E.T., Senior Engineering Assistant
City of Vaughan
2141 Major Mackenzie Drive, Vaughan L6A 1T1
Tel: 905-832-8585 ext. 3111
Email: pat.marcantonio@vaughan.ca

Mark Bassingthwaite, P.Eng., Project Manager
Clarifica, a division of Cole Engineering Group Ltd.
100 Renfrew Drive, Suite 100, Markham, ON L3R 9R6
Tel: 905-940-6161 ext. 311
E-mail: mbassingthwaite@ColeEngineering.ca

Click on this ad for map of Study Area.

City Page Online

Page 2 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, November 26, 2009

FALL LEAF AND YARD COLLECTION

Ends November 27, 2009

Alternative Disposal Options:

If you still have leaf and yard material to dispose of, the following disposal options are available:

- Take the material to Miller Waste System's Compost Facility located at 1351 Bloomington Road, Richmond Hill. If you reside in the ALHB area, please call the Region for yard waste drop off options. The ALHB regulated area is located between Rutherford Road and Steeles Avenue, and from Hwy 27 to Dufferin Street. **Visit www.york.ca/waste for more information.**
- Manage the material through the use of a backyard composter. The City sells backyard composters for $17 each (price is subject to change).
- Wait until the start of the City's Spring Leaf and Yard Collection Program.

Leaf and yard material placed out for garbage or green bin collection will not be collected.

For more information, please visit www.greeningvaughan.ca or contact the Public Works Department at 905-832-8562.

THE ART OF DIVERSITY

a community art competition

Call for Entries

Click on this ad for complete details and registration form.

CPR Holiday Train arrives in Vaughan!

TUESDAY, DECEMBER 1

8:45 p.m.

Nashville Road at the CPR Tracks in Kleinburg

Featuring performances by The Odds

The Canadian Pacific Holiday Train hits the rails again, visiting over 130 communities in eight states and six provinces. In the last decade, the Holiday Train has helped raise 4 million pounds (US) and 2 million pounds (CDN) of food for local food banks.

Please bring non-perishable food items for the Vaughan Food Bank.

International Day of Persons with Disabilities

December 3, 2009

Vaughan Accessibility Advisory Committee invites you to join us as we celebrate International Day of Persons with Disabilities!

THURSDAY, DECEMBER 3, 2009

The Recreation and Culture Department is offering complimentary drop-in leisure activities at recreation facilities across the City, for all ages and abilities.

Should you require assistance, please contact:

Mihaela Neagoe,
Active Living Coordinator - Special Needs/Volunteers,
905-832-2377 ext. 7405.

Click on this ad for Activity Schedule.

Mayor and Members of Council invite everyone to our annual

Menorah Lighting Ceremony

in celebration of Chanukah

WEDNESDAY, DECEMBER 16, 2009
3:00 p.m.
City of Vaughan
Civic Centre, Main Foyer
2141 Major Mackenzie Drive
Vaughan, Ontario

City Page Online

Page 1 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, December 3, 2009

MEETINGS OF COUNCIL

For a complete list of City of Vaughan meetings, click on this box.

Listen to Council proceedings live at www.vaughan.ca/radio

APPOINTMENTS

TO THE CITY OF VAUGHAN 2010 GENERAL MUNICIPAL ELECTION COMPLIANCE AUDIT COMMITTEE

The City of Vaughan is currently seeking interested applicants from professionals who are required to adhere to codes of standards of their profession, and other individuals with in depth knowledge of the campaign financing rules of the *Municipal Elections Act, 1996,* for appointment to the **City's 2010 General Municipal Election Compliance Audit Committee**.

The purpose of the Municipal Election Compliance Audit Committee is to:

- consider compliance audit applications made by electors and decide whether they should be granted or rejected;
- appoint an auditor if the application is granted;
- receive the auditor's report;
- consider the auditor's report and decide if legal proceedings should be commenced; and
- give directions accordingly and recover the costs of conducting the compliance audit from the applicant if no apparent contraventions are found.

If you wish to be considered for an appointment, please submit your application, in writing, to:

JEFFREY A. ABRAMS, City Clerk
City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1

For further information, contact the City Clerk by email at jeffrey.abrams@vaughan.ca. For the Council Item and Terms of Reference, please click on this ad or visit www.vaughan.ca.

BID NO. Q09-476

OUTFITTING OF VARIOUS VANS AND PICKUP TRUCKS

SEALED BIDS, in the envelope provided, clearly marked, as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2 (Rutherford & Creditstone), Vaughan, Ontario, L4K 5E4, no later than:

15:00:00 Hours (3:00:00 p.m.) Local Time
WEDNESDAY, DECEMBER 16, 2009

Bid Documents may be obtained from the Purchasing Services Department, located at the above address, between 08:30 and 16:30 hours (8:30 a.m. to 4:30 p.m.), local time, Monday to Friday, for a non-refundable fee of **$15.00 per bid document** or contact Purchasing Services at 905-832-8555.

The Corporation of the City of Vaughan reserves the right to accept or reject all or any part of any Bid, and also reserves the right to accept other than the lowest Bid, and to cancel this call for Bids at any time.

For further Technical information regarding this Bid, please contact Alvin Boyce, Fleet Manager, Fleet Management Services Department, at 905-832-8585 ext. 6141.

JEFF PEYTON, Director of Building and Facilities
GEORGE WILSON, C.P.P, C.P.M, CMM, Director of Purchasing Services

BID NO. Q09-459

SUPPLY AND DELIVERY OF TWO (2) TEN FOOT WINGED ROTARY MOWERS

SEALED BIDS, in the envelope provided, clearly marked, as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2, (Rutherford & Creditstone), Vaughan, Ontario, L4K 5E4, no later than:

15:00:00 Hours (3:00:00 p.m.) Local Time
FRIDAY, DECEMBER 11, 2009

Bid Documents may be obtained from the Purchasing Services Department, located at the above address, between 08:30 and 16:30 hours (8:30 a.m. to 4:30 p.m.), local time, Monday to Friday, or contact Purchasing Services at 905-832-8555.

The Corporation of the City of Vaughan reserves the right to accept or reject all or any part of any Bid, and also reserves the right to accept other than the lowest Bid, and to cancel this call for Bids at any time.

For further Technical Information regarding this Bid, please contact Alvin Boyce, Fleet Manager, 905-832-8585 ext. 6141.

JEFF PEYTON, Director of Building and Facilities
GEORGE WILSON, C.P.P, C.P.M, CMM, Director of Purchasing Services

BID NO. T09-298

RENOVATIONS TO GARNET A. WILLIAMS COMMUNITY CENTRE ARENA
501 Clark Avenue, Thornhill
- AND -
AL PALLADINI COMMUNITY CENTRE ARENA
9201 Islington Avenue, Woodbridge

SEALED BIDS, in the envelope provided, clearly marked as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit 2, Vaughan, Ontario L4K 5E4, no later than:

15:00:00 hours (3:00:00 p.m.) Local Time
TUESDAY, DECEMBER 15, 2009

The scope of work under this contract includes Arena Renovations at Garnet A. Williams Community Centre and Al Palladini Community Centre.

Bid Documents may be obtained from the Purchasing Services Department, located at the above address, between 08:30 and 16:30 hours (8:30 a.m. to 4:30 p.m.), local time, Monday to Friday, ***for a non-refundable fee of $100.00*** (GST included), per bid document, or contact Purchasing Services at 905-832-8555.

The Corporation of the City of Vaughan reserves the right to accept or reject all or any part of any bid, and also reserves the right to accept other than the lowest bid and to cancel this call for Bids at any time.

For further Technical information regarding this bid, please contact Ahmad Mostofian, Nino Rico Inc. Architect, at 905-760-1848 ext. 228.

JEFF PEYTON, Director of Building and Facilities
GEORGE WILSON, C.P.P, C.P.M, CMM, Director of Purchasing Services

BID NO. Q09-458

SUPPLY AND DELIVERY OF ONE (1) CURRENT YEAR 2-WD TRACTOR TO COME WITH 3 POINT HITCH, POWERSHUTTLE TRANSMISSION AND DELUXE CAB, WITH A/C

SEALED BIDS, in the envelope provided, clearly marked, as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2, (Rutherford & Creditstone), Vaughan, Ontario, L4K 5E4, no later than

15:00:00 Hours (3:00:00 p.m.) Local Time
FRIDAY, DECEMBER 11, 2009

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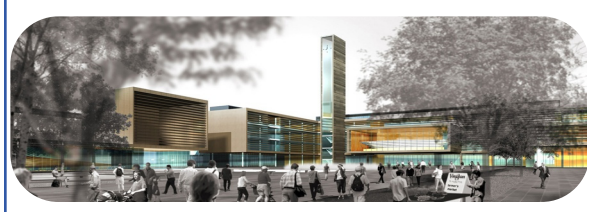
JEFF PEYTON, Director of Building and Facilities
GEORGE WILSON, C.P.P, C.P.M, CMM, Director of Purchasing Services

EMPLOYMENT OPPORTUNITIES at the City of Vaughan



Looking for employment opportunities with one of Ontario's fastest growing, most diverse cities?

Now accepting applications for Stand-By Crossing Guards for all areas of Vaughan!

Stand-by School Crossing guards are an important part of our Program as they are called to duty when permanent guards are absent to ensure the continued safety of our children.

- Starting pay is $12.25 per hour
- You may be eligible to receive a daily travel allowance

Candidates must:

- Exercise good judgement
- Possess alertness and observation skills
- Be able to understand and follow instructions (written and oral)
- Have the ability to actively supervise children while crossing.

Interested persons please call 905-832-8563 for more information or email resume@vaughan.ca.

Click on this ad to view our complete list of opportunities. Employment opportunities are also posted at all community centre bulletin boards.

Creative Together COMMUNITY FORUM

creative together
CULTURAL PLAN FOR VAUGHAN

The City of Vaughan is developing a Cultural Plan called ***Creative Together***. The purpose of the Plan is to establish a vision and actions to guide cultural development in Vaughan and to integrate culture in planning across municipal departments.

Click on this ad for more information on the plan.

We are now at a stage in our process where we need community input and feedback on a set of directions and priorities for *Creative Together*. Your input will help shape a draft Cultural Plan to be released early in the new year.

Results from the work to date including the cultural mapping work will be presented at the Forum.

WEDNESDAY, DECEMBER 9, 2009
6:30 p.m. to 9:00 p.m.
Vellore Hall, Cultural Interpretive Centre
9541 Weston Road, Woodbridge
(east side of Weston Road, north of Rutherford Road and south of Major Mackenzie Drive)

For questions and more information, please contact Angela Palermo, Cultural Services Manager at 905-832-8585 ext. 8139. ***We look forward to your input!***

To register your attendance please contact:

Nadia Vidiri 905 832-8585 ext. 7320
or nadia.vidiri@vaughan.ca
Susan Giankoulas 905-832-8585 ext. 3127
or susan.giankoulas@vaughan.ca

Can't make the forum?
See upcoming online survey at www.vaughan.ca.

CLASS ENVIRONMENTAL ASSESSMENT

STUDY FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

NOTICE OF STUDY COMMENCEMENT

The City of Vaughan has initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). The objective of the Study is to review alternatives for flood control within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park. Ultimately, the Class Environmental Assessment process will determine the preferred form of the proposed stormwater management facilities or features. Once the problem is fully documented, a set of alternative solutions will be evaluated and presented to the Public and Agencies for comment at various points throughout the Study.

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Please note that information related to this Study will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in Study documentation prepared for public review.

Further notices will be posted at www.vaughan.ca. If you require further information, or if you have specific comments related to this Study, please contact either of the following:

Pat Marcantonio, C.E.T., Senior Engineering Assistant
City of Vaughan
2141 Major Mackenzie Drive, Vaughan L6A 1T1
Tel: 905-832-8585 ext. 3111
Email: pat.marcantonio@vaughan.ca

Mark Bassingthwaite, P.Eng., Project Manager
Clarifica, a division of Cole Engineering Group Ltd.
100 Renfrew Drive, Suite 100, Markham, ON L3R 9R6
Tel: 905-940-6161 ext. 311
E-mail: mbassingthwaite@ColeEngineering.ca

Click on this ad for map of Study Area.

City Page Online

Page 2 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, December 3, 2009

The City of Vaughan welcomes the Olympic Torch!

FRIDAY, DECEMBER 18, 2009
5 p.m. (approximately)

The City of Vaughan is excited to be a Route Community for the Vancouver 2010 Olympic Torch Relay. Vaughan residents will have the opportunity to celebrate as the Olympic torch passes through the City of Vaughan.

The torch stops at approximately 5 p.m. in Kleinburg (Nashville Road and Islington Avenue.)

Vaughan Mayor and Members of Council will be present to greet our local Olympic torchbearer.

Details will be announced one week prior to the event.

For more information, please contact Sally, Economic Development Department at 905-832-8521 ext. 8367.

Click here to view the Olympic torch relay route map in Vaughan.

Ad published December 7, 2009

THE ART OF DIVERSITY

a community art competition

Call for Entries

Click on this ad for complete details and registration form.

City of Vaughan
The City Above Toronto

Mayor and Members of Council invite everyone to our annual

Menorah Lighting Ceremony

in celebration of Chanukah

WEDNESDAY, DECEMBER 16, 2009
3:00 p.m.
City of Vaughan
Civic Centre, Main Foyer
2141 Major Mackenzie Drive
Vaughan, Ontario

MAYOR'S ANNUAL PANCAKE BREAKFAST

Mayor and Members of Council invite all residents to the Mayor's Annual Pancake Breakfast

Saturday, January 23, 2010
10:00 a.m. to 12:30 p.m.

Vellore Village Community Centre
1 Villa Royale Avenue
Woodbridge

Enjoy complimentary pancakes, hot drinks, and entertainment.

Please join us!

WATERMAIN PROTECTION PROGRAM

To DECEMBER 17

The City of Vaughan is installing sacrificial magnesium anodes to watermains to prevent corrosion damage and reduce the frequency of watermain breaks.

This program affects the Thornhill area in the quadrant areas of Dufferin Street, Steeles Avenue, Yonge Street and Bathurst Street and is scheduled between **October 19 to December 17, 2009, weather permitting.**

Work is being performed by C.P. Systems under contract to the City. Click on this ad for more information about the program.

For further information, please contact the Public Works Department at 905-832-8562.

Appendix F

Notice of PIC

CITY OF VAUGHAN

CLASS ENVIRONMENTAL ASSESSMENT STUDY

FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

NOTICE OF PUBLIC INFORMATION CENTRE

The City of Vaughan has initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). (See Location Map on back). The objective of the study is to review alternatives for flood control within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park. Ultimately, the Class Environmental Assessment process will determine the preferred form of the proposed stormwater management facilities. Once the problem is fully documented, a set of alternative solutions will be evaluated and presented to the Public and Agencies for comment at various points throughout the study.

A key component of the study will be consultation with interested stakeholders (public, landowners and regulatory agencies). A Public Information Centre (PIC) will be held on February 25, 2010 to provide interested parties with an opportunity to review and discuss issues related to the study. A Public Information Centre (PIC) is scheduled for:

DATE:	**THURSDAY, FEBRUARY 25, 2010**
TIME:	**5:00 pm – 8:30 pm**
LOCATION:	**THORNHILL PRESBYTERIAN CHURCH** **271 CENTRE STREET** **THORNHILL, ONTARIO**

The Public Information Centre will be conducted as follows:
5:00 pm – 7:00 pm – Drop in Centre and meet Project Team
7:00 pm – 7:45 pm – Project overview and formal presentation
7:45 pm – 8:30 pm – Question and Answer period

The study will be conducted as a 'Schedule B' project in compliance with the Municipal Engineers Association document *"Municipal Class Environmental Assessment,"* (October 2000, amended 2007) which will address Phases 1 and 2 of the Class EA Process. The City is interested in receiving any comments or input that you may have about this study. Comments and information regarding the study are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the study and may be included in study documentation.

Please note that information related to this Study will be collected in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments received will become part of the public record and may be included in Study documentation prepared for public review.

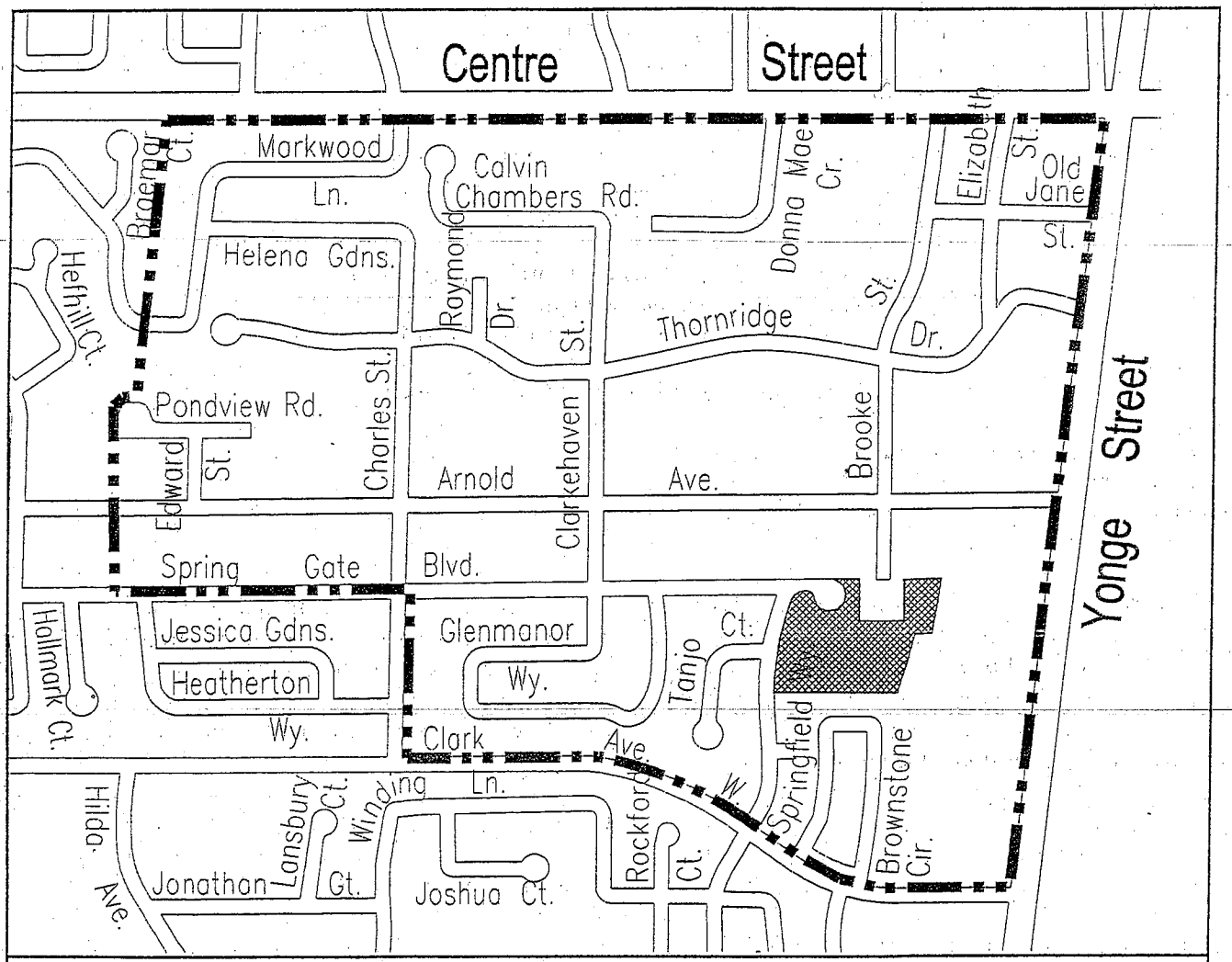
Further notices will be posted on the City's website at www.vaughan.on.ca. If you require further information, or if you have specific comments related to this study, please contact either of the following:

Mr. Pat Marcantonio, C.E.T.
Senior Engineering Assistant
City of Vaughan
Engineering Services
2141 Major Mackenzie Drive
Vaughan, Ontario
Tel: (905) 832-8585, Ext. 3111
E-mail: pat.marcantonio@vaughan.ca

Mr. Mark Bassingthwaite, P. Eng.
Project Manager
Clarifica, a division of Cole Engineering Group Ltd. Consultant
100 Renfrew Dr., Suite 100
Markham, ON L3R 9R6
Tel: (905) 940-6161, Ext. 311
E-mail: mbassingthwaite@ColeEngineering.ca

Jack Graziosi, P. Eng., M. Eng., Director of Engineering Services

LOCATION MAP



SMW

City Page Online

Page 1 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, February 11, 2010

MEETINGS OF COUNCIL

For a complete list of City of Vaughan meetings, click on this box.

Listen to Council proceedings live at www.vaughan.ca/radio or click on this box.

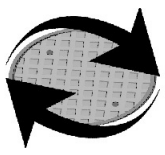
PROCLAMATIONS

The City of Vaughan has issued the following proclamations:

BLACK HISTORY MONTH
February 2010
www.pch.gc.ca

HERITAGE WEEK
February 15 - 21, 2010

REGION OF YORK
CITY OF VAUGHAN



INFLOW & INFILTRATION REDUCTION PROGRAM

SMOKE TESTING SEWER LINES

The City of Vaughan, in conjunction with The Regional Municipality of York, is conducting smoke testing in specific areas of the City. A "SMOKE TEST" survey assists our inspection crews in locating breaks, defects and potentially inappropriate connections in the sewer system. The smoke that you see coming from the vent stacks on houses or holes in the ground is:

- **NON-TOXIC** • **HAS NO ODOUR** • **NON-STAINING**
- **CREATES *NO* FIRE HAZARD** • **WHITE TO GRAY COLOUR**

The smoke should not enter your home unless you have defective plumbing or dry drain traps.

What should I do if smoke gets into the house? Do not become alarmed. Open windows, turn on exhaust fans and note the location of the smoke. The smoke will dissipate in a few minutes. Contact the City of Vaughan at 905-832-8562 and speak to staff.

IMPORTANT! If there is any individual in your home or business who has respiratory problems and is immobile, please notify us at 905-832-8562, press #4, prior to testing.

RESIDENTS IN THE STUDY AREAS WILL BE NOTIFIED BY A DOOR HANGER PRIOR TO TESTING.

For more information and a list of affected streets, please click on this ad or contact Public Works Department at 905-832-8562, press #4.

NOTICE OF PUBLIC MEETING

Vaughan Tomorrow
OUR CITY. OUR PLAN.

VAUGHAN METROPOLITAN CENTRE SECONDARY PLAN

MONDAY, MARCH 8, 2010
7:00 p.m. to 9:00 p.m.
Hilton Garden Inn – Toscana Room B
3201 Hwy 7 (at Interchange Way), Vaughan

On **Monday March 8, 2010**, the City of Vaughan Policy Planning Department and the consulting team of Urban Strategies Inc. will host a public information meeting for the Vaughan Metropolitan Centre Secondary Plan.

The City of Vaughan is in the midst of creating a new Official Plan to guide the City's growth over the next twenty-five years. The emerging vision for the City includes a "vibrant and thriving downtown" in the area known as the Vaughan Metropolitan Centre – formerly the Vaughan Corporate Centre, and is being planned near the intersection of Highway 7 and Jane Street.

The purpose of this meeting is to present an overview of the Draft Vaughan Metropolitan Centre Secondary Plan for information and feedback. The goal of the plan is to create a vibrant and sustainable downtown that serves all Vaughan citizens. We encourage members of the public to attend this meeting to provide their insight, and to continue to play an important role in the planning process for the City of Vaughan.

For further information regarding the study, please contact Paul Robinson, ext. 8410 or Melissa Rossi, ext. 8320 Policy Planning Department at 905-832-8585. For more information about Vaughan Tomorrow – the City's Growth Management Strategy – and upcoming public meetings, please visit **www.vaughantomorrow.ca.**

For complete details and location map, please click on this ad.

BID NO. RFP10-021

INVESTIGATION CONSULTANT SERVICES FOR THE CITY OF VAUGHAN

SEALED PROPOSALS, in the envelope provided, clearly marked as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2, (Rutherford & Creditstone), L4K 5E4, no later than:

15:00:00 hours (3:00:00 p.m.) Local Time
THURSDAY, FEBRUARY 25, 2010

Late Proposals shall not be accepted. Request For Proposal Documents may be obtained from the Purchasing Services Department, located at the address above, between 08:30 and 16:30 hours (8:30 a.m. to 4:30 p.m.), local time, Monday to Friday or contact Purchasing Services at 905-832-8555.

All proposals are subject to the terms and conditions of the Request for Proposal, the accompanying Specifications, and all other contract provisions or data that is incorporated. The Corporation of the City of Vaughan reserves the right to accept or reject all or part of any Proposal and also reserves the right to accept any Proposal that is in best interest of the owner or to cancel this Request for Proposals at any time.

If further information is required please contact the following, in writing, on or before **FRIDAY, FEBRUARY 19, 2010, to:**

Elaine Li, C.P.P., C.P.M., Buyer
Purchasing Services Department
905-832-8555 ext. 8395, Fax 905-832-8522
Email elaine.li@vaughan.ca

GEORGE WILSON, C.P.P., C.P.M.,C.M.M.
Director of Purchasing Services

BID NO. RFP10-016

SUPPLY, DELIVERY, CATALOGUING AND PROCESSING SERVICES OF LIBRARY MATERIALS FOR A NEW LIBRARY

SEALED PROPOSALS, in the envelope provided, clearly marked, as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit 2, (Rutherford & Creditstone), Vaughan, Ontario, L4K 5E4, no later than:

15:00:00 Hours (3:00:00 p.m.) Local Time
WEDNESDAY, MARCH 3, 2010

The City of Vaughan/Vaughan Public Libraries is soliciting proposals from experienced and qualified Proponents to supply, catalogue, process and deliver an Opening Day Collection for a new library. The Opening Day Collection consists of the following three (3) categories:

- Part A – Junior & Teen Materials
- Part B – Adult Materials
- Part C – Music CDs

Request For Proposal Document may be obtained from the Purchasing Services Department, located at the address above, between 08:30 and 16:30 hours (8:30 a.m. to 4:30 p.m.), local time Monday to Friday or contact Purchasing Services at 905-832-8555 or Fax 905-832-8522.

All Proposals are subject to the terms and conditions of the Request for Proposal and all other contract provisions or data that is incorporated.

The Corporation of the City of Vaughan reserves the right to accept or reject all or part of any Proposal and also reserves the right to accept any Proposal that is in best interest of the Owner or to cancel this Request for Proposals at any time.

MARGIE SINGLETON
Chief Executive Officer
Vaughan Public Libraries

GEORGE WILSON, C.P.P, C.P.M, CMM
Director of Purchasing Services
The Corporation of the City of Vaughan

NOTICE OF STUDY COMMENCEMENT

MUNICIPAL SERVICING MASTER PLAN CLASS ENVIRONMENTAL ASSESSMENT STUDY

STEELES AVENUE CORRIDOR
JANE TO KEELE, CITY OF VAUGHAN
OFFICIAL PLAN AMENDMENT (OPA) 620
and
Ministry of Energy and Infrastructure
Class Environmental Assessment (Cat. B)

The City of Vaughan is undertaking a Municipal Servicing Master Plan Class Environmental Assessment (EA) Study to assess what municipal servicing Improvements and/or modifications to the stormwater, water and wastewater services will be required to implement the development objectives outlined in Official Plan Amendment (OPA) 620. The projects are being assessed with the intention of fulfilling the Phase 1 and Phase 2 requirements of the Municipal Class EA process.

The study area is bounded by Black Creek (immediately west of Jane Street) to the west, Keele Street to the east, Steeles Avenue to the south, and the CN Railway to the north.

For complete details on this Study and contact information, please click on this ad.

NOTICE OF PUBLIC INFORMATION CENTRE

CLASS ENVIRONMENTAL ASSESSMENT STUDY FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

The City of Vaughan has initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). The objective of the study is to review alternatives for flood control within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park.

A key component of the study will be consultation with interested stakeholders (public, landowners and regulatory agencies). A Public Information Centre will be held to provide interested parties with an opportunity to review and discuss issues related to the study on:

THURSDAY, FEBRUARY 25, 2010
5:00 p.m. – 8:30 p.m.
Thornhill Presbyterian Church
271 Centre Street, Thornhill

The Public Information Centre will be conducted as follows:

5:00 p.m. – 7:00 p.m.	**Drop in Centre and meet the Project Team**
7:00 p.m. – 7:45 p.m.	**Project overview and formal presentation**
7:45 p.m. – 8:30 p.m.	**Question and Answer period**

For complete details on this study, map of study area, and contact information, please click on this ad.

JACK GRAZIOSI, P. Eng., M. Eng., Director of Engineering Services

This Notice first issued February 11, 2010.

2010 ELDERLY HOMEOWNERS TAX ASSISTANCE PROGRAMME

Application Deadline: March 31, 2010

A Tax Credit, in the amount of $290, is provided by the City of Vaughan to elderly homeowners who qualify. In order to qualify for this Tax Credit, **THE OWNER OR SPOUSE OF THE OWNER MUST**:

- Be 65 years of age or older as of ***MARCH 31, 2010***.
- Have been assessed as the owner and occupant of residential property in the municipality for a period of *not less than 1 year immediately preceding the application deadline.*
- Be receiving a monthly GUARANTEED INCOME SUPPLEMENT under Part II of the Old Age Security Act (Canada).
- Have submitted an application form no later than ***March 31, 2010***, which is the final deadline for applications.

An application must be made each year for this assistance and the credit, where allowed, is an outright grant made by the City and does not entail repayment of any kind.

For further information, please contact the Tax Department at 905-832-8502 or Fax 905-832-8566.

NOTICE OF PUBLIC MEETING

Vaughan Tomorrow
OUR CITY. OUR PLAN.

YONGE STREET AREA STUDY

TUESDAY, MARCH 2, 2010
7:00 p.m. to 9:00 p.m.
Uplands Golf Club
46 Uplands Avenue, Thornhill

On Tuesday March 2, 2010, the City of Vaughan Policy Planning Department and the consulting team of Young and Wright/IBI Group Architects Inc. will host a public information meeting for the Yonge Street Area Study.

The Yonge Street Area Study will establish the land use policies and urban design guidelines for future development in the area. The purpose of this meeting is to present the draft development framework for the Yonge Street Area Study. This event will provide an opportunity for the general public and interested parties to provide comments on the proposed plan prior to preparation of a secondary plan for the area.

We encourage members of the public to attend this meeting to provide their insight, and to continue to play an important role in the planning process for the City of Vaughan.

For further information regarding the Study, please contact Paul Robinson, ext. 8410 or Clement Chong, ext. 8214 Policy Planning Department at 905-832-8585.

For more information about Vaughan Tomorrow – the City's Growth Management Strategy – and upcoming public meetings, please visit **www.vaughantomorrow.ca.**

For complete details and location map, please click on this ad.

City Page Online

Page 2 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, February 11, 2010

EMPLOYMENT OPPORTUNITIES

Looking for employment opportunities with one of Ontario's fastest growing, most diverse cities?

Now accepting applications for STAND-BY CROSSING GUARDS in Thornhill and Maple

Stand-by School Crossing guards are an important part of our Program as they are called to duty when permanent guards are absent to ensure the continued safety of our children.

Click on this ad for complete details and how to apply. Employment opportunities are also posted at all community centre bulletin boards.

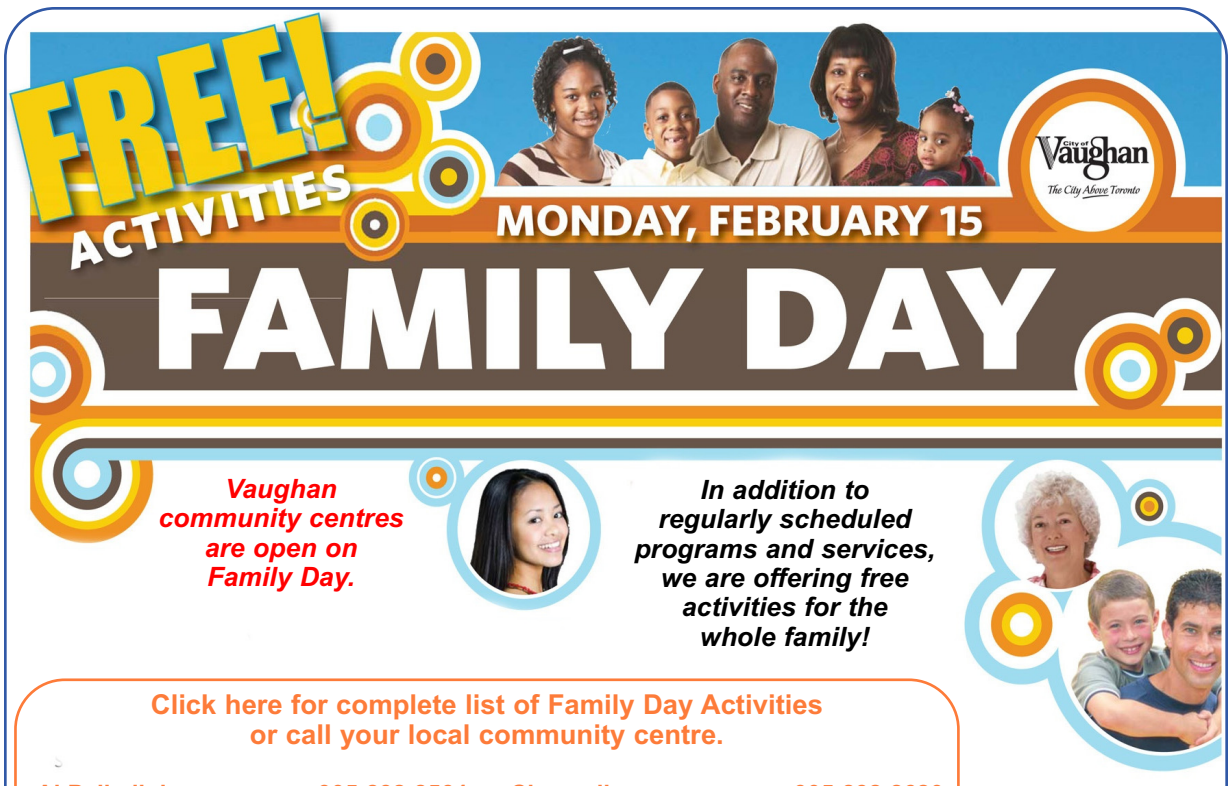
NEW PUBLIC COMPLAINTS PROCESS

York Regional Police Presentation

WEDNESDAY, FEBRUARY 24 at 1:00 p.m.
Region of York Administrative Centre
Committee Room A
17250 Yonge Street, Newmarket
(visitor parking available on Eagle St, West of Yonge St)

The York Regional Police Services Board invites residents to hear a presentation by **Mr. Gerry McNeilly** from The Office of the Independent Police Review Director on the ***New* Public Complaints Process.** *Everyone is welcome!*

Please RSVP to Mafalda Avellino, Executive Director, by **MONDAY, FEBRUARY 22** at psb@yrp.ca, or 905-830-4444 ext. 7906.



NOTICE OF SERVICE DISRUPTION

DUE TO ELEVATOR REPLACEMENT AT AL PALLADINI COMMUNITY CENTRE 9201 Islington Avenue, Woodbridge

There will be a scheduled service disruption at the Al Palladini Community Centre. The disruption will commence on **FEBRUARY 18, and be complete on, or about MAY 31, 2010.**

The disruption includes:

- **Elevator access to the second floor.**

The following alternative services are available:

- Stairway to access second floor will remain open
- Strollers can be parked outside of babysitting room

On behalf of the City of Vaughan, we would like to thank you for your patience in this matter.

For questions or additional information, please contact:

Mike Zentena,
Capital Project Supervisor
Tel: 905-832-8560 ext. 6129
Email: mike.zentena@vaughan.ca
Fax: 905-303-2007

City Page Online

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City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, February 18, 2010

MEETINGS OF COUNCIL

For a complete list of City of Vaughan meetings, click on this box.

Listen to Council proceedings live at www.vaughan.ca/radio or click on this box.

PROCLAMATIONS

FEBRUARY 2010

The City of Vaughan has issued the following proclamations:

BLACK HISTORY MONTH
www.pch.gc.ca

HEART MONTH
www.heartandstroke.ca

REGION OF YORK CITY OF VAUGHAN

INFLOW & INFILTRATION REDUCTION PROGRAM

SMOKE TESTING SEWER LINES

The City of Vaughan, in conjunction with The Regional Municipality of York, is conducting smoke testing in specific areas of the City. A "SMOKE TEST" survey assists our inspection crews in locating breaks, defects and potentially inappropriate connections in the sewer system. The smoke that you see coming from the vent stacks on houses or holes in the ground is:

- **NON-TOXIC** • **HAS NO ODOUR** • **NON-STAINING**
- **CREATES *NO* FIRE HAZARD** • **WHITE TO GRAY COLOUR**

The smoke should not enter your home unless you have defective plumbing or dry drain traps.

What should I do if smoke gets into the house? Do not become alarmed. Open windows, turn on exhaust fans and note the location of the smoke. The smoke will dissipate in a few minutes. Contact the City of Vaughan at 905-832-8562 and speak to staff.

IMPORTANT! If there is any individual in your home or business who has respiratory problems and is immobile, please notify us at 905-832-8562, press #4, prior to testing.

RESIDENTS IN THE STUDY AREAS WILL BE NOTIFIED BY A DOOR HANGER PRIOR TO TESTING.

For more information and a list of affected streets, please click on this ad or contact Public Works Department at 905-832-8562, press #4.

NOTICE OF PUBLIC MEETING

Vaughan Tomorrow
OUR CITY. OUR PLAN.

VAUGHAN METROPOLITAN CENTRE SECONDARY PLAN

MONDAY, MARCH 8, 2010
7:00 p.m. to 9:00 p.m.
Hilton Garden Inn – Toscana Room B
3201 Hwy 7 (at Interchange Way), Vaughan

On **Monday March 8, 2010**, the City of Vaughan Policy Planning Department and the consulting team of Urban Strategies Inc. will host a **Public Information Meeting for the Vaughan Metropolitan Centre Secondary Plan.**

The City of Vaughan is in the midst of creating a new Official Plan to guide the City's growth over the next twenty-five years. The emerging vision for the City includes a "vibrant and thriving downtown" in the area known as the Vaughan Metropolitan Centre – formerly the Vaughan Corporate Centre, and is being planned near the intersection of Highway 7 and Jane Street.

The purpose of this meeting is to present an overview of the Draft Vaughan Metropolitan Centre Secondary Plan for information and feedback. The goal of the plan is to create a vibrant and sustainable downtown that serves all Vaughan citizens. We encourage members of the public to attend this meeting to provide their insight, and to continue to play an important role in the planning process for the City of Vaughan.

For further information regarding the study, please contact Paul Robinson, ext. 8410 or Melissa Rossi, ext. 8320 Policy Planning Department at 905-832-8585. For more information about Vaughan Tomorrow – the City's Growth Management Strategy – and upcoming public meetings, please visit **www.vaughantomorrow.ca.**

For complete details and location map, please click on this ad.

PROPOSAL NO. RFP10-053

CONSULTING SERVICES FOR THE VAUGHAN DISTRICT ENERGY FEASIBILITY STUDY FOR VAUGHAN HOLDINGS INC.

SEALED PROPOSALS, in the envelope provided, clearly marked as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2, (Rutherford and Creditstone), L4K 5E4, no later than:

15:00:00 hours (3:00:00 p.m.) Local Time
WEDNESDAY, MARCH 10, 2010

Vaughan Holdings Inc., a wholly owned subsidiary of the City of Vaughan, is soliciting proposals from qualified consultants to prepare the Vaughan District Energy Feasibility Study. The purpose of the study is to evaluate the feasibility of developing a district energy system to serve the Vaughan Metropolitan Centre (VMC). The VMC is defined as an Urban Growth Centre under the Province's *Places to Grow* Plan and is the City of Vaughan's planned downtown. The study will also identify other areas throughout the City where further feasibility studies may be warranted.

All Proposals are subject to the terms and conditions of the Request for Proposal, and all other Contract provisions or data that is incorporated. Request for Proposal Documents may be obtained from the Purchasing Services Department, located at the above address, between 8:30 and 16:30 hours (8:30 am to 4:30 pm), local time, Monday to Friday or contact Purchasing Services at 905-832-8555.

Vaughan Holdings Inc. reserves the right to accept or reject all or part of any Proposal and to accept the Proposal that is in the best interest to Vaughan Holdings Inc. or to cancel this Request for Proposal at any time. For further information regarding this Proposal, please contact Asad Chughtai, Manager of Purchasing/Contract Services – Supplies and Services, Purchasing Department, at 905-832-8555 ext. 8306.

A Proponents' Meeting is Scheduled for MONDAY, MARCH 1, 2010, at 9:00 a.m., in the Public Hearing Room, Vaughan Civic Centre, 2141 Major Mackenzie Drive, Vaughan.

CLAYTON D. HARRIS C.A., President & CEO, Vaughan Holdings Inc., City Manager, City of Vaughan
GEORGE WILSON, C.P.P., C.P.M.,C.M.M., Director of Purchasing Services

REQUEST FOR PRE-QUALIFICATION RFP10-007

PRE-QUALIFICATION OF ADDITIONAL COMPUTER HARDWARE SUPPLIERS AND SERVICE PROVIDERS

SEALED SUBMISSIONS, in the envelope provided, clearly marked as to contents, will be received by the Purchasing Services Department, 70 Tigi Court, Unit #2, (Rutherford & Creditstone), L4K 5E4, no later than (the closing time):

15:00:00 hours (3:00:00 p.m.) Local Time
MONDAY, MARCH 15, 2010

The City of Vaughan is soliciting submissions from experienced, qualified and interested vendors to establish additional pre-qualified Vendors of Record for computer equipments and related IT Services Providers. Selected Proponents will also be invited to participate on individual computer equipment projects and related IT services requirements for various City facilities.

As of FRIDAY, FEBRUARY 19, 2010, Request for Pre-qualification Documents may be obtained from the Purchasing Services Department, located at the address above, between 08:30 and 16:30 hours (8:30 am to 4:30 pm), local time Monday to Friday or contact Purchasing Services at 905-832-8555.

A Respondents' meeting is scheduled for TUESDAY, MARCH 2, 2010, at 10:30 a.m., Maple Community Centre, Activity Room #1, 10190 Keele Street, Vaughan.

All Submissions are subject to the terms and conditions of the Request for Pre-qualification. The Corporation of the City of Vaughan reserves the right to accept or reject all or part of any Submission, and to accept the Submission that is in the best interest to the City.

DIMITRI YAMPOLSKY
Chief Information Officer

GEORGE A. WILSON, C.P.P., C.P.M., CMM
Director of Purchasing Services

2010 ELDERLY HOMEOWNERS TAX ASSISTANCE PROGRAMME

Application Deadline: March 31, 2010

A Tax Credit, in the amount of $290, is provided by the City of Vaughan to elderly homeowners who qualify. In order to qualify for this Tax Credit, **the owner or spouse of the owner must**:

- Be 65 years of age or older as of ***MARCH 31, 2010***.
- Have been assessed as the owner and occupant of residential property in the municipality for a period of *not less than 1 year immediately preceding the application deadline*.
- Be receiving a monthly GUARANTEED INCOME SUPPLEMENT under Part II of the Old Age Security Act (Canada).
- Have submitted an application form no later than ***March 31, 2010***, which is the final deadline for applications.

An application must be made each year for this assistance and the credit, where allowed, is an outright grant made by the City and does not entail repayment of any kind.

For further information, please contact the Tax Dept at 905-832-8502 or Fax 905-832-8566.

NOTICE OF PUBLIC INFORMATION CENTRE

CLASS ENVIRONMENTAL ASSESSMENT STUDY FOR A STORMWATER MANAGEMENT FACILITY WITHIN GALLANOUGH PARK

The City of Vaughan has initiated a Class Environmental Assessment (Class EA) to develop plans and strategies to implement a stormwater management facility within Gallanough Park (the Park). The objective of the study is to review alternatives for flood control within the Park, and develop an implementation plan for minimizing the risk of flooding to areas north of the Park.

A key component of the study will be consultation with interested stakeholders (public, landowners and regulatory agencies). A Public Information Centre will be held to provide interested parties with an opportunity to review and discuss issues related to the study on:

THURSDAY, FEBRUARY 25, 2010
5:00 p.m. – 8:30 p.m.
Thornhill Presbyterian Church
271 Centre Street, Thornhill

For complete details, map of study area, and contact information, please click on this ad.

JACK GRAZIOSI, P. Eng., M. Eng., Director of Engineering Services
This Notice first issued February 11, 2010.

PROPOSAL NO. RFP10-041

SHELTER OPERATION AND ANIMAL CONTROL SERVICES FOR THE CITY OF VAUGHAN

SEALED PROPOSALS, in the envelope provided, clearly marked, as to contents, will be received by the Purchasing Services Department, 70 Tigi Court (Rutherford & Creditstone), Vaughan, Ontario, L4K 5E4, no later than:

15:00:00 Hours (3:00:00 p.m.) Local Time
WEDNESDAY, MARCH 10, 2010

The City of Vaughan is seeking proposals from qualified and experienced contractors to provide long term shelter operation and animal control services as well as routine maintenance through the City's shelter facility and capable of carrying out the work as defined in the RFP document.

As of FRIDAY, FEBRUARY 19, 2010, Request for Proposal Documents may be obtained from the Purchasing Services Department, located at the above address, between 08:30 and 16:30 hours (8:30 am to 4:30 pm), local time Monday to Friday or contact Purchasing Services at 905-832-8555.

All proposals are subject to the terms and conditions of the Request for Proposal, the accompanying Term of Reference, Scope of Work, Specifications, and all other contract provisions or data that is incorporated.

The Corporation of the City of Vaughan reserves the right to accept or reject all or part of any Proposal and also reserves the right to accept any Proposal that is in best interest of the owner or to cancel this Request for Proposals at any time.

TONY THOMPSON, Director of Enforcement Services
GEORGE WILSON, C.P.P, C.P.M, CMM, Director of Purchasing Services

NOTICE OF PUBLIC MEETING

Vaughan Tomorrow
OUR CITY. OUR PLAN.

YONGE STREET AREA STUDY

TUESDAY, MARCH 2, 2010
7:00 p.m. to 9:00 p.m.
Uplands Golf Club
46 Uplands Avenue, Thornhill

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The Yonge Street Area Study will establish the land use policies and urban design guidelines for future development in the area. The purpose of this meeting is to present the draft development framework for the Yonge Street Area Study. This event will provide an opportunity for the general public and interested parties to provide comments on the proposed plan prior to preparation of a secondary plan for the area.

We encourage members of the public to attend this meeting to provide their insight, and to continue to play an important role in the planning process for the City of Vaughan.

For further information regarding the Study, please contact Paul Robinson, ext. 8410 or Clement Chong, ext. 8214 Policy Planning Department at 905-832-8585.

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For complete details and location map, please click on this ad.

City Page Online

Page 2 of 2

City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-2281
www.vaughan.ca

Issued every Thursday

Thursday, February 18, 2010

VOLUNTEER RECOGNITION AWARDS 2009

WEDNESDAY, APRIL 21, 2010
6:45 p.m. – Registration 7:30 p.m. – Ceremony
Vaughan Civic Centre, Council Chambers
2141 Major Mackenzie Drive, Vaughan

By celebrating the efforts of volunteers, we create opportunities to raise awareness about the vital contributions they make to our community and society as a whole.

SUBMISSION DEADLINE: FRIDAY, MARCH 26

Click here for more information.

Click here for Nomination Form.

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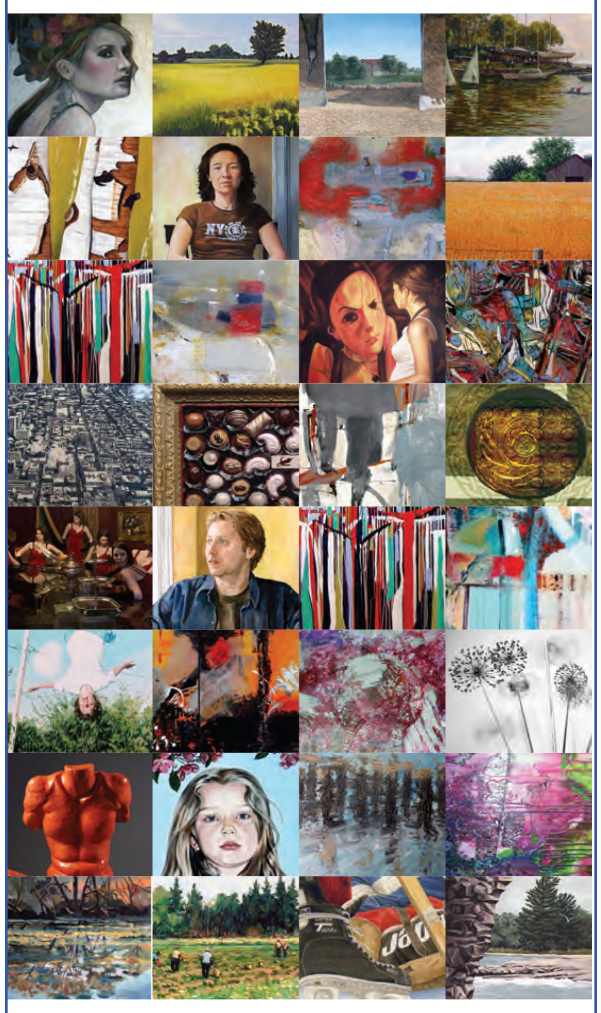
For questions or additional information, please contact:

Mike Zentena, Capital Project Supervisor
905-832-8560 ext. 6129, Fax 905-303-2007
or email mike.zentena@vaughan.ca

2010 Vaughan Juried Exhibition

an art integration project



CALL FOR ENTRIES

May 28 – June 27, 2010

Presented by the City of Vaughan

SUBMISSION DEADLINE: FRIDAY, APRIL 9.

Click here for complete details.

NOMINATIONS PACKAGE
Submission Deadline: February 19, 2010

2010 R.A.V.E. AWARDS

Recognizing Arts Vaughan Excellence

Click on this ad for complete details and registration form.

Presented by the City of Vaughan

THE ART OF DIVERSITY

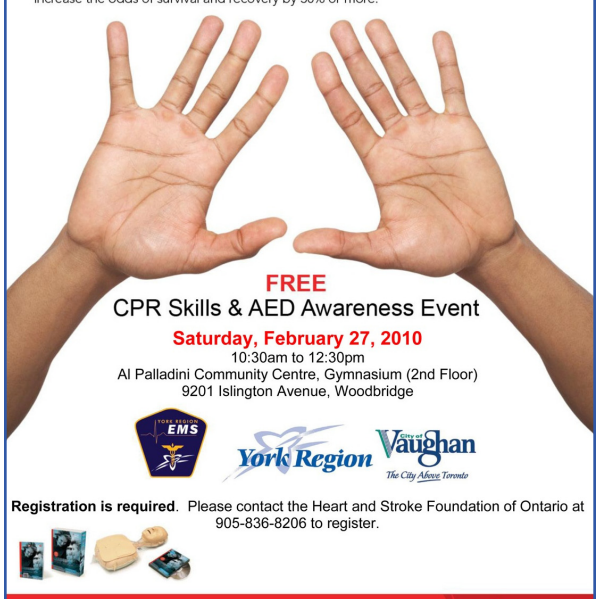
a community art competition

Call for Entries

Click on this ad for complete details and registration form.

YOU ALREADY HAVE THE TOOLS TO SAVE A LIFE. WITH OUR HELP, YOU'LL BE ABLE TO USE THEM.

Approximately 40,000 cardiac arrests occur in Canada every year. Up to 85% take place at home. Less than 5% survive. However, if CPR is performed in the first few minutes, it can increase the odds of survival and recovery by 30% or more.



FREE
CPR Skills & AED Awareness Event
Saturday, February 27, 2010
10:30am to 12:30pm
Al Palladini Community Centre, Gymnasium (2nd Floor)
9201 Islington Avenue, Woodbridge

Registration is required. Please contact the Heart and Stroke Foundation of Ontario at 905-836-8206 to register.

Learn more at heartandstroke.ca/restart

HEART & STROKE FOUNDATION OF ONTARIO
Finding answers. For life.

NEW PUBLIC COMPLAINTS PROCESS

York Regional Police Presentation

WEDNESDAY, FEBRUARY 24 at 1:00 p.m.
Region of York Administrative Centre
Committee Room A
17250 Yonge Street, Newmarket
(visitor parking available on Eagle St, West of Yonge St)

The York Regional Police Services Board invites residents to hear a presentation by **Mr. Gerry McNeilly** from The Office of the Independent Police Review Director on the ***New* Public Complaints Process.** *Everyone is welcome!*

Please RSVP to Mafalda Avellino, Executive Director, by **FEBRUARY 22** at psb@yrp.ca, or 905-830-4444 ext. 7906.

WHAT'S ON IN VAUGHAN 2010

Click here for all the details.

Presented By TD Canada Trust

City of Vaughan The City Above Toronto

ENERGY & YOUR BOTTOM LINE

PowerStream in partnership with VBEC invite you to a **complimentary workshop for small businesses:**

Tuesday, March 2, 2010
6:30 pm - 8:30 pm

REGISTER TODAY!
SPACES ARE LIMITED

PowerStream Inc
161 Cityview Blvd.
Vaughan, ON

For more information and to register, please contact the Vaughan Business Enterprise Centre (VBEC) at (905) 417-0412 or email **yourbusiness@centrebusiness.com**

PowerStream YOUR CURRENT CONNECTION · City of Vaughan The City Above Toronto · VBEC · Go Green with PowerStream · green directions VAUGHAN · Toronto and Region Conservation for The Living City

Appendix G

PIC Display Panels and Slides

WELCOME

TO THE

GALLANOUGH PARK STORMWATER MANAGEMENT FACILITY PUBLIC INFORMATION CENTRE

THORNHILL PRESBYTERIAN CHURCH
THURSDAY FEBRUARY 25TH, 2010

City of Vaughan — The City Above Toronto

Clarifica Water Resources — A division of Cole Engineering Group Ltd.

Welcome to the Study For a Stormwater Management Facility Within Gallanough Park - Municipal Class EA Public Information Centre

Thornhill Presbyterian Church
February 25, 2010

- Please sign in on the sheet provided
- This evening's agenda:
  - 5:00 – 7:00 pm → Drop in Centre and Meet Project Team
  - 7:00 – 7:45 pm → Project Overview and Formal Presentation
  - 7:45 – 8:30 pm → Question and Answer Period
- Comment sheets are provided for those who wish to provide comments in writing. Please either place your completed sheets in the Comment Box or mail/fax them to one of the identified Project Team Members (see below) by **March 18, 2010.**
- Thank-you for your involvement in this project
- For additional information, please contact one of the following Team Members:

Pat Marcantonio, C.E.T.
Senior Engineering Assistant
City of Vaughan
Engineering Services
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
Phone: 905-832-8585 Ext. 3111
E-mail: pat.marcantonio@vaughan.ca

Mark Bassingthwaite, P.Eng.
Project Manager
Cole Engineering Group Ltd.
100 Renfrew Dr., Suite 100
Markham, ON L3R 9R6
Phone: 905-940-6161 Ext. 311
Fax: 905-940-2064
E-mail: mbassingthwaite@ColeEngineering.ca

Clarifica Water Resources — A division of Cole Engineering Group Ltd

City of Vaughan — The City Above Toronto

Purpose of the Public Information Centre

The purpose of this Public Information Centre (PIC) is to introduce you to this project, inform you of progress to date and obtain your comments.

The major elements presented today are:

- Study Overview & Background
- Project Goal
- Overview of the Municipal Class Environmental Assessment Process
- Problem/Opportunity Statement
- Design Charrette
- Alternative Solutions Under Consideration
- Preliminary Evaluation Criteria
- Preliminary Assessment of Alternative Solutions
- Preliminary Recommended Solution
- Next Steps

Clarifica Water Resources — A division of Cole Engineering Group Ltd.

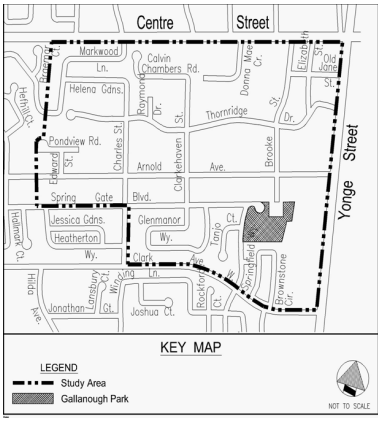
City of Vaughan — The City Above Toronto

Study Overview

Introduction

- The City of Vaughan has initiated the Class Environmental Assessment (EA) process to assess the feasibility of alternative solutions for Gallanough Park Stormwater Management (SWM) Project.
- This study is following the Schedule 'B' requirements of the Municipal Class EA (October 2000, amended September 2007) planning process.

Key Plan



Clarifica Water Resources — A division of Cole Engineering Group Ltd

City of Vaughan — The City Above Toronto

Background

- Thornhill neighbourhood has a history of flooding from storm events.
- City of Vaughan has initiated drainage improvement studies since the extreme storm event on August 19, 2005.
- This Environmental Assessment (EA) is a continuation of the drainage improvement studies completed by Genivar (February 2008) and W.G. Clarke (May 2009) for the Thornhill neighbourhood.
- The preferred alternative in the Genivar study included Gallanough Park as a site for a stormwater management (SWM) facility to improve drainage in the Thornhill neighbourhood.
- The 3.0m diameter Brooke St. Storm Sewer provides drainage for the area bounded by Yonge St. to the east, Bathurst St. to the west, Arnold Ave to the north, and CN Railway to the south (approximately 170 ha).
- The study by W.G. Clarke included Gallanough Park SWM Facility as part of the drainage improvements. Other improvements include by-pass of drainage course #2 into the Brooke St. trunk sewer. (Results of the improvements shown on the following slides)

Clarifica Water Resources
A division of Cole Engineering Group Ltd.

City of Vaughan
The City Above Toronto

Overview of Drainage Improvements

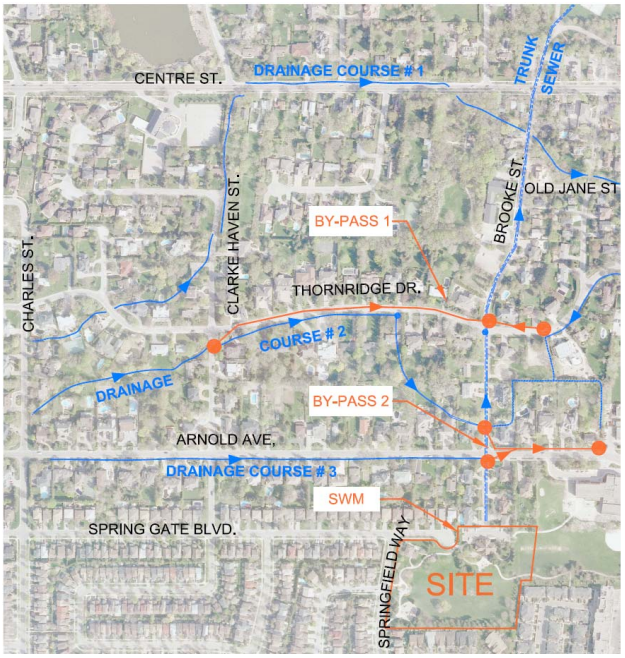


Figure PIC -1

Clarifica Water Resources
A division of Cole Engineering Group Ltd.

City of Vaughan
The City Above Toronto

Improved Flood Limits

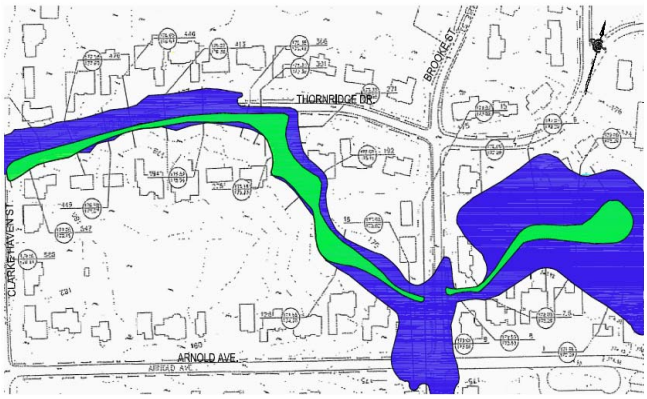


Figure PIC – 2

SOURCE: W.G. Clarke. (2009). *Thornhill Area Road Reconstruction - City of Vaughan.* Stormwater Management Final Report.

LEGEND

CURRENT FLOOD AREA FOR 100 YEAR STORM

FUTURE FLOOD AREA FOR 100 YEAR STORM (INCLUDES: GALLANOUGH PARK SWM FACILITY, THORNHILL BY-PASS, ARNOLD BY-PASS AND CULVERT IMPROVEMENTS)

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City of Vaughan
The City Above Toronto

Overview of the Class Environmental Assessment Process

- The *Municipal Class Environmental Assessment (2000, amended 2007)* (Class EA) process, which is approved under the *Environmental Assessment Act*, enables the planning of municipal infrastructure projects in accordance with a proven procedure for protecting the environment.
- The study is being undertaken in accordance with the first two Phases of the Class EA process for a **Schedule 'B'** project.
- The **Schedule** 'B' Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of the effects on the environment, and identification of reasonable measures to mitigate any adverse effects.
- There is an opportunity for public input at any time during the Class EA process, including this Public Information Centre (PIC).
- Upon completion of the Class EA, a Project File Report will be available for public review.

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Overview of the Class Environmental Assessment Process

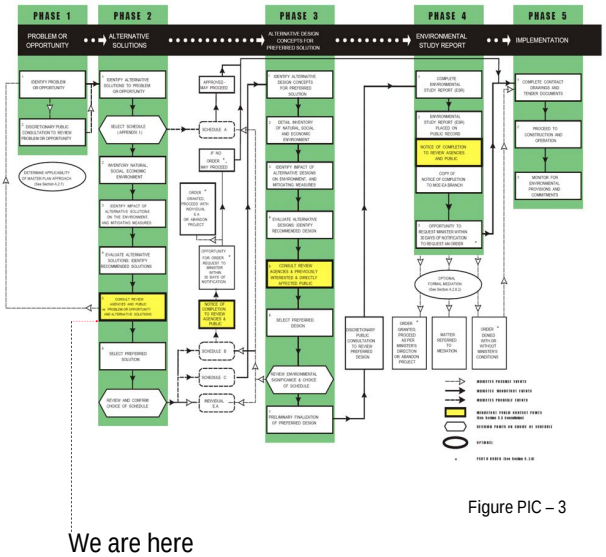

Figure PIC – 3

We are here

Problem/Opportunity Statement

Problem

The residential properties located north of Gallanough Park which front onto Brooke Street, Thornridge Drive, Clark Haven Street, and Arnold Ave have been frequently affected by flooding during heavy storms over the years. The City has investigated the drainage infrastructure in and around the affected area and has determined that flooding is caused by the surcharged Trunk Sewer along Brooke Street, deficient or deteriorated culverts and poor drainage practices resulting from residential re-development in the Thornhill Neighbourhood area.

Opportunity

The project presents an opportunity to provide social and environmental benefits. Through stormwater management (SWM) implementation at Gallanough Park, reduction in the risk of flooding can be realized. The reduced risk will benefit safety of the public and private properties. The enhancements will include the latest SWM and low impact development measures to improve the drainage characteristics and result in reduced erosion potential and pollution input of the receiving creeks/environment.

Design Charrette

- A Design Charrette was held at Thornhill Presbyterian Church on Thursday January 28, 2010.
- 13 community members, 4 City staff, consultants and a facilitator were present.
- Purpose was to facilitate open discussion of issues, challenges and opportunities for Gallanough Park's use as a SWM facility in an engaging and co-operative way.
- Attendees individually highlighted their major concerns and identified a list of constraints which needed consideration to develop a feasible design.
- Groups of charrette participants developed creative preliminary designs of the SWM facility. The preliminary consensus from charrette attendees was that an underground storage facility is preferred, based on aesthetics and recreation potential. Standing water is not desirable.
- The input received was given careful consideration and it guided the evaluation of the alternatives.

Summary of Alternatives

1. Do Nothing

- Existing structures and grading left as is
- Risk of flooding to private and public properties remains unchanged
- Does not address the problem/opportunity statement

2. Surface Dry Pond

- Excavate center of Park up to 3.0 m deeper and retrofit existing storm sewers to control flows
- Frequent storms (less than 2 year event) would be conveyed within a pipe or low flow channel
- Ponding of stormwater is temporary and only occurs during a larger storm event (greater than 2 year storm)
- Ground within the dry pond will be 'wet' for a short period after a normal rainfall event (few days)

3. Underground Storage

- Install 3 m high underground concrete chamber and retrofit existing storm sewers to control flows
- No additional surface ponding of water and all Park uses could be maintained

4. Mix of Underground and Surface Dry Pond

- Excavate the Park up to 2.0 m deeper and retrofit existing storm sewers to control flows
- Install 1.2 m high underground concrete chamber to control events less than 10 year return period
- Surface ponding of water would only occur when underground chambers are full, and would be expected during events larger than a 10 year event

Preliminary Evaluation Criteria

Gallanough Park SWM Facility Preliminary Evaluation Criteria
Social
Impacts to existing park uses
Creation of new park uses
Potential for standing water
Impacts to adjacent properties during and after construction
Economic
Capital construction cost
Operation and maintenance cost
Reduction in flood damages
Natural Environment
Impacts on general water quality
Impacts to the existing vegetation
Functional
Ease of construction
Ease of operations and maintenance
Risk to adjacent or upstream properties
Risk to downstream properties

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Preliminary Assessment of Alternative Solutions

Alternative 1: Do Nothing

Advantages	Disadvantages
• No additional capital or maintenance cost	• No reduction in flooding events and risk to the public • Does not address problem/opportunity statement

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Preliminary Assessment of Alternative Solutions

Alternative 2: Surface Dry Pond

Advantages	Disadvantages
• Reduction in flooding events in the Thornhill area • Lowest capital ($800,000) and maintenance costs compared to alternatives 3 and 4 • Increased infiltration into soils • Some potential for Park use improvements (i.e. tobogganing hills)	• Inconvenience for Park users during larger rainfall events (greater than 2 year) due to 'wet' ground (for few days) • Potential for standing water during storm events (greater than 2 year storm)

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Preliminary Assessment of Alternative Solutions

Alternative 3: Underground Storage

Advantages	Disadvantages
• Reduction in flooding events in the Thornhill area • Highest potential for improvement in aesthetics and park use due to flat ground • Lowest potential for standing water in Park	• Highest capital construction ($5,400,000) and maintenance cost • Longer construction period • More difficult maintenance procedures involving confined space entry

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Preliminary Assessment of Alternative Solutions

Alternative 4: Mix of Underground and Surface Dry Pond

Advantages	Disadvantages
• Reduction in flooding events in the Thornhill area • Higher potential for Park use improvements compared to Alternative 2	• Higher capital construction ($4,400,000) and maintenance cost • Potential for standing water during storm events (greater than 10 year storm events) • More difficult maintenance procedures involving confined space entry

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Cost Comparison

Alternative	Capital Cost	Annual Maintenance Cost	Net Present Value (10 years)
Alternative 1: Do Nothing	**$ 0.00**	**$ 0.00**	**$ 0.00**
Alternative 2: Surface Dry Pond	**$ 800,000**	**$ 3,400**	**$ 830,000**
Alternative 3: Underground storage	**$ 5,400,000**	**$ 19,000**	**$ 5,570,000**
Alternative 4: Mix of Underground and Surface Storage	**$ 4,400,000**	**$ 19,000**	**$ 4,570,000**

Note: Net Present Value is capital cost plus the current value of accumulated maintenance cost for the next 10 years at 5% annual interest rate.

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Preliminary Assessment of Alternative Solutions

	Alternative #1 (Do Nothing)	Alternative #2 (Dry Pond)	Alternative #3 (Underground Tank)	Alternative #4 (Mix of Underground Tank and Dry Pond)
Social				
Impacts to existing park uses	Advantage	Disadvantage	Advantage	Disadvantage
Creation of new park uses	Disadvantage	Advantage	Advantage	Advantage
Potential for standing water	Advantage	Disadvantage	Advantage	Disadvantage
Impacts to adjacent properties during and after construction	N/A	Disadvantage	Disadvantage	Disadvantage
Economic				
Capital construction cost	Advantage $ 0	Advantage $ 800,000	Disadvantage $ 5,400,000	Disadvantage $ 4,400,000
Operation and maintenance cost	Advantage	Advantage	Disadvantage	Disadvantage
Reduction in flood damages	Disadvantage	Advantage	Advantage	Advantage
Natural Environment				
Impacts on general water quality	Disadvantage	Advantage	Advantage	Advantage
Impacts to the existing vegetation	Advantage	Disadvantage	Disadvantage	Disadvantage
Functional				
Ease of construction	N/A	Advantage	Advantage	Advantage
Ease of operations and maintenance	Advantage	Advantage	Advantage	Disadvantage
Risk to adjacent or upstream properties	Advantage	Advantage	Advantage	Advantage
Risk to downstream properties	Disadvantage	Advantage	Advantage	Advantage

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Preliminary Preferred Alternative Based on Rational Evaluation

Preferred Alternative: Surface Dry Pond (Alternative # 2)

- Significantly less capital cost than other alternatives ($3.6 M less than Alternative 3)
- Least maintenance cost ($3,400 per year)
- Reduction in flooding events in the Thornhill Neighbourhood, at:
  - Thornridge Dr. between Clark Haven Ave. and Brooke St.
  - Southeast corner of Brooke St. and Thornridge Dr.
  - Brooke St. and Arnold Ave. intersection
- Park use is maintained most of the time
- Potential future opportunities for walking trails are maintained
- Bigger tobogganing hills, mini-soccer field maintained and improved, and improved overland drainage on Springfield Way and Tanjo Crt.

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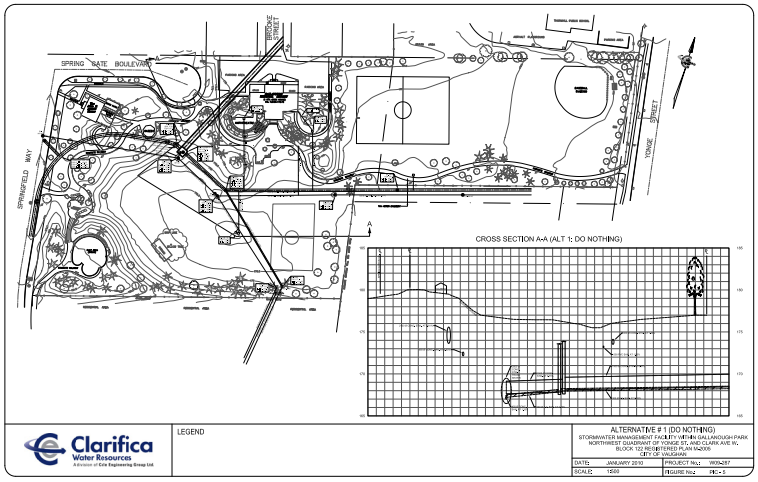
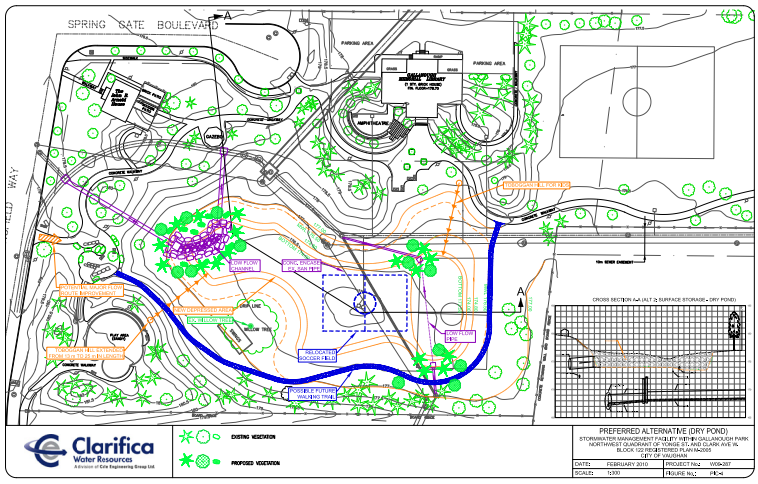
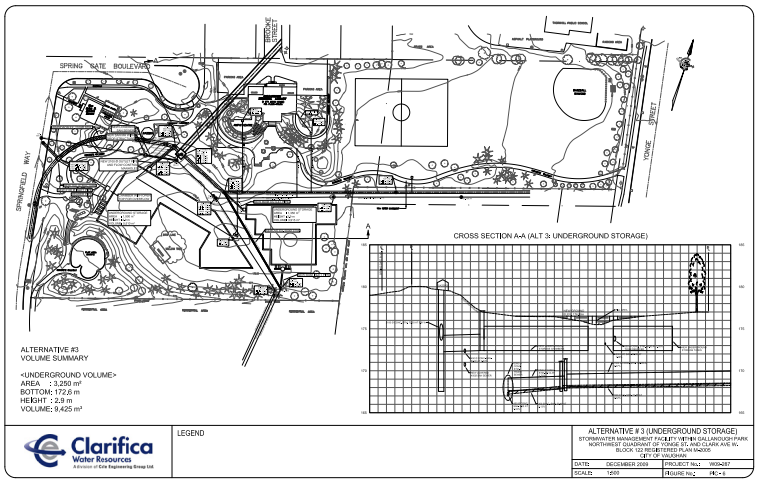
The Next Steps . . .

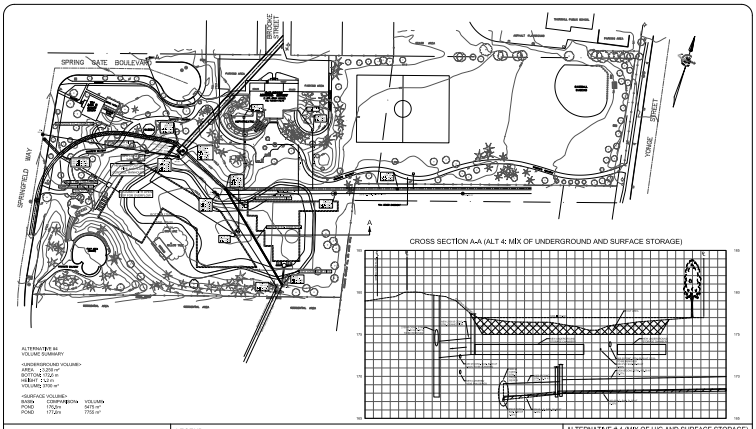
- Comments received from this PIC will be considered along with those received from review agencies and landowners in order to confirm the preferred Alternative Solution.
- The study team will identify alternative design concepts associated with the preferred solution and evaluate those concepts.
- The team will also identify anticipated environmental effects and ways of minimizing negative effects and maximizing positive effects associated with the alternative design concepts.
- A notice of completion will be advertised and the project file will be available for viewing.
- Regardless of the alternative chosen, approval from Toronto and Region Conservation Authority will be required.

Thank you for your participation!









LEGEND

Clarifica
Water Resources
A division of Exfo Engineering Group Ltd.

ALTERNATIVE # 4 (MIX OF U/G AND SURFACE STORAGE)
STORMWATER MANAGEMENT FACILITY WITHIN GALLANTAUGH PARK
NORTHWEST QUADRANT OF YONGE ST. AND CLARK AVE W.
BLOCK 122 REGISTERED PLAN M-2055
CITY OF VAUGHAN

DATE:	DECEMBER 2009	PROJECT No.:	W06-287
SCALE:	1:500	FIGURE No.:	FIG - 7

Appendix H

PIC Registration and Comment Sheets Received

Clarifica
Water Resources
A division of Cole Engineering Group Ltd.

March 8, 2010
Our Ref: W09-287-01

Dear Sir:

Re: Vaughan Gallanough Park SWM Facility Class EA
Public Information Centre (PIC) – February 25, 2010

Thank you for your comments on the public meeting held on February 25, 2010. We will include your comments within the Project File and take your comments, along with other public and agency input, into consideration when confirming the preferred alternative.

Your suggestion regarding an additional stormwater drainage connection between Gallanough Park and Don River has been investigated in the previous study by Genivar as Alternative 1 and is presented in their "Thornhill Storm Drainage Improvements Study – Final Report" dated, February 2008. This report indicates that an additional storm sewer in Brooke Street would improve drainage capacity, however, this alternative was not recommended due to the negative environmental impacts, very disruptive construction, and high cost. The negative environmental impacts are due to the in-water construction required at Don River and increase stormwater discharge into a sensitive natural watercourse. The disruptive construction and high cost are due to the extreme depth of the Brooke Street storm sewer system.

The study by Genivar recommended a SWM facility at the Gallanough Park in conjunction with improvements to the existing drainage system in the Thornhill Neighborhood area. The current study focuses on SWM facility options at Gallanough Park. It is understood, from your written comment provided at the public meeting, that you prefer the 'do nothing' alternative. Please note that this alternative does not address the problem statement and can not be recommended as the preferred alternative.

In response to your comment regarding public safety, the Ministry of Environment has published a Stormwater Management Planning and Design Manual in March 2003. This manual outlines design requirements for stormwater management facilities, including safety concerns. Any proposed facility would be required to adhere to these guidelines.

Cole Engineering Group Ltd., 100 Renfrew Dr., Suite 100, Markham, Ontario L3R 9R6 Telephone: 905.223.2314 Fax: 905.940.2064

Please feel free to contact any of the members of the study team with further comments or for more information.

Please contact the undersigned with any questions or concerns.

Yours truly,

CLARIFICA
A division of Cole Engineering Group Ltd.

Mark Bassingthwaite, P.Eng.
Project Manager

MFB:as

c.: Pat Marcantonio, City of Vaughan

S:\2009 Projects\Water Res. Eng. & Tech. Projects (W09)\2009 WR Projects\W09-287 Vaughan Gallanough Park SWM Facility Class EA\PIC\Completed Comment and Registration Forms\Responcse to Al Stauffer.doc

REGISTRATION SHEET

Public Information Centre – Study for a Stormwater Management Facility Within Gallanough Park
Municipal Class Environmental Assessment

February 25, 2010 – Thornhill Presbyterian Church

Name (Please Print)	Address/E-mail	Phone Number
1.		
2.		
3.		
4.		
5.		
6.		
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10		

Clarifica Water Resources
A division of Cole Engineering Group Ltd.

City of Vaughan
The City Above Toronto

REGISTRATION SHEET

Public Information Centre – Study for a Stormwater Management Facility Within Gallanough Park
Municipal Class Environmental Assessment

February 25, 2010 – Thornhill Presbyterian Church

Name (Please Print)	Address/E-mail	Phone Number
11		
12		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
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Clarifica Water Resources
A division of Cole Engineering Group Ltd.

City of Vaughan
The City Above Toronto

COMMENT FORM

Public Information Centre – Study for a Stormwater Management Facility within Gallanough Park
Municipal Class Environmental Assessment Study

February 25, 2010 – Thornhill Presbyterian Church

We are interested in hearing any comments you may have associated with this Class Environmental Assessment project. Thank-you for clearly writing your comments in the space provided below. If you require additional space, please continue your comments on the back of this sheet.

The preferred option is not preferred by anyone who lives directly around the park. We are the upstream solution to a downstream problem that was in part caused by those downstream residents.

We should be considering the covered option, or the 'do nothing' option.

Comments and information regarding this project are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Privacy Act. With the exception of personal information, all comments will become part of the public record.

Please submit your written comments before leaving the PIC. If you require more time to comment, please mail/fax in the comment sheet by March 18, 2010 to:

Pat Marcantonio, C.E.T.
Project Manager
City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
Phone: (905) 832-8556
Fax: (905) 832-8568
Email: pat.marcantonio@vaughan.ca

Mark Bassingthwaite, P.Eng.
Project Manager
Clarifica, a division of Cole Engineering Group Ltd.
100 Renfrew Dr., Suite 100
Markham, ON L3R 9R6
Phone: 416-987-6161
Fax: 905-940-2064
E-mail: mbassingthwaite@coleengineering.ca

PLEASE CLEARLY PRINT YOUR NAME AND CONTACT INFORMATION BELOW:

First Name: _____
Last Name: _____
Telephone: _____
Fax: _____

Street: _____
City/Town: _____
Postal Code: _____
E-mail: _____

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February 25, 2010 – Thornhill Presbyterian Church

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THANK YOU STAFF

PLZ KEEP INFO FLOWING + NEW IDEAS POSSIBLE AS I FEEL WE ARE STILL FAR FROM SOLUTIONS

Comments and information regarding this project are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Privacy Act. With the exception of personal information, all comments will become part of the public record.

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Last Name:
Telephone:
Fax:

Street:
City/Town
Postal Co
E-mail:

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City of Vaughan
The City Above Toronto

COMMENT FORM

Public Information Centre – Study for a Stormwater Management Facility within Gallanough Park
Municipal Class Environmental Assessment Study

February 25, 2010 – Thornhill Presbyterian Church

We are interested in hearing any comments you may have associated with this Class Environmental Assessment project. Thank-you for clearly writing your comments in the space provided below. If you require additional space, please continue your comments on the back of this sheet.

I am in favour of the proposal to build the dry pond in Gallanough Park at the cost of $800,000. It is of no benefit to bury cistern tanks at a cost of 5.4 Million Plus if it does no better job. The soccer field if lost is of no consequence - relocate soccer to Hefhill Park if Necessa

Comments and information regarding this project are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Privacy Act. With the exception of personal information, all comments will become part of the public record.

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E-mail: mbassingthwaite@coleengineering.ca

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Fax: _____ E-mail: _____

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City of Vaughan
The City Above Toronto

COMMENT FORM

Public Information Centre – Study for a Stormwater Management Facility within Gallanough Park
Municipal Class Environmental Assessment Study

February 25, 2010 – Thornhill Presbyterian Church

We are interested in hearing any comments you may have associated with this Class Environmental Assessment project. Thank-you for clearly writing your comments in the space provided below. If you require additional space, please continue your comments on the back of this sheet.

Take the low cost option.

Do not want increased taxes.

Comments and information regarding this project are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Privacy Act. With the exception of personal information, all comments will become part of the public record.

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COMMENT FORM

Public Information Centre – Study for a Stormwater Management Facility within Gallanough Park
Municipal Class Environmental Assessment Study

February 25, 2010 – Thornhill Presbyterian Church

We are interested in hearing any comments you may have associated with this Class Environmental Assessment project. Thank-you for clearly writing your comments in the space provided below. If you require additional space, please continue your comments on the back of this sheet.

I prefer Option 1

Comments and information regarding this project are being collected to assist the City of Vaughan in meeting the requirements of the Environmental Assessment Act. This material will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Privacy Act. With the exception of personal information, all comments will become part of the public record.

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Telephone: _____ Postal Code:
Fax: _____ E-mail:

Clarifica Water Resources
A division of Cole Engineering Group Ltd.

City of Vaughan
The City Above Toronto

Nirmal Shah

From: Mark Bassingthwaite
Sent: Thursday, March 04, 2010 10:44 AM
To: Dan Lee
Subject: Fw: Stormwater Mangement within Gallanough Park

Follow Up Flag: Follow up
Flag Status: Red

Sent: Thu Mar 04 10:27:32 2010
Subject: RE: Stormwater Mangement within Gallanough Park

Thank you very much for attending the public meeting on the Gallanough proposals. I appreciate your attendance and your comments - as a City we are committed to a vigorous public engagement process.
Without getting into great detail, I would like to comment on your position.

The reason why we are considering this project is from a risk management perspective. I firmly believe that the City has a responsibility to all of its residents to provide the highest quality of living environment possible within our financial means. It is a fact that there is extensive flooding in this part of Thornhill when there are major storms. Since the 2005 storm there has been at least one other significant weather event that resulted in damages to homes in the area. The prime area for the flooding is north and west of Gallanough Park. Flooding took place in homes in an area that almost went as far as Atkinson and Arnold. The reason why there was such extensive flooding was that even though we have a very large storm trunk under Brooke Street extending from Gallanough north to the Don River, because of the water flow pattern, in the event of a major storm in can reach capacity and the system backs up. The point of difficulty is essentially where the water flowing from the west (Arnold and Thornridge) meets the water flowing from the south (virtually the entire area south of Clarke, east of Hilda). The problem is not a simple one or one that can be addressed by just trying to fix just one part of the system. (Part of the construction project currently underway in the Thornridge area is to address stormwater management issues - it will also help).

The Gallanough project acts essentially as the "tap" for the entire system. In the case of a major storm, the water flowing from the south will be controlled for a short period of time until the capacity of the Brooke Street trunk is available. It is expected that even in the worse case scenario, the Gallanough Storm Water Management facility will only have water in it for a day or two. This is a critical point to understand. No one is suggesting that this be a WET POND. Only in those very significant weather situations would there be any water at all in the area designated for the pond. At all other times the area will be used for park activities. This area would NOT be restricted or fenced outside (I expect) of those very rare moments when a major storm has occurred and we are holding back the water to allow it to flow northward in a controlled fashion. In those situations everything possible will be done to ensure public safety. (Please take a look as you drive around the newer areas of the City and you will see how we control "wet" storm water ponds. Even better go take a look at the cul-de-sac at the western end of Thornridge and you will see a (much smaller) example of a dry storm water management pond just to the north of the tennis courts.

I trust that my explanation will allay some of your concerns.

Regards,

2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
905-832-8585 x8349

I attended the public meeting last week on this matter. From the presentation and discussion, it appears that there are only two viable options: do nothing or a three meeter deep pond which will cover about 75% of the existing park south of the library. From what was presented it appears that the drainage around Arnold and Brooks Streets as well as on Thornridge Drive is the main problem. I am wondering why a separate stormwater drainage system cannot be installed from this area directly into the Don River. It would seem in my inexperienced opinion to be a more effective way of preventing flooding in this area as well as probably costing less than some of the alternatives.

In any case, I am opposed to an open pond of the sort proposed for the park. Even though it will be dry most of the time, it will occasionally have deep water. I cannot believe that such a dangerous location will be left accessible to small children and that if the pond is built, it will end up being fenced in which will render most of the park unusable to the local residences.

Thus I am opposed to any scheme that would involve an open storage pond in the park and suggest looking at more effective and less costly alternatives.

Appendix I

Agency Comments

Ministry of Health and Long-Term Care

Public Health Division
Public Health Protection & Prevention Branch
11th Floor, 1075 Bay Street
Toronto ON M5S 2B1

Telephone: 416-327-7290
Facsimile: 416-327-0984

Ministère de la Santé et des Soins de longue durée

Division de la santé publique
Direction de la protection de la santé publique et de la prévention
11e étage1075, rue Bay
Toronto ON M5S 2B1

Téléphone: 416-327-7290
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Ontario

APR 0 8 2010

Mr. Mark Bassingthwaite, P.Eng.
Project Manager
Water Resources Engineer
Clarifica Water Resources
Cole Engineering Group Ltd.
100 Renfrew Drive
Suite 100
Markham ON L3R 9R6

Dear Mr. Bassingthwaite:

Re: Class Environmental Assessment Study for a Stormwater Management Facility within Gallanough Park

Thank you for your letter with regard to the above Environmental Assessment (EA).

Public Health Division is interested in the public health aspects of this EA and wishes to be kept informed of any further developments. The local board of health has direct oversight for development within their local jurisdiction. We ask that you direct your request for input to the local medical officer of health for the health unit in which the EA is located.

Dr. Karim Kurji
Medical Officer of Health
York Region Public Health Services Department
17250 Yonge Street
Box 147
Newmarket ON L3Y 6Z1

Sincerely,

Paul McCue
Senior Program Consultant
Environmental Health Branch, Public Health Division

c: Dr. Karim Kurji, Medical Officer of Health, York Region Public Health Services Department

Niagara Escarpment Commission

232 Guelph St.
Georgetown, ON L7G 4B1
Tel: 905-877-5191
Fax: 905-873-7452
www.escarpment.org

Commission de l'escarpment du Niagara

232, rue Guelph
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No de tel. 905-877-5191
Télécopieur 905-873-7452
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Ontario

Ontario's Niagara Escarpment

Ontario's Niagara Escarpment
A World Biosphere Reserve

March 23, 2010

Mr. Mark Bassingthwaite
Project Manager
Clarifica Water Resources
Cole Engineering Group Ltd.
100 Renfrew Drive, Suite 100
Markham, ON L3R 9R6

Dear Mr. Bassingthwaite:

RE: Class Environmental Assessment Study for a Stormwater Management Facility within Gallanough Park

The Niagara Escarpment Commission (NEC) received the notice regarding the above noted project within Gallanough Park in the City of Vaughan.

This area is outside the Niagara Escarpment Plan.

Therefore, the Niagara Escarpment Commission has **no comment** on this project, and no further correspondence is required on this project.

Thank you for the opportunity to comment.

Yours very truly,

Ken Whitbread
Manager

KW:jw

Ministry of the Environment

Central Region
Technical Support Section

5775 Yonge Street, 8th Floor
North York, OntarioM2M 4J1

Tel.: (416) 326-6700
Fax: (416) 325-6347

Ministère de l'Environnment

Région du Centre
Section d'appui technique

5775, rue Yonge, 8ième étage
North York, Ontario M2M 4J1

Tél. : (416) 326-6700
Téléc. : (416) 325-6347

Ontario

March 24, 2010

File: EA05-07-05

Mark Bassingthwaite, P. Eng.
Project Manager
Clarifica- Cole Engineering Group Ltd
100 Renfrew Dr, Suite 100
Markham ON L3R 9R6

RE: TSS Comments:
Stormwater Management Facility within Gallanough Park
City of Vaughan
Class Environmental Assessment
Response to March 4, 2010 letter

Dear Mr. Bassingthwaite:

This letter is our response to your March 4, 2010 letter for the above noted project. This response acknowledges that the City of Vaughan has indicated that its study is following the approved environmental planning process for a **Schedule 'B'** project under the *Municipal Engineers Association Municipal Class Environmental Assessment* (Class EA).

I have enclosed some information that identifies issues of concern with respect to the proposed undertaking and provides some guidance on what Technical Support Section (TSS) reviewers generally recommend to include in the Project File for this project.

TSS is providing the following general comments to assist you and your project team members in effectively addressing these issues:

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The Project File should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

Surface Water

- The Project File must include a sufficient level of information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the Study Area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking. The MOE Guideline B-6, *Evaluating Construction Activities Impacting on Water Resources* should be used to plan and construct this project.

Groundwater

- If the potential construction or decommissioning of water wells is identified as an issue, the Project File should refer to Ontario Regulation 903, Wells, under the *Ontario Water Resources Act*.

- Potential impacts to groundwater-dependent natural features should be addressed. Any potential effects should be identified, and appropriate mitigation measures should be recommended.

- Any potential approval requirements for groundwater taking or discharge should be identified in the Project File. In particular, a Permit to Take Water (PTTW) under the *Ontario Water Resources Act* will be required for any water takings that exceed 50,000 litres per day. For more information on the application and approval process, we suggest you refer to the MOE *Permit to Take Water Manual* (April 2005).

Dust and Noise

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the Study Area are not adversely affected during construction activities. If dust suppressants are proposed to be used, we recommend the use of non-chloride based compounds to protect water quality.

Servicing and Facilities

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have a Certificate of Approval before it can operate lawfully. Please consult with the Environmental Assessment and Approvals Branch to determine whether a new or amended Certificate of Approval will be required for any proposed infrastructure.

Contaminated Soils

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act (EPA)* and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. We recommend contacting the MOE York Durham District Office in Ajax for further consultation if contaminated sites are present.

- Any current or historical waste disposal sites should be identified in the Project File. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the *Environmental Protection Act* may be required for land uses on former disposal sites.

- The Project File should identify any underground transmission lines in the Study Area. The owners should be consulted to avoid impacts to this infrastructure, including potential spills.

Mitigation and Monitoring

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- All waste generated during construction must be disposed of in accordance with MOE requirements.

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the Project File and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly. The proponent's construction and post-construction monitoring plans should be documented in the Project File.

Class EA Process

- The Project File should provide clear and complete documentation of the planning process in order to allow traceability of decision-making. It must also demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all public consultation efforts undertaken during the planning process. Additionally, it should identify all concerns that were raised and how they have been addressed throughout the planning process. The Class EA also directs proponents to include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment. The Project File should include a level of detail such that all potential impacts can be identified and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the Project File.

- Please include in the Project File a list of all subsequent permits or other approvals that may be required for the implementation of the preferred alternative, including Permits to Take Water, Certificates of Approval or other ministerial approvals, approval under the *Canadian Environmental Assessment Act* (CEAA), and conservation authority permits.

- Please note that MOE guidelines and other information related to the issues noted above are available at www.ene.gov.on.ca under the publications link. We encourage the proponent to review all the available guides and to reference any relevant information in the Project File.

First Nations Consultation

- Please note that as part of the required stakeholder and agency consultation, proponents are advised to contact the Ministry of Aboriginal Affairs and the Department of Indian and Northern Affairs to determine potentially affected Aboriginal peoples in the project area. Please refer to the website http://www.ene.gov.on.ca/en/eaab/aboriginal-resources.php for a list of appropriate government contacts.

- Once identified, you are advised to provide notification directly to the Aboriginal peoples who may be affected by the project and provide them with an opportunity to participate in any planned public consultation sessions and comment on the project.

Thank you for the opportunity to comment on this project. We recommend a draft copy of the Project File be circulated to this office prior to the filing of the final draft, allowing approximately 30-days review time for the ministry's technical reviewers to provide comments. Please also forward our office the Notice of Completion and Project File when completed. Should you or any members of your project team have any questions regarding the above, please contact me at (416) 326-5745.

Yours sincerely,

Dorothy Moszynski
Environmental Resource Planner and EA Coordinator
Air, Pesticides and Environmental Planning

c. Dave Fumerton, York Durham District Office, MOE
Central Region EA File
A & P File

Ministry of Tourism and Culture
Cultural Services Unit, 4th Fl.
400 University Ave
Toronto, ON M7A 2R9

Ministre du Tourisme et de la Culture
400, avenue University
Toronto, ON M7A 2R9

Ontario

May 10, 2010

Pat Marcantonio
Senior Engineering Assistant – City of Vaughan
2141 Major Mackenzie Dr
City of Vaughan, ON L6A 1T1

Dear Mr. Marcantonio:

Subject : Class EA for a Stormwater Management Facility within Gallanough Park
Location : City of Vaughan

As part of the process under the Environmental Assessment Act, the Ministry of Tourism and Culture has an interest in the conservation of cultural heritage resources including:

- Archaeological resources;
- Built heritage resources; and
- Cultural heritage landscapes.

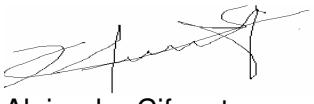
We have reviewed your project and, based on provincial criteria, have determined that the site has low archaeological potential and therefore does not require an archaeological assessment.

However, should deeply buried archaeological finds be discovered during construction activities, this office should be notified without delay and a licensed archaeologist may be required to monitor the site directly.

In the event that human remains are found, the local police must be notified immediately, followed promptly by notification to this office.

Please do not hesitate to contact the undersigned if you have any questions.

Yours truly,



Alejandro Cifuentes
Heritage Planner
(416)314-7159
Alejandro.cifuentes@ontario.ca

c.: Winston Wong, Heritage Planner, Ministry of Tourism and Culture.
Mark Bassingthwaite, Project Manager, Cole Engineering Group.