

**Combined Sewage Storage -  
Environmental Study Report**

City of Ottawa



January 8, 2013

**Appendix A**  
**Stakeholder, Agency and**  
**Public Consultation**

**A-1**  
**EA Phase 1 Notices**

## Transportation Impact Assessment Guidelines Review

The City of Ottawa's Planning and Growth Management Department is undertaking its three- year review of the Transportation Impact Assessment (TIA) Guidelines, as directed by City Council motion 65/2 at the September 27, 2006 meeting. The TIA Guidelines identify the scope and format of transportation analysis required to support development applications in the City of Ottawa. Please visit [ottawa.ca/tia](http://ottawa.ca/tia) to view the current TIA Guidelines.

As part of this review process the public is encouraged to provide their comments by December 20, 2009 to:

Paul Jordan, A/ Program Manager  
 Design Review and Implementation Unit  
 Development Review Suburban Services Branch  
 Planning & Growth Management Department  
 Infrastructure Services and Community Sustainability  
 City of Ottawa  
 100 Constellation Crescent  
 Ottawa, Ontario  
 613-580-2424, ext. 27806  
 FAX: 613-560-6069  
[paul.jordan@ottawa.ca](mailto:paul.jordan@ottawa.ca)

11-7042-6949



## Proposed Street Closure

### 261 Bren-Maur Road

The Council of the City of Ottawa proposes to close a portion of the western end of Bren-Maur Road.

The purpose of the street or lane closure is to compliment the construction of a stormwater management pond to the north of Bren-Maur Road.

The Planning and Environment Committee will hear, in person or by counsel or agent, any person who applies to be heard concerning this closure. If you have objections, please contact in writing the undersigned on or before **Monday, December 7, 2009**.

To receive additional information or a copy of a map showing the proposed closure, please contact:

Lily Xu  
 Planning and Growth Management Department  
 City of Ottawa  
 110 Laurier Avenue West, 4<sup>th</sup> Floor  
 Ottawa, Ontario  
 K1P 1J1  
 Tel : 613-580-2424, ext. 27505  
 E-mail: [Lily.Xu@ottawa.ca](mailto:Lily.Xu@ottawa.ca)

12-1087-6939

**CITY OF OTTAWA**  
**CLASS ENVIRONMENTAL ASSESSMENT**  
**OTTAWA RIVER ACTION PLAN (MASTER PLAN)**  
**AND CSO CONTROL STUDY**  
**NOTICE OF STUDY COMMENCEMENT /**  
**NOTICE OF PUBLIC OPEN HOUSE**  
**Presentation at 6:30 p.m.**

**Combined Sewer Overflows (CSOs) to the Ottawa River** do not meet all provincial CSO control targets. The *Ottawa River Action Plan* identifies several projects that will enable the City to become fully compliant with provincial *Procedure F-5-5* and to improve water quality in the watershed. Public consultation is being undertaken to determine whether the CSO Control project identified in the *Ottawa River Action Plan* meets the environmental, economic and social priorities of the community, in addition to regulatory requirements.

**Public Information Sessions** have been arranged to provide the public with an opportunity to review the CSO Control options being considered, and to discuss their relative costs and benefits to the community. Evaluation criteria were developed and applied to determine how well each option meets the social, environmental and financial policies of the City, which will be presented and discussed with the public.

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Lansdowne Park, Salon E 1015 Bank Street	Ron Kolbus Lakeside Centre, Britannia Park	Nepean Sportsplex Halls C & D 1701 Woodroffe Avenue	Royal Canadian Legion Branch 632 (Orleans) 800 Taylor Creek Drive

**Public comments** are welcome throughout the study and there will be several opportunities to learn more during the course of the study. This study is being conducted in accordance with the requirements of the *Municipal Class Environmental Assessment*, 2007, which is an approved process under the *Environmental Assessment Act*. All comments received will be collected in accordance with the Act, (with the exception of personal information), and will become part of the public record.

**Upon completion of Phase 1 of the EA**, the *CSO Control Study* will immediately proceed through the remaining phases of the class EA process under separate study, to allow for implementation by 2014. Upon completion of Phase 2 of this study, a Master Plan document will be prepared that will establish the long-term plan for improving the Ottawa River watershed. The draft Master Plan will be available to the public for comment prior to approval by Council.

For more information, or if you wish to be placed on the study's mailing list, please contact:

Sally McIntyre  
 Program Manager  
 Environmental Programs  
[Sally.mcintyre@ottawa.ca](mailto:Sally.mcintyre@ottawa.ca)  
 (613) 580-2424 ext. 23307

08-8042-6849

**Ville d'Ottawa**

**Évaluation environnementale de portée générale  
 Plan d'action visant la rivière des Outaouais (Plan directeur)  
 et Étude de contrôle de l'évacuation du trop-plein  
 des égouts unitaires  
 Avis de commencement d'étude /  
 Avis de réunion portes ouvertes**

Les évacuations du trop-plein d'égouts unitaires dans la rivière des Outaouais ne respectent pas tous les objectifs provinciaux en la matière. Le *Plan d'action visant la rivière des Outaouais* désigne plusieurs projets qui permettront à la Ville de se conformer pleinement à la *Procédure provinciale F-5-5* et d'améliorer la qualité de l'eau du bassin hydrographique. Un processus de consultation publique a été mis en place afin de déterminer si le projet de contrôle de l'évacuation du trop-plein des égouts unitaires désigné dans le *Plan d'action visant la rivière des Outaouais* respecte les priorités environnementales, économiques et sociales de la collectivité, en plus de répondre aux exigences réglementaires.

Des **séances d'information** ont été prévues pour permettre aux membres du public d'examiner les options envisagées de contrôle de l'évacuation du trop-plein des égouts unitaires et de discuter de leur coût et de leurs avantages pour la collectivité. Des critères d'évaluation ont été élaborés et appliqués afin de déterminer comment chacune des options répond aux politiques sociales, environnementales et financières de la Ville; ils seront présentés aux membres du public, qui pourront en discuter.

CENTRE	OUEST	SUD	EST
Lundi 23 novembre De 18 h à 20 h	Jeudi 26 novembre de 18 h à 20 h	Lundi 30 novembre de 18 h à 20 h	Mardi 1 <sup>er</sup> décembre de 18 h à 20 h
Parc Lansdowne, Salon E 1015, rue Bank	Centre Ron-Kolbus- Lakeside, parc Britannia, 102, avenue Greenview	Sportsplex de Nepean, Salons C et D 1701, avenue Woodroffe	Légion Royale Canadienne 800, promenade Taylor Creek, Orléans
Présentation à 18 h 30	Présentation à 18 h 30	Présentation à 18 à 30	Présentation à 18 à 30

Les membres du public pourront faire part de leurs **commentaires** tout au cours de l'étude et auront plusieurs occasions d'en apprendre davantage sur ce projet. Cette étude est menée conformément aux exigences de l'*évaluation environnementale de portée générale municipale* de 2007, un processus approuvé en vertu de la *Loi sur les évaluations environnementales*. Tous les commentaires reçus seront recueillis conformément à la *Loi* (à l'exception des renseignements personnels), et seront rendus publics.

**Après l'achèvement de la phase 1 de l'ÉE, l'Étude de contrôle de l'évacuation du trop-plein des égouts unitaires** sera immédiatement intégrée dans les autres phases du processus d'ÉE de portée générale, sous la forme d'autres études, afin de permettre une mise en œuvre en 2014. Lorsque la phase 2 de cette étude sera achevée, un plan directeur sera préparé afin d'établir le plan à long terme d'amélioration du bassin hydrographique de la rivière des Outaouais. La version provisoire de ce plan directeur sera soumise aux commentaires du public avant d'être approuvée par le Conseil.

Pour obtenir plus d'information à ce sujet ou pour figurer sur la liste d'envoi de l'étude, veuillez communiquer avec :

Sally McIntyre  
 Gestionnaire de programme  
 Programmes environnementaux  
[Sally.mcintyre@ottawa.ca](mailto:Sally.mcintyre@ottawa.ca)  
 (613) 580-2424, poste 23307

Ad # 08-8042-6849

**Projet de fermeture de rue  
 261, chemin Bren-Maur**

Le Conseil municipal d'Ottawa envisage de fermer une partie de l'extrémité ouest du chemin Bren-Maur.

Ce projet vise à permettre la construction d'un bassin de gestion des eaux pluviales au nord du chemin Bren-Maur.

Le Comité de l'urbanisme et de l'environnement entendra, en personne ou par l'entremise de son avocat ou agent, tout particulier qui sollicite une audience concernant la fermeture de rue envisagée. Si vous désirez vous y opposer, veuillez communiquer par écrit avec la personne soussignée au plus tard **le lundi 7 décembre 2009**.

Pour obtenir de plus amples renseignements :

Martin Barakengera  
 Service de l'Urbanisme et Gestion de la croissance  
 Ville d'Ottawa  
 110, Avenue Laurier Ouest, 4<sup>e</sup> étage  
 Ottawa (Ontario)  
 K1J 1P1  
 Tél. : 613-580-2424, poste 27500  
 Courriel : [martin.barakengera@ottawa.ca](mailto:martin.barakengera@ottawa.ca)

Ad # 12-1087-6939

**CITY OF OTTAWA**  
**CLASS ENVIRONMENTAL ASSESSMENT**  
**CSO Storage Project**  
**NOTICE OF PUBLIC MEETING**

Currently, **Combined Sewer Overflows (CSO)** to the Ottawa River do not meet all provincial CSO control targets. Three options for achieving full compliance were presented at open houses held in late 2009 as part of consultations regarding the *Ottawa River Action Plan*.

As a result of analysis carried out and feedback from the community, City staff recommends that Council endorse **Option B**. Option B represents a level of CSO control equivalent to “zero (0) combined sewer overflows (CSO) per year during the swimming season in the “average year”. This service level is more stringent than the provincial requirement of two (2) combined sewer overflows per year; and, will be a significant improvement from the current average of thirty (30) overflows per year.

**Option B** consists of the construction of one or more storage facilities that will temporarily store sanitary and combined sewer flows during wet weather events to minimize the number of discharges to local rivers. The exact size and location of the storage facilities and any ancillary works will be determined during subsequent phases of this project. The scope of Option B as presented in fall 2009 has been modified to allow for consideration of the needs of growth, system redundancy, and stormwater management, where cost effective to do so.

The CSO Storage Project is being carried out as a **Schedule C project** in accordance with the requirements of the *Municipal Class Environmental Assessment, 2007*, which is an approved process under the *Environmental Assessment Act*. Public comment are welcome throughout the assessment process, will be collected in accordance with the Act, and will become part of the public record (with the exception of personal information).

Consideration of Option B as the preferred level of service will occur at a **Public Meeting of the Planning & Environment Committee (PEC)** on February 9, 2010. The public is invited to attend and make presentation to the Committee on the preferred level of CSO control to be pursued under this environmental assessment (EA).

Time: 9:30 am to 1:30 pm  
Date: February 09, 2010  
Location: Planning and Environment Committee  
City Hall, Champlain Room  
110 Laurier Avenue West.

Following consideration by PEC, the matter will be elevated to Council for approval of a preferred level of CSO control (i.e. the “Problem Definition” for the EA). Thereafter, the **CSO Storage Project** will proceed through the remaining phases of the Class EA process to allow for project implementation by 2015.

For further information, please contact:

Sally McIntyre  
Program Manager  
Environmental Programs  
riverplan@ottawa.ca  
613-580-2424 ext. 23307

# VILLE D'OTTAWA

## ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE

### Projet de stockage des SEU AVIS DE RÉUNION PUBLIQUE

À l'heure actuelle, **les surverses d'égouts unitaires (SEU)** qui se font en direction de la rivière des Outaouais ne répondent pas aux critères provinciaux de contrôle des SEU. Trois options pour assurer leur conformité ont été présentées lors de séances « portes ouvertes » tenues vers la fin de 2009 dans le cadre des consultations portant sur le Plan d'action pour la rivière des Outaouais.

À la suite des analyses effectuées et à la lumière des réactions de la communauté, le personnel municipal recommande au Conseil de retenir **l'option B**. L'option B représente un niveau de contrôle des SEU équivalant à aucun (0) SEU pendant la saison de la baignade d'une « année moyenne ». Ce niveau de service est plus contraignant que l'exigence provinciale, à savoir deux (2) SEU par année, et constitue une amélioration notable par rapport à la moyenne actuelle de trente (30) SEU par année.

**L'option B** comporte la construction d'une ou de plusieurs installations de stockage dans lesquelles seront retenues temporairement les eaux des égouts sanitaires et unitaires pendant les périodes de fortes précipitations afin de réduire au minimum le nombre de déversements dans les rivières locales. La taille et l'emplacement des installations de stockage et des ouvrages accessoires seront déterminés au cours des étapes ultérieures du projet. La portée de l'option B présentée à l'automne de 2009 a été modifiée pour pouvoir faire entrer en ligne de compte les besoins de croissance, la redondance de système et la gestion des eaux pluviales, dans les cas où cela permettrait des économies.

Le projet de stockage des SEU est mené sous le régime de **l'annexe C des Lignes directrices sur les évaluations environnementales municipales de portée générale (2007)**, qui est un processus répondant aux exigences de la **Loi sur les évaluations environnementales**. Le public est invité à présenter ses commentaires tout au long du processus de planification; ces commentaires seront recueillis conformément à la Loi et seront du domaine public (exception faite des renseignements personnels).

L'examen de l'option B en tant que niveau de service recommandé se fera à la **réunion publique du Comité de l'urbanisme et de l'environnement (CUE) le 9 février 2010**. Le public est invité à y assister et à faire des interventions devant le Comité au sujet du niveau de contrôle des SEU qui devrait être visé au cours de cette évaluation environnementale (EE).

Heure : 9 h 30 à 13 h 30

Date : Le 9 février 2010

Lieu : Comité de l'urbanisme et de l'environnement  
Hôtel de ville, salle Champlain  
110, avenue Laurier Ouest

Après examen par le CUE, le dossier sera transmis au Conseil, qui aura à approuver le niveau de contrôle des SEU (soit la « Définition du problème » dans l'EE). Par la suite, le projet de stockage des SEU passera aux étapes suivantes du processus d'EE de portée générale en vue de sa mise en oeuvre d'ici 2015.

Pour de plus amples renseignements, veuillez communiquer avec :

Sally McIntyre

Gestionnaire de programme

Programmes environnementaux

riverplan@ottawa.ca

613-580-2424, poste 23307

**A-2**  
**Project Contact List**

Adopt a River Bank (NGO)  
Bank Street Promenade BIA  
Britannia Yacht Club  
Byward Market BIA  
Canada Lands Corporation  
Canadian Environmental Assessment Agency  
Canadian Environmental Network (NGO)  
Canadian Parks & Recreation  
CanoeKayak Canada  
Capital Cruises  
Central Park Community  
Centretown Citizens Community Association  
CH2MHILL  
City Centre Coalition (Residents Association)  
City of Gatineau  
City of Ottawa  
Councillor Mathieu Fleury  
Councillor Monette's Office  
Downtown Rideau BIA  
Eastern Ottawa CoC  
Environment Canada  
Federal Heritage Building Review Office  
Fisheries and Oceans Canada  
Friends of Bytown  
Friends of Petrie Island  
Friends of the Rideau  
Greenspace Alliance of Canada's Capital (NGO)  
Haunted Walks Inc.  
Hydro Ottawa  
Lady Dive Amphibus  
Landowner Resource Centre  
Le Conseil régional de l'environnement et du développement durable de l'Outaouais  
Le Regroupement des gens d'affaires de la Capital  
Lowertown Community Association  
LRT Office  
Ministry of Aboriginal Affairs  
Ministry of Environment  
Ministry of Municipal Affairs and Housing  
Ministry of Natural Resources  
Ministry of Tourism and Culture  
National Arts Centre  
National Capital Business Alliance  
National Capital Commission  
Nature Conservancy of Ottawa  
Ontario Environmental Network (linked to the Cdn. Env. Ntwk)  
Ottawa Chamber of Commerce  
Ottawa New Edinburg Club (Yacht)

Ottawa Region Landlords Association (NGO)  
Ottawa River Canoe Club  
Ottawa River Institute  
Ottawa River Keeper  
Ottawa River Runners  
Ottawa Rowing Club  
Ottawa Taxpayer Advocacy Group  
Paddle Canada  
Parks Canada  
Pauls Boat Lines Ltd.  
Preston Street BIA  
Public Works and Government Services Canada  
Rideau CoC  
Rideau Valley Conservation Authority  
River Management Society  
Rockcliffe Park Residents Association: Environment Committee  
Somerset Street Chinatown BIA  
Somerset Village BIA  
Sparks Street BIA  
The Heritage Canada Foundation (NGO)  
The Ottawa Field-Naturalists' Club  
University of Ottawa  
Vanier BIA  
Water, Soil, Air Environmental Advisory Council (NGO)  
Westboro Beach Community Association

**A-3**  
**Letters to Agencies &**  
**Stakeholder Groups**



February 19, 2010

**Reference: Ottawa CSO Storage EA and Functional Design Project**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. Your organization has been identified as having an interest in the project. The purpose of this letter is to inform you of the project, invite your participation in upcoming consultation, and request submissions outlining any comments, concerns or additional information that you or your organization may have regarding the proposed project.

The information below provides further information on the project background and consultation process. Should you require further information or wish to meet prior to upcoming public information sessions, please do not hesitate to contact the undersigned.

Comments and information regarding this project are being collected to assist in meeting the requirements of the EA process. These comments will be maintained for reference throughout the project and will become part of the Public Record. Your responses may be provided by letter or by e-mail, and we would be happy to meet with your organisation to discuss the project. Should you or your organization decline to attend public meetings, please indicate whether you want to continue to receive correspondence on this project. If we do not receive any response to this request, for the purpose of documentation in the report, "no issues or concerns identified" will be recorded.

**Background**

As you know, CSOs to the Ottawa River do not meet all provincial CSO control targets. The City's Ottawa River Action Plan (ORAP) is a working plan to protect water quality in the Ottawa River, and includes a plan to control CSOs beyond regulatory compliance levels. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements. As such, the CSO Storage Project has been identified as a preferred alternative under ORAP, which includes 17 projects to address stormwater and wastewater discharges to the Ottawa River.

City Of Ottawa  
Infrastructure Services and Community  
Sustainability  
Infrastructure Services  
100 Constellation Crescent, 6E-26-61  
Ottawa, Ontario, K2G 6J8  
Tel. : 613-580-2424

Ville d'Ottawa  
Services d'infrastructure et Viabilité des  
collectivités  
Services des infrastructures  
100, croissant Constellation, 6E-26-61  
Ottawa (Ontario) K2G 6J8  
Tél. : 613-580-2424

The City of Ottawa has been conducting public consultation on the ORAP in accordance with the Municipal Class EA master planning requirements since the fall of 2009. The Notice of Commencement for the CSO Storage project was issued as part of this process and is hereby attached. As one of the 17 projects identified in the ORAP, the CSO Storage Project will identify and develop, in form and function, the preferred alternative for providing additional storage to reduce CSOs within the Ultimate Combined Sewer Area (shown on the attached Figure) and attain the targets identified as part of the ORAP, as endorsed by City Council (City Council endorsement pending). The CSO Storage project will be designed to provide a level of protection that, at minimum, achieves the "Beach Protection" requirements defined within Section 9 of the Ministry of Environment's Procedure F-5-5. It is also identified as a cost-effective means of enhancing CSO control beyond regulatory compliance, and thus meet the City's policy of having zero CSO in an average year.

### **EA Process**

The EA study and consultation program will be undertaken to conform to the Municipal Class EA Phase 2 requirements. At this stage of the EA process, alternative solutions are being identified and a preferred solution will be selected, taking into account public and regulatory agency input.

Public open houses (3) are planned to be held at key milestones of the project. An advertisement in the local newspapers (Ottawa Citizen and Le Droit) will announce the date, time and location of the open houses.

All information, comments and questions may be directed to:

#### **On the CSO Storage Project:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: Louis.Julien@ottawa.ca

#### **On the EA Process:**

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: Loretta.Hardwick@stantec.com

Sincerely,

Louis Julien, P.Eng.  
Project Manager

Attachment: Notice of Commencement  
Ultimate Combined Sewer Area & Current Status of Separation Program

**CITY OF OTTAWA  
CLASS ENVIRONMENTAL ASSESSMENT  
CSO Storage Project  
NOTICE OF PUBLIC MEETING**

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The CSO Storage Project is being carried out as a **Schedule C project** in accordance with the requirements of the *Municipal Class Environmental Assessment, 2007*, which is an approved process under the *Environmental Assessment Act*. Public comment are welcome throughout the assessment process, will be collected in accordance with the Act, and will become part of the public record (with the exception of personal information).

Consideration of Option B as the preferred level of service will occur at a **Public Meeting of the Planning & Environment Committee (PEC)** on February 9, 2010. The public is invited to attend and make presentation to the Committee on the preferred level of CSO control to be pursued under this environmental assessment (EA).

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For further information, please contact:

Sally McIntyre  
Program Manager  
Environmental Programs  
riverplan@ottawa.ca  
613-580-2424 ext. 23307

**CITY OF OTTAWA**  
**CLASS ENVIRONMENTAL ASSESSMENT**  
**OTTAWA RIVER ACTION PLAN (MASTER PLAN)**  
**AND CSO CONTROL STUDY**

**NOTICE OF STUDY COMMENCEMENT /**  
**NOTICE OF PUBLIC OPEN HOUSE**

**Presentation at 6:30 p.m.**

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Lansdowne Park, Salon E 1015 Bank Street	Ron Kolbus Lakeside Centre, Britannia Park	Nepean Sportsplex Halls C & D 1701 Woodroffe Avenue	Royal Canadian Legion Branch 632 (Orleans) 800 Taylor Creek Drive

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**Upon completion of Phase 1 of the EA**, the *CSO Control Study* will immediately proceed through the remaining phases of the class EA process under separate study, to allow for implementation by 2014. Upon completion of Phase 2 of this study, a Master Plan document will be prepared that will establish the long-term plan for improving the Ottawa River watershed. The draft Master Plan will be available to the public for comment prior to approval by Council.

For more information, or if you wish to be placed on the study's mailing list, please contact:

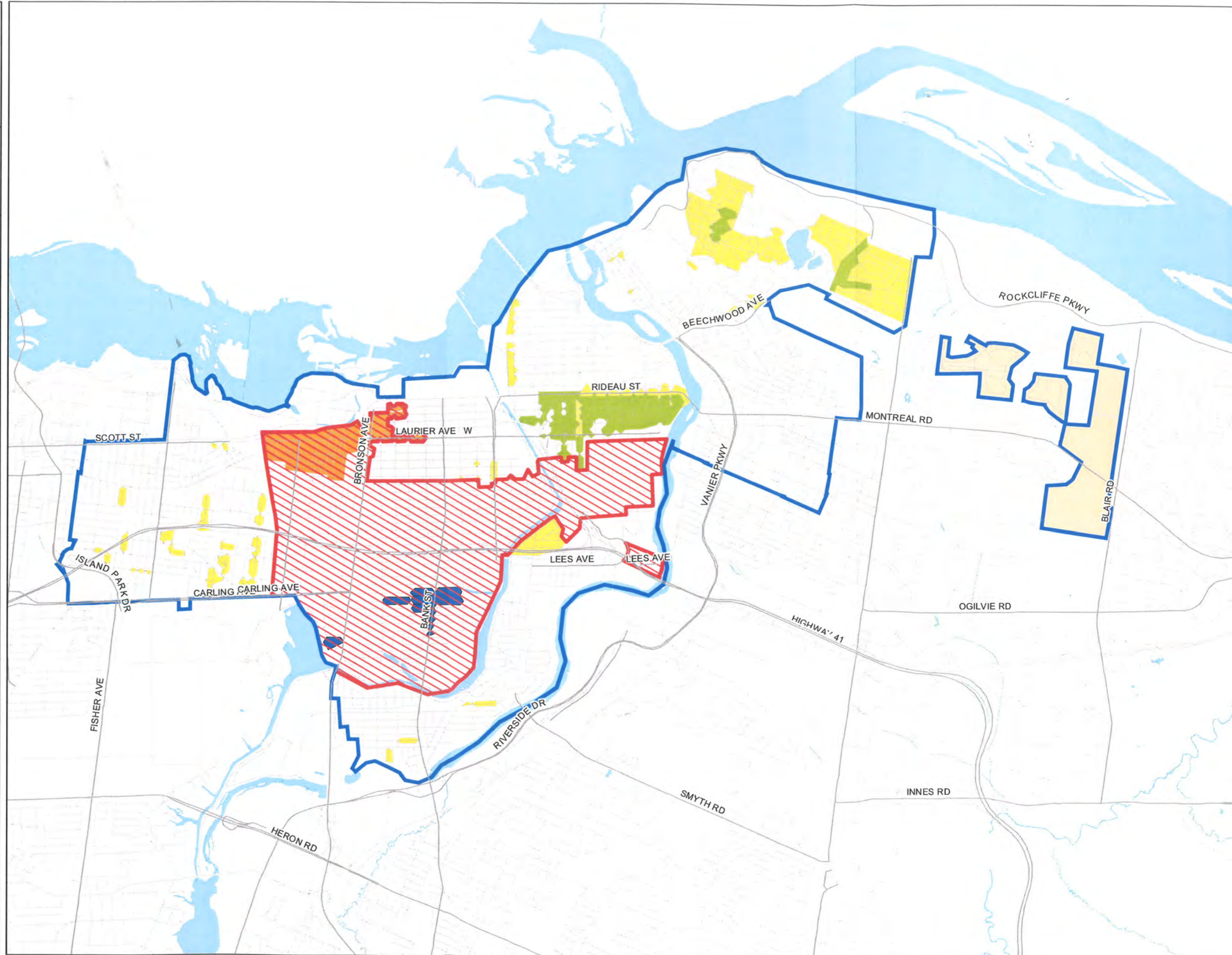
Sally McIntyre  
 Program Manager  
 Environmental Programs  
 Sally.mcintyre@ottawa.ca  
 (613) 580-2424 ext. 23307

**ULTIMATE COMBINED SEWER AREA &  
CURRENT STATUS OF SEPARATION PROGRAM  
(END of 2008)**



**Legend**

- Original Combined Sewer Area
- Ultimate Combined Sewer Area (UCSA)
- Separated Areas Within UCSA
  
- Combined Areas Still Awaiting Separation**
- Separated but Still Drains to Combined
- Planned for Future Separation
- Federal Jurisdiction (combined)
- Separation Potential Under Investigation



**Department of Public Works and Services**

This map was compiled from existing & collected engineering information from the City of Ottawa Geographic Information System and is protected by copyright. The location of Infrastructure is approximate.





File Number W08-11-09-CSOS

February 19, 2010

**Reference: Ottawa CSO Storage EA and Functional Design Project**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. Your organization has been identified as a government department or regulatory agency with potential interest in the project. The purpose of this letter is to inform you of the project, invite your participation in upcoming consultation, and request submissions outlining any comments, concerns or additional information that you or your organization may have regarding the proposed project.

As a public agency that could be directly impacted by the proposed works, we have identified a need to directly consult with you through the process of the development of the preferred solution. As some of the proposed alternative solutions involve public lands administered by various jurisdictions (i.e., City of Ottawa, National Capital Commission, Public Works and Government Services Canada, Parks Canada) it is important that your input be provided early in the process. The first consultation meeting is scheduled for the afternoon of March 9, 2010. At this meeting, we will review the project's objectives, our proposed evaluation criteria as well as the potential CSO storage solutions. We would appreciate a confirmation of your attendance by no later than February 19, 2010. Should you be unable to attend the meeting, we would appreciate it if you could identify and confirm a delegate who can attend. We would appreciate it if you could also identify any other representatives from your agency that you feel should be in attendance.

Upon confirmation of the meeting location, you will be sent a follow up letter, along with a project briefing package. Should you require further information prior to this meeting, please do not hesitate to contact the undersigned.

**Background**

Currently, CSOs to the Ottawa River do not meet all provincial CSO control targets. The City's Ottawa River Action Plan (ORAP) is a working plan to protect water quality in the Ottawa River, and includes a plan to control CSOs beyond regulatory compliance levels. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements. As such, the CSO Storage Project has been identified as a preferred alternative under ORAP, which includes 17 projects to address stormwater and wastewater discharges to the Ottawa River.

City Of Ottawa  
Infrastructure Services and Community  
Sustainability  
Infrastructure Services  
100 Constellation Crescent, 6E-26-61  
Ottawa, Ontario, K2G 6J8  
Tel. : 613-580-2424

Ville d'Ottawa  
Services d'infrastructure et Viabilité des  
collectivités  
Services des infrastructures  
100, croissant Constellation, 6E-26-61  
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The City of Ottawa has been conducting public consultation on the ORAP in accordance with the Municipal Class EA master planning requirements since the fall of 2009. The Notice of Commencement for the CSO Storage project was issued as part of this process and is hereby attached. As one of the 17 projects identified in the ORAP, the CSO Storage Project will identify and develop, in form and function, the preferred alternative for providing additional storage to reduce CSOs within the Ultimate Combined Sewer Area (shown on the attached Figure) and attain the targets identified as part of the ORAP, as endorsed by City Council (City Council endorsement pending). The CSO Storage project will be designed to provide a level of protection that, at minimum, achieves the "Beach Protection" requirements defined within Section 9 of the Ministry of Environment's Procedure F-5-5. It is also identified as a cost-effective means of enhancing CSO control beyond regulatory compliance, and thus meet the City's policy of having zero CSO in an average year.

### EA Process

The EA study and consultation program will be undertaken to conform to the Municipal Class EA Phase 2 requirements. At this stage of the EA process, alternative solutions are being identified and a preferred solution will be selected, taking into account public and regulatory agency input.

Public open houses (3) are planned to be held at key milestones of the project. An advertisement in the local newspapers (Ottawa Citizen and Le Droit) will announce the date, time and location of the open houses.

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All information, comments and questions may be directed to:

#### On the CSO Storage Project:

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: Louis.Julien@ottawa.ca

#### On the EA Process:

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: Loretta.Hardwick@stantec.com

Sincerely,

  
Louis Julien, P.Eng.  
Project Manager

Attachment: Notice of Commencement  
Ultimate Combined Sewer Area & Current Status of Separation Program

**CITY OF OTTAWA  
CLASS ENVIRONMENTAL ASSESSMENT  
CSO Storage Project  
NOTICE OF PUBLIC MEETING**

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As a result of analysis carried out and feedback from the community, City staff recommends that Council endorse **Option B**. Option B represents a level of CSO control equivalent to “zero (0) combined sewer overflows (CSO) per year during the swimming season in the “average year”. This service level is more stringent than the provincial requirement of two (2) combined sewer overflows per year; and, will be a significant improvement from the current average of thirty (30) overflows per year.

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Time: 9:30 am to 1:30 pm  
Date: February 09, 2010  
Location: Planning and Environment Committee  
City Hall, Champlain Room  
110 Laurier Avenue West.

Following consideration by PEC, the matter will be elevated to Council for approval of a preferred level of CSO control (i.e. the “Problem Definition” for the EA). Thereafter, the *CSO Storage Project* will proceed through the remaining phases of the Class EA process to allow for project implementation by 2015.

For further information, please contact:

Sally McIntyre  
Program Manager  
Environmental Programs  
riverplan@ottawa.ca  
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**CITY OF OTTAWA**  
**CLASS ENVIRONMENTAL ASSESSMENT**  
**OTTAWA RIVER ACTION PLAN (MASTER PLAN)**  
**AND CSO CONTROL STUDY**  
**NOTICE OF STUDY COMMENCEMENT /**  
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**Presentation at 6:30 p.m.**

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**Public Information Sessions** have been arranged to provide the public with an opportunity to review the CSO Control options being considered, and to discuss their relative costs and benefits to the community. Evaluation criteria were developed and applied to determine how well each option meets the social, environmental and financial policies of the City, which will be presented and discussed with the public.

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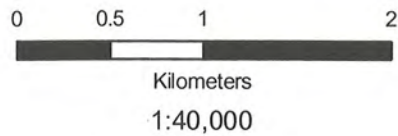
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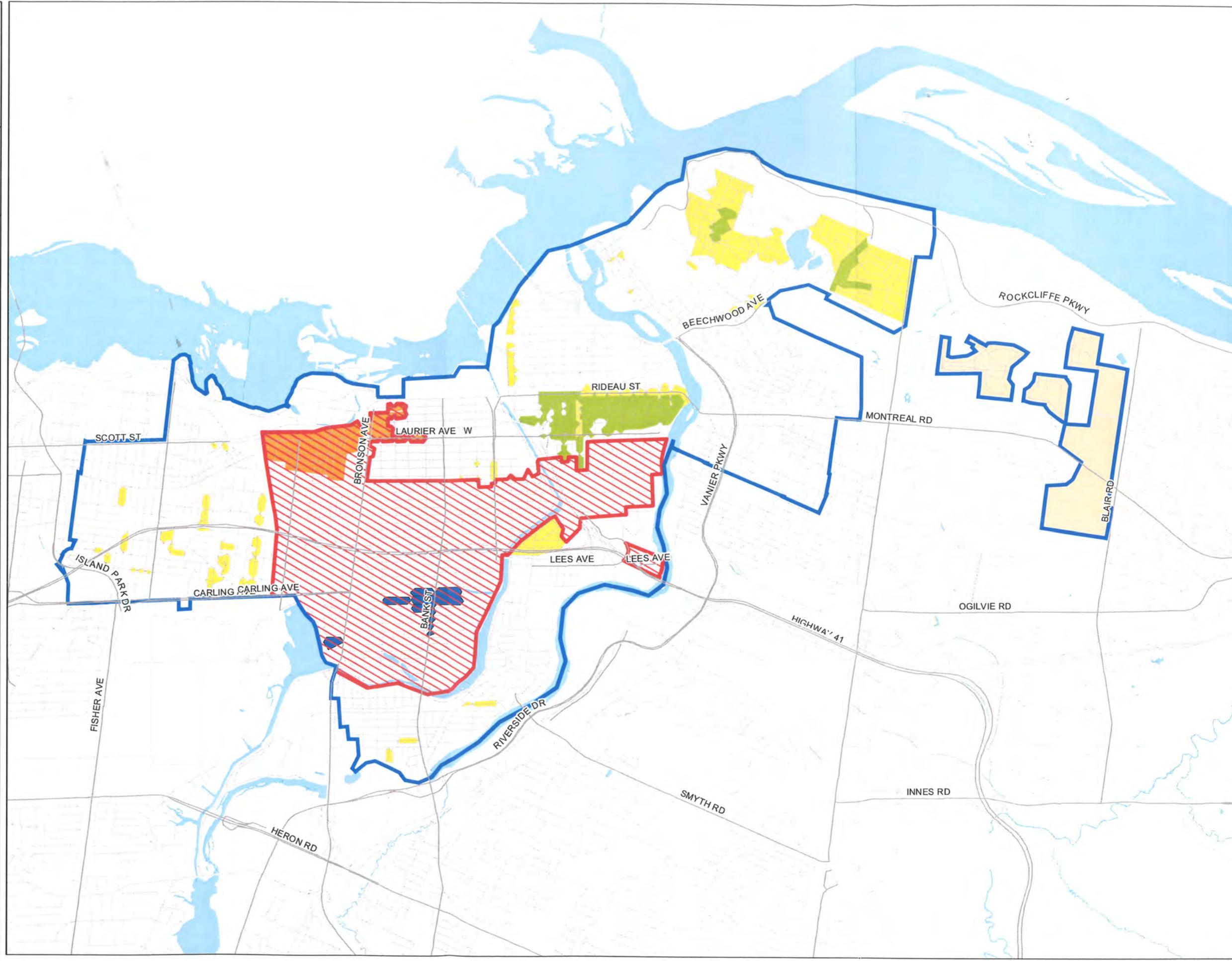
Sally McIntyre  
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**ULTIMATE COMBINED SEWER AREA &  
CURRENT STATUS OF SEPARATION PROGRAM  
(END of 2008)**



**Legend**

- Original Combined Sewer Area
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**Department of Public Works and Services**

This map was compiled from existing & collected engineering information from the City of Ottawa Geographic Information System and is protected by copyright. The location of Infrastructure is approximate.



**A-4**  
**Letters to First Nations**



File Number

February 11, 2010

Heather Levecque  
Manager Consultation Unit  
Ministry of Aboriginal Affairs  
9<sup>th</sup> Floor  
160 Bloor Street East  
Toronto, Ontario, M7A 2E6

Dear Ms. Levecque:

**Reference: Ottawa CSO Storage EA and Functional Design Project**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. Your organization has been identified as a government department or regulatory agency with potential interest in the project. The purpose of this letter is to inform you of the project, invite your participation in upcoming consultation, and request submissions outlining any comments, concerns or additional information that you or your organization may have regarding the proposed project.

As a public agency that may have expertise to offer regarding this EA, we have identified a need to consult with you through the process of the development of the preferred solution. The information below provides further information on the project background and consultation process. Should you require further information or wish to meet prior to upcoming public information sessions, please do not hesitate to contact the undersigned.

Comments and information regarding this project are being collected to assist in meeting the requirements of the EA process. These comments will be maintained for reference throughout the project and will become part of the Public Record. Your responses may be provided by letter or by e-mail. Should you or your organization decline to attend public meetings, please indicate whether you want to continue to receive correspondence on this project. If we do not receive any response to this request, for the purpose of documentation in the report, "no issues or concerns identified" will be recorded.

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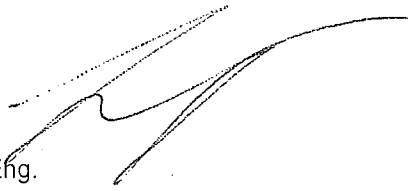
#### On the CSO Storage Project:

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
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Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
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Attachment: Notice of Commencement  
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CLASS ENVIRONMENTAL ASSESSMENT  
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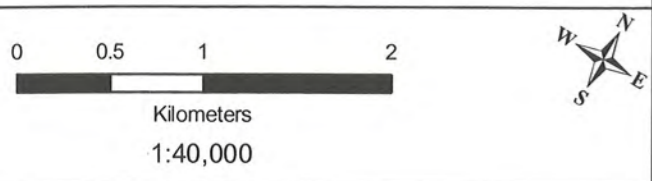
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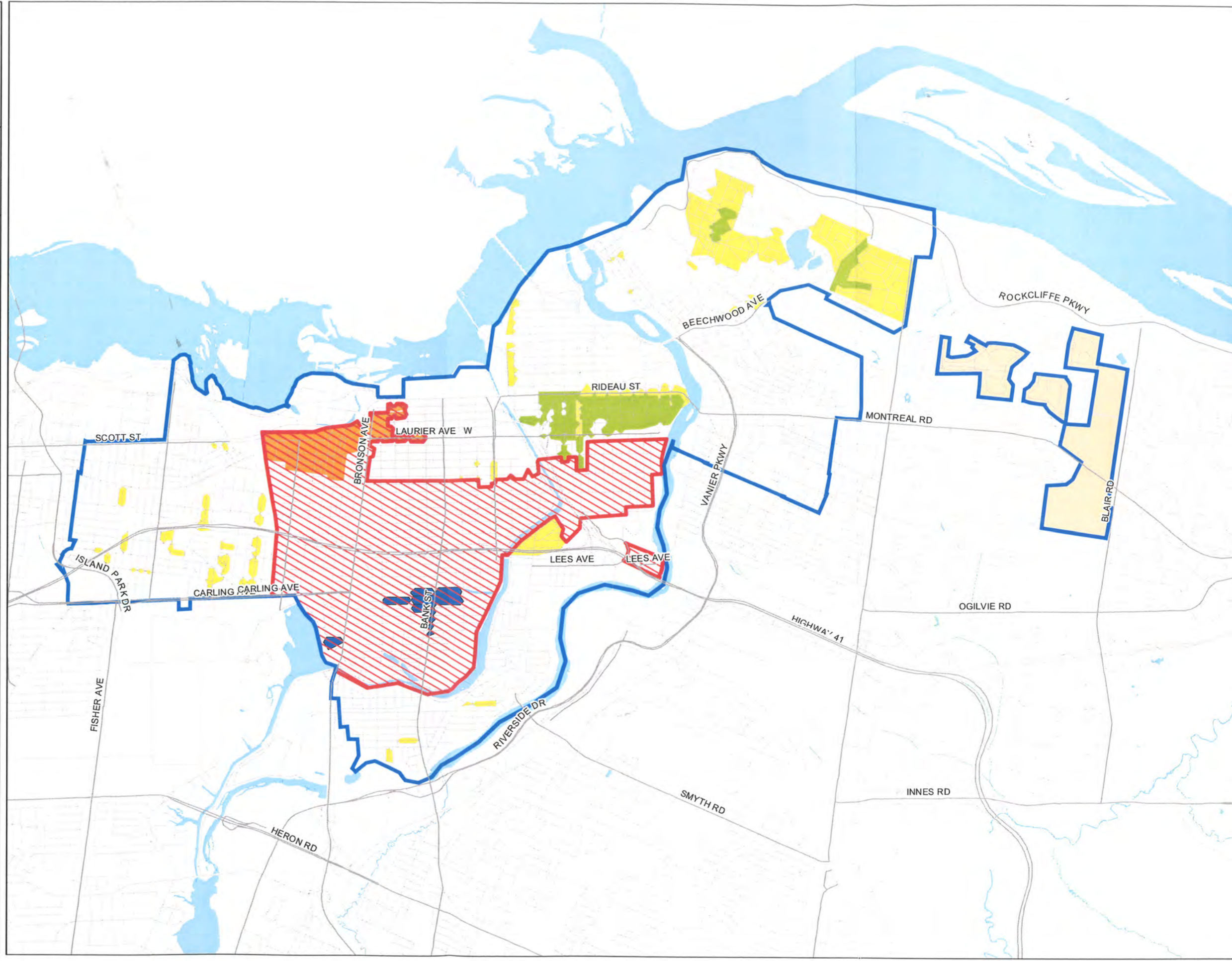
Sally McIntyre  
Program Manager  
Environmental Programs  
Sally.mcintyre@ottawa.ca  
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**ULTIMATE COMBINED SEWER AREA &  
CURRENT STATUS OF SEPARATION PROGRAM  
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**Legend**

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**Department of Public Works and Services**  
 This map was compiled from existing & collected engineering information from the City of Ottawa Geographic Information System and is protected by copyright. The location of Infrastructure is approximate.



Melanie Paradis  
Métis Consultation Unit  
Métis Nation of Ontario  
500 Old St. Patrick St., Unit D  
Ottawa, ON K1N 9G4

March 18, 2010

Dear Ms. Paradis:

**Reference: Ottawa CSO Storage EA and Functional Design Project**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. Your organization has been identified as one with potential interest in the project. The purpose of this letter is to inform you of the project, invite your participation in upcoming consultation, and request submissions outlining any comments, concerns or additional information that you or your organization may have regarding the proposed project.

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louis.julien@ottawa.ca

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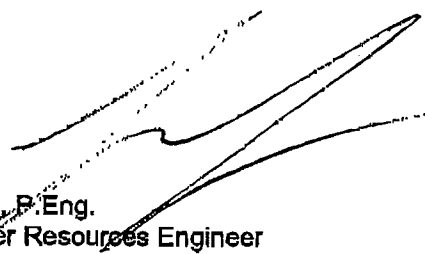
#### **On the CSO Storage Project:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
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Phone: 613-580-2424 ext 21504  
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Loretta Hardwick, Project Consultant  
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Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

Sincerely,



Louis Julien, P.Eng.  
Senior Water Resources Engineer

Attachment: Notice of Public Open House  
Ultimate Combined Sewer Area & Current Status of Separation Program



Jim Hunton  
Algonquins of Ontario  
Consultation Office  
31 Riverside Drive, Suite 101  
Pembroke, ON K8A 8R6

March 18, 2010

Dear Mr. Hunton

**Reference: Ottawa CSO Storage EA and Functional Design Project**

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Fax: 613-560-6068  
Email: Louis.Julien@ottawa.ca

#### **On the EA Process:**

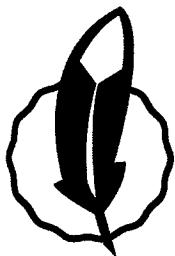
Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: Loretta.Hardwick@stantec.com

Sincerely,



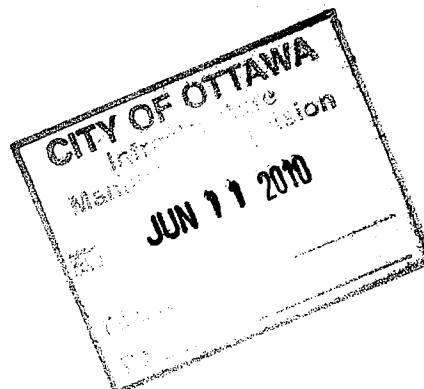
Louis Julien, P.Eng.  
Senior Water Resources Engineer

Attachment: Notice of Public Open House  
Ultimate Combined Sewer Area & Current Status of Separation Program



# Algonquins of Ontario

June 1, 2010



City of Ottawa  
Infrastructure Services Department  
Asset Management Branch  
100 Constellation Crescent, 6<sup>th</sup> Floor  
Ottawa, ON K2G 6J8

Attention: Louis Julien, P.Eng.  
Senior Water Resources Engineer

Subject: **Ottawa Combined Sewer Overflow (CSO) Storage Facility**  
**Our Project No.: 2107378 (CP 183)**

Dear Mr. Julien:

This is to acknowledge your notice of commencement for the Environmental Assessment (EA) and Functional Design for the proposed Combined Sewer Overflow Storage Facility.

The Algonquins of Ontario (AOO) have a fundamental interest in the protection of water quality in the Ottawa River and we look forward to receiving additional information as the EA process is advanced.

Yours truly,

J. E. Hunton, MCIP, RPP

JEH/jr



Gilbert Whiteduck  
Chief, Kitigan Zibi Anishinabeg  
PO Box 309  
1 Paganakomin Mikan  
Maniwaki, QC J9E 3C9

March 18, 2010

Dear Mr. Whiteduck:

**Reference: Ottawa CSO Storage EA and Functional Design Project**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. Your organization has been identified as one with potential interest in the project. The purpose of this letter is to inform you of the project, invite your participation in upcoming consultation, and request submissions outlining any comments, concerns or additional information that you or your organization may have regarding the proposed project.

The information below provides further information on the project background and consultation process. Should you require further information or wish to meet prior to upcoming public information sessions, please do not hesitate to contact the undersigned.

Comments and information regarding this project are being collected to assist in meeting the requirements of the EA process. These comments will be maintained for reference throughout the project and will become part of the Public Record. Your responses may be provided by letter or by e-mail. Should you or your organization decline to attend public meetings, please indicate whether you want to continue to receive correspondence on this project. If we do not receive any response to this request, for the purpose of documentation in the report, "no issues or concerns identified" will be recorded.

### **Background**

Currently, CSOs to the Ottawa River do not meet all provincial CSO control targets. The City's Ottawa River Action Plan (ORAP) is a working plan to protect water quality in the Ottawa River, and includes a plan to control CSOs beyond regulatory compliance levels. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements. As such, the CSO Storage Project has been identified as a preferred alternative under ORAP, which includes 17 projects to address stormwater and wastewater discharges to the Ottawa River.

The City of Ottawa has been conducting public consultation on the ORAP in accordance with the Municipal Class EA master planning requirements since the fall of 2009. The Notice of Commencement for the CSO Storage project was issued as part of this process and is hereby attached. As one of the 17 projects identified in the ORAP, the CSO Storage Project will identify and develop, in form and function, the preferred alternative for providing additional storage to reduce CSOs within the Ultimate Combined Sewer Area (shown

*Shaping our future together  
Ensemble, formons notre avenir*

City of Ottawa  
Infrastructure Services Department  
Asset Management Branch  
100 Constellation Crescent, 6<sup>th</sup> Floor  
Ottawa, ON K2G 6J8  
Tel.: (613) 580-2424 ext 21504  
Fax: (613) 560-6068  
louis.julien@ottawa.ca

Ville d'Ottawa  
Services d'infrastructure  
Direction de gestion des biens  
100, croissant Constellation, 6<sup>e</sup> étage  
Ottawa (Ontario) K2G 6J8  
tél.: (613) 580-2424 ext 21504  
télééc.: (613) 560-6068  
louis.julien@ottawa.ca

on the attached Figure) and attain the targets identified as part of the ORAP, as endorsed by City Council. The CSO Storage project will be designed to provide a level of protection that, at minimum, achieves the "Beach Protection" requirements defined within Section 9 of the Ministry of Environment's Procedure F-5-5. It is also identified as a cost-effective means of enhancing CSO control beyond regulatory compliance, and thus meet the City's policy of having zero CSO in an average year.

#### **EA Process**

The EA study and consultation program will be undertaken to conform to the Municipal Class EA Phase 2 requirements. At this stage of the EA process, alternative solutions are being identified and a preferred solution will be selected, taking into account public and regulatory agency input.

Public open houses (3) are planned to be held at key milestones of the project. An advertisement in the local newspapers (Ottawa Citizen and Le Droit) is attached and announces the date, time and location of the open houses.

All information, comments and questions may be directed to:

#### **On the CSO Storage Project:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: Louis.Julien@ottawa.ca

#### **On the EA Process:**

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: Loretta.Hardwick@stantec.com

Sincerely,



Louis Julien, P.Eng  
Senior Water Resources Engineer

Attachment: Notice of Public Open House  
Ultimate Combined Sewer Area & Current Status of Separation Program

## Hardwick, Loretta

---

**From:** Rukavina, Martin (MAA) [Martin.Rukavina@ontario.ca]  
**Sent:** Tuesday, February 23, 2010 12:57 PM  
**To:** Hardwick, Loretta  
**Cc:** Louis.Julien@ottawa.ca; Comeau, Adrien  
**Subject:** RE: Ottawa CSO Storage EA and Functional Design Project (MAA3985DRC-2010-133)

Hi Loretta,  
That was the only group I would have suggested.

Thank you,  
Martin

---

**From:** Hardwick, Loretta [mailto:Loretta.Hardwick@stantec.com]  
**Sent:** February 23, 2010 11:05 AM  
**To:** Rukavina, Martin (MAA)  
**Cc:** Louis.Julien@ottawa.ca; Comeau, Adrien  
**Subject:** RE: Ottawa CSO Storage EA and Functional Design Project (MAA3985DRC-2010-133)

Good morning Mr. Rukavina,

Information on the project and a request for input will be sent to the Algonquins of Ontario through their consultation office in Pembroke. Do you recommend other Aboriginal groups that should also be notified?

Regards,

**Loretta Hardwick**  
Associate, Senior Environmental Scientist  
Stantec  
Ph: (613) 738-6056  
Fx: (613) 738-0721  
Cell: (613) 447-8766  
[loretta.hardwick@stantec.com](mailto:loretta.hardwick@stantec.com)  
[stantec.com](http://stantec.com)

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**From:** Rukavina, Martin (MAA) [mailto:Martin.Rukavina@ontario.ca]  
**Sent:** Monday, February 22, 2010 9:42 AM  
**To:** Louis.Julien@ottawa.ca; Hardwick, Loretta  
**Subject:** Ottawa CSO Storage EA and Functional Design Project (MAA3985DRC-2010-133)

Good Morning:

The Ministry of Aboriginal Affairs received your letter sent on February 11, 2010 to Ms. Heather Levecque. As part of our responsibilities under the Government Review Team, can you please identify what Aboriginal groups have been notified about this project? Your prompt reply would be greatly appreciated.

Thank you,

--

**Martin Rukavina** – Advisor, Relationships

Aboriginal and Ministry Relationships Branch | Aboriginal Relations and Ministry Partnerships Division | Ministry of  
Aboriginal Affairs

Tel: (416) 327-9594 | Fax: (416) 325-1066 | E-mail: [Martin.Rukavina@ontario.ca](mailto:Martin.Rukavina@ontario.ca) | Web: <http://www.ontario.ca/maa>

---

**From:** Gilbert Whiteduck [<mailto:gwhiteduck@hotmail.com>]

**Sent:** 2012/05/31 14:34

**To:** Julien, Louis

**Subject:** RE: Combined Sewage Storage Tunnel Project (Ottawa River Action Plan Project No. 3).

Good afternoon Mr. Julien,

Thank you for the follow-up. It is my belief that a meeting following the receipt of the documentation could prove to be helpful. I do not have dates to suggest but we could revisit a possible meeting date by mid-June.

Chief Gilbert W. Whiteduck  
KZA

---

**From:** [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**To:** [gwhiteduck@hotmail.com](mailto:gwhiteduck@hotmail.com)

**CC:** [Jennifer.Carreira@ottawa.ca](mailto:Jennifer.Carreira@ottawa.ca); [Sarah.Rogers@stantec.com](mailto:Sarah.Rogers@stantec.com)

**Subject:** Combined Sewage Storage Tunnel Project (Ottawa River Action Plan Project No. 3).

**Date:** Thu, 31 May 2012 18:28:58 +0000

Chief Whiteduck,

We will be holding our third and final Public Open House for the Environmental Assessment of the above-noted project on June 26th, from 6:30pm to 9:00pm, at Jean Piggott Place inside City Hall (110 Laurier West). We have not yet advertised this Public Open House; however, given your interest in the project and the fact that you live some distance from Ottawa, we want to give you advance notice about his event.

We are preparing an information package that we will send soon to stakeholders. You may expect to receive this in the next 10-15 days, by regular mail. If you wish, we would be pleased to send the information electronically as well.

We also remain willing to meet with you at a mutually agreeable time, as was expressed in March/April 2011. Should you wish to meet, please suggest a few dates/times.

Finally, Chief Whiteduck, thank you for your interest in this project. We hope that your support for this project will help make it a reality soon, to the ultimate benefit of the Ottawa River and all communities that enjoy and depend on it.

We look forward to seeing you or your representative at the Public Open House on Jun 26th.

Sincerely,

Louis Julien, P.Eng.  
Senior Water Resources Engineer  
Infrastructure Services & Community Sustainability  
Infrastructure Services Department  
100 Constellation Crescent, 6th Floor East; Ottawa ON K2G 6J8

**Rogers, Sarah**

---

**From:** Janet Stavinga (Algonquins of Ontario) <jstavinga@nrtco.net>  
**Sent:** Wednesday, June 13, 2012 6:13 PM  
**To:** 'Carreira, Jennifer'  
**Cc:** 'Schepers, Nancy'; 'Swail, Chris'; 'Gonthier, Alain'; 'Julien, Louis'; Rogers, Sarah  
**Subject:** RE: Combined Sewage Storage Tunnel (CSST) Project - Ottawa River Action Plan Project No. 3

Good evening Jennifer,

Thank you for your follow up message as well as your kind offer for City staff to meet with the AOO, if required.

I will update the AOO and let you know if we require a more detailed briefing.

Thank you once again.

**Janet Stavinga**  
Executive Director

---

**Algonquins of Ontario Consultation Office**

31 Riverside Drive, Suite 101  
Pembroke, ON K8A 8R6  
Tel: 613-735-3759 ext 202  
Fax: 613-735-6307  
Email: [jstavinga@nrtco.net](mailto:jstavinga@nrtco.net)  
Website: [www.tanakiwin.com](http://www.tanakiwin.com)

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**From:** Carreira, Jennifer [mailto:Jennifer.Carreira@ottawa.ca]  
**Sent:** June-13-12 4:34 PM  
**To:** Janet Stavinga (Algonquins of Ontario)  
**Cc:** Schepers, Nancy; Swail, Chris; Gonthier, Alain; Julien, Louis; Rogers, Sarah  
**Subject:** RE: Combined Sewage Storage Tunnel (CSST) Project - Ottawa River Action Plan Project No. 3

Hello Janet,

Thank you for your response. I trust the information provided thus far will suit your needs in apprising the Algonquin Negotiation Representatives (ANRs) of this critical project.

With regard to your preference for more direct means of consultation, City staff would be pleased to provide a briefing to the AOO. Of course, this may not be feasible in advance of the Public Open House; regardless, please advise if you would like to schedule a briefing.

Again, thank you for taking the time to highlight the CSST project with the ANRs.

Kind regards,

Jennifer

Jennifer Carreira  
Stakeholder Relations & Outreach  
Deputy City Manager's Office (Planning & Infrastructure)  
City of Ottawa  
110 Laurier Avenue West, Ottawa, ON K1P 1J1  
Office: 613-580-2424 x 21706 | Fax: 613-560-6028  
[Jennifer.Carreira@ottawa.ca](mailto:Jennifer.Carreira@ottawa.ca)

---

**From:** Janet Stavinga (Algonquins of Ontario) [<mailto:jstavinga@nrtco.net>]  
**Sent:** June 12, 2012 8:04 PM  
**To:** Carreira, Jennifer  
**Cc:** Schepers, Nancy; Swail, Chris; Gonthier, Alain; Julien, Louis; [Sarah.Rogers@stantec.com](mailto:Sarah.Rogers@stantec.com)  
**Subject:** RE: Combined Sewage Storage Tunnel (CSST) Project - Ottawa River Action Plan Project No. 3

Good evening Jennifer,

Thank you for advising the Algonquins of Ontario of the upcoming Open House on the above-noted project. I will apprise the Algonquin Negotiation Representatives of the status of this project, although I suspect we will choose not to attend the Open House as we prefer more direct means of consultation.

I do look forward to the information package as we will review these materials further.

Thank you again for keeping us informed.

Best regards,

Janet

**Janet Stavinga**  
Executive Director

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**Algonquins of Ontario Consultation Office**  
31 Riverside Drive, Suite 101  
Pembroke, ON K8A 8R6  
Tel: 613-735-3759 ext 202  
Fax: 613-735-6307  
Email: [jstavinga@nrtco.net](mailto:jstavinga@nrtco.net)  
Website: [www.tanakiwin.com](http://www.tanakiwin.com)

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**From:** Carreira, Jennifer [<mailto:Jennifer.Carreira@ottawa.ca>]  
**Sent:** June-01-12 4:40 PM  
**To:** [jstavinga@nrtco.net](mailto:jstavinga@nrtco.net)  
**Cc:** Schepers, Nancy; Swail, Chris; Gonthier, Alain; Julien, Louis; [Sarah.Rogers@stantec.com](mailto:Sarah.Rogers@stantec.com)  
**Subject:** Combined Sewage Storage Tunnel (CSST) Project - Ottawa River Action Plan Project No. 3

Good afternoon, Janet,

On behalf of Nancy Schepers, I'm contacting you with regard to the above-noted project, the Combined Sewage Storage Tunnel (CSST) – the marquee project of the Ottawa River Action Plan, the City's plan to protect the health of the Ottawa River, ensuring cleaner water, safer beaches and a better environment.

Further to our recent discussion regarding the CSST, please note that the City is moving to finalize the Environmental Assessment (EA). The third and final Public Open House for this project has been scheduled as follows:

Tuesday June 26  
6:30 – 9:00 p.m.  
Presentation at 7:00 p.m.  
Ottawa City Hall – Jean Piggott (110 Laurier Avenue West)

We have not yet advertised this Public Open House; however, given the AOO's interest in the project and the Ottawa River, and the upcoming meeting of the Algonquin Negotiating Representatives, we are offering this advance notice. The official notice will be published in community newspapers on or after June 8<sup>th</sup>, and in the Ottawa Citizen and LeDroit on June 8<sup>th</sup> and 22<sup>nd</sup>.

An information package will be sent soon; in the interim, and for the purposes of discussion during the ANRs' meeting, please find attached advance information on the project.

Janet, thank you for expressing the AOO's interest in this critical project. We hope that the AOO might express its support, and we look forward to seeing you or the AOO's representative at the Public Open House on Jun 26th.

Kind regards,

Jennifer

Jennifer Carreira  
Stakeholder Relations & Outreach  
Deputy City Manager's Office (Planning & Infrastructure)  
City of Ottawa  
110 Laurier Avenue West, Ottawa, ON K1P 1J1  
Office: 613-580-2424 x 21706 | Fax: 613-560-6028  
[Jennifer.Carreira@ottawa.ca](mailto:Jennifer.Carreira@ottawa.ca)

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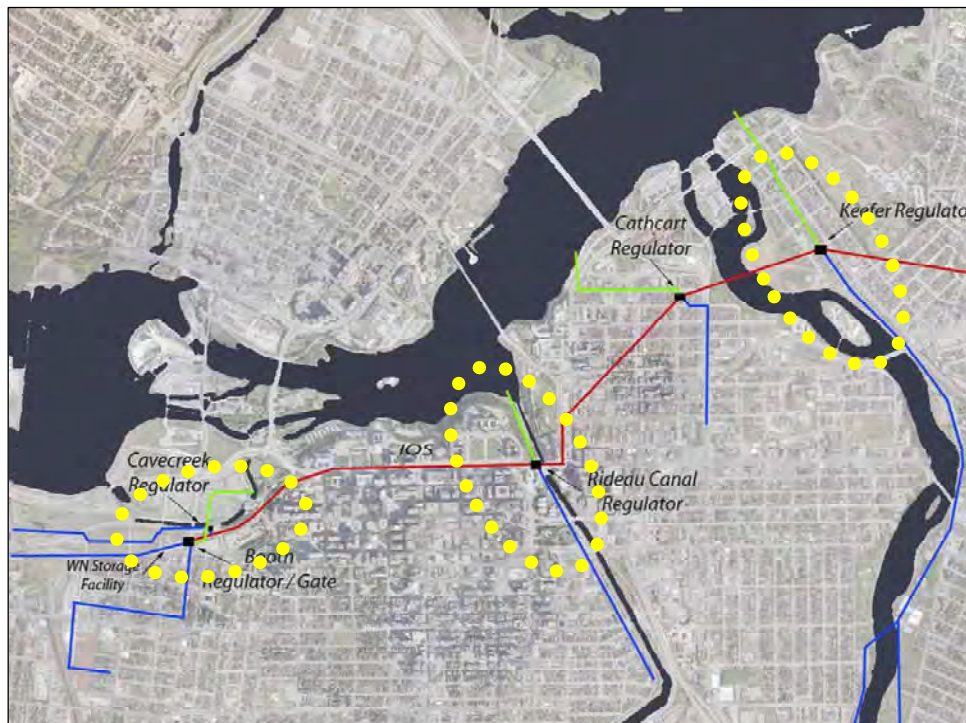
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## 1 Background

The Combined Sewage Storage Tunnel (CSST) Project is one of 17 projects of the Ottawa River Action Plan.

The City's combined sewer areas drain to the Interceptor-Outfall Sewer (IOS). Combined sewers collect and transport sanitary wastewater and stormwater runoff in a single pipe. In dry weather, an interceptor sewer, such as the IOS, captures all of the wastewater flow from the combined sewers and carries it to the wastewater treatment plant. A regulator is a control structure that normally directs sewage from a combined sewer to an interceptor; in wet weather it directs excess combined sewage to a local water body in order to prevent overloading of the interceptor and/or treatment plant and basement flooding. This is called a combined sewer overflow (CSO). Thousands of cities such as London, Paris, New York, Montreal, Toronto, Kingston etc., have combined sewers and CSOs.

Frequent and large CSOs to the River have been identified at three locations: the West End Regulators (Cave Creek and Booth) in the Lebreton Flats area, the Rideau Canal Regulator and the Keefer Regulator. These regulators and the Interceptor-Outfall Sewer (in red) are shown below.



Extensive public consultations held in late 2009 during development of the Ottawa River Action Plan showed that there was a strong desire to limit the

frequency of overflows beyond the provincial target of 2 overflow events during the swimming season of the so-called “Design Year”. The public did not expect complete elimination of CSOs, which is considered unaffordable, but showed strong support to go beyond the provincial target of two overflow events to zero overflow events during the swimming season of the “Design Year”. In February of 2010, City Council instructed staff to achieve this target, with the understanding that there would continue to be overflows during rainfall events that are larger than those of the “Design Year”.

Through development of the Ottawa River Action Plan and the Combined Sewer Area Pollution Prevention and Control Plan, it was determined that the best option to achieve this control target would be to build one or more facilities to store excess combined sewage that would otherwise overflow to the River. When wet weather subsides, the stored sewage would then be returned to the sewer system and from there to the City’s wastewater treatment plant for treatment.

## **2 Environmental Assessment and Functional Design**

This project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007. The Municipal Class EA is divided into five Phases.

### **2.1 Environmental Assessment**

In early 2010, Stantec Consulting Ltd. was hired to complete the Environmental Assessment and Functional Design for the CSST Project. The project is currently nearing the end of Phase 3 (evaluating alternative designs for the recommended preferred alternative solution) and beginning to draft the Environmental Study Report (Phase 4) of the Class EA process, and the functional design is almost complete. The EA phases are summarized schematically on the next page, along with dates when the CSST project reached key milestones.

### **2.2 Public and Stakeholder Consultation**

Public consultation took place twice during Phase 2 at the following project milestones, in accordance with the Class EA process:

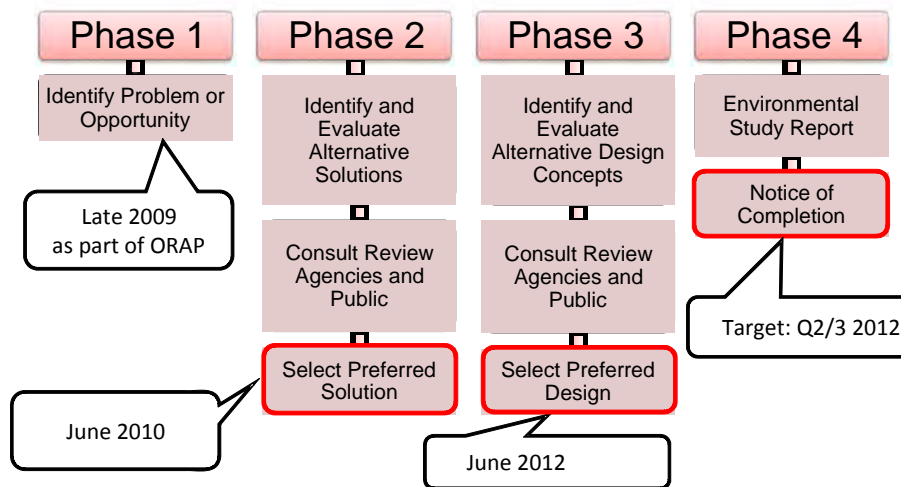
- March/April 2010: presentation of a long list of alternatives, the evaluation criteria and the evaluation methodology. This long list included underground tank options, tunnel options, combinations of tanks and tunnels and in-River Storage.
- June 2010: presentation of the short list of alternative solutions being considered, the evaluation of the alternative solutions and introduction to the recommended preferred alternative solution.

These milestones were also the subject of communications (emails, and/or phone calls, and/or meetings) with potentially affected stakeholders and other interested parties.

One opportunity for public consultation has been planned during Phase 3, which is the current point of the project as previously mentioned. A public open house is being planned for June 26<sup>th</sup> 2012 at City Hall and will include presentation of alternative design concepts for the recommended preferred alternative solution.

Public comments are being collected throughout the study including open houses in accordance with the Class EA Act, and become part of the public record (with the exception of personal information).

### Municipal Class EA Process



### 2.3 Recommended Preferred Alternative Solution

The recommended preferred alternative solution consists of three major components to be implemented in two phases:

- Phase 1:
  - a Core Tunnel, linking the West End Regulators in Lebreton Flats, the Rideau Canal Regulator and the Keefer Regulator
  - a North-South tunnel along Kent Street, interconnected to the Core Tunnel at or near Slater

- Phase 2:
  - an East Tunnel from Keefer Regulator to the Robert O. Pickard Environmental Centre

Together, the two Phase 1 tunnels provide sufficient storage to achieve the mandated CSO control targets. They total over 6km and have an inner diameter of 2.4 to 3.0m. The alignment of both tunnels is shown in the figure at the end of this document.

Preliminary planning-level cost estimate for Phase 1: \$115 to \$150 Million. The implementation schedule is discussed below under “Next Steps”.

During rare, extreme weather, the North-South tunnel component can also be used as a major flood-relief pipe to channel excessive runoff away from flood-prone areas to the Ottawa River.

Phase 2 will provide even more storage and therefore further improve CSO control, and will also greatly enhance system redundancy and operational flexibility. This element cannot be constructed with the currently available funding; it will be constructed when funding is available.

## ***2.4 Functional Design***

The functional design is almost complete. Its purpose is to define the form, function, size, preliminary location and planning-level cost estimates of major components of the twin-tunnel solution, such as:

- the tunnels
- entry/exit points and staging areas for tunnel boring machine(s)
- flow diversion and structures and regulators
- flow diversion sewers
- odour control facilities
- modifications to existing sewers and regulators
- high-level operating strategy and integration with the City’s Real-Time Control system

Population intensification and climate change have been considered in the functional design, in addition to the usual factors such as known geotechnical constraints, conflicts with other utilities and buildings, conflicts with LRT, constructability, etc.

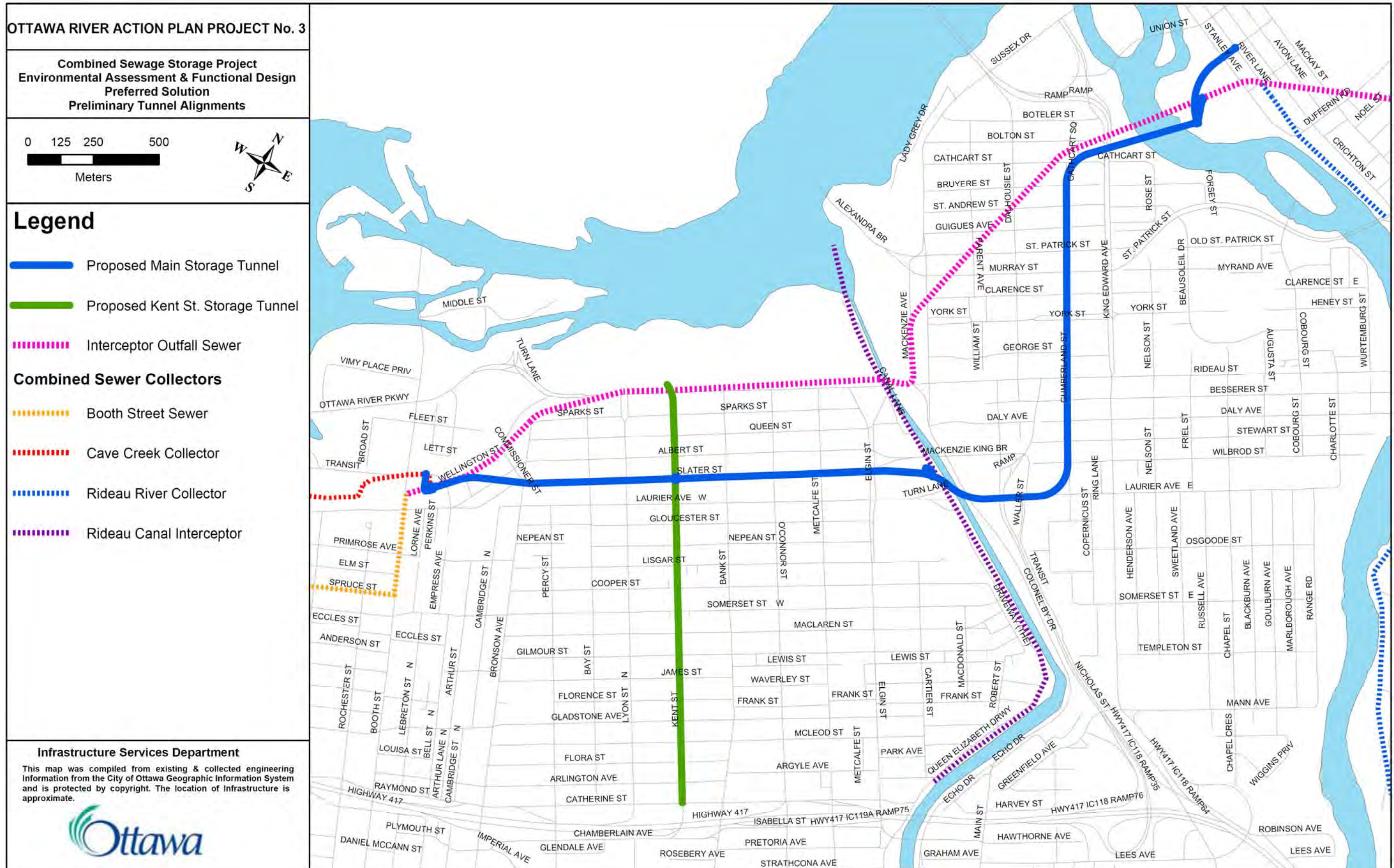


### **3 Next Steps**

Subject to prompt and successful completion of discussions between the City and Federal Departments regarding the use of Federal lands for some components of the project, the project's Environmental Assessment and Functional Design could be completed by late summer 2012. Estimates of the time needed to complete the next steps of the process are presented below:

- Preliminary & Detailed Design ..... Q1/2013
- Tendering and Contract Award..... Q3/2014
- Construction ..... Q1/2015
- Commissioning ..... Q3/2017

The timeline above is to be read with caution given the complexity and scope of this project and the inevitable uncertainties that are to be expected at this stage.



**A-5**  
**City Project Website**

Home > City Hall > Planning, projects and reports > Public consultations > Combined Sewer Overflows

Combined Sewer Overflows

Open House March/April 2009

Open House June 2010

Open House June 2012

## Combined Sewer Overflows

### Combined Sewer Overflow (CSO) Storage Environmental Assessment and Functional Design Project

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport sewage and stormwater runoff in the same pipe. These older systems were designed to overflow when it rains to prevent flooding and basement backups.

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. This is one of seventeen short-term projects included in the City's [Ottawa River Action Plan](#). It is being conducted under the Municipal Class EA process.

When implemented, the project will help to:

- Reduce CSOs from the Ultimate Combined Sewer Area
- Improve water quality in the Ottawa River
- Become fully compliant with Ministry of Environment's Procedure F-5-5

**Why is the project needed?**

Currently, CSOs to the Ottawa River do not meet all provincial CSO control targets. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

**How is the EA study being carried out?**

The EA study and consultation program conform to the Municipal Class EA Phase 2 requirements. At this stage of the EA process, a preferred conceptual design for the recommended solution has been identified, and presented to the public during a **Public Open House** held on June 26, 2012; functional design has begun, and will take into consideration public and regulatory agency input.

**Public comments are welcome.** All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record. Comments are to be sent to the contacts identified below.

**Next Steps in the Project:**

- Review and document input received from the **June 26, 2012 Open House** July 2012
- Confirm the functional design for the preferred alternative solution August 2012
- Complete the Environmental Study Report and post notice of completion (30 day review) September 2012
- Final design of the preferred solution January 2013 to June 2014
- Construction of the preferred solution January 2015 to December 2017
- Commissioning of the storage tunnels January 2018

For more information

If you would like your name added to the study's mailing list, please contact:

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

Sarah Rogers  
Environmental Scientist  
Stantec  
2781 Lancaster Road Suite 200  
Ottawa ON K1B 1A7  
Ph: (613) 738-0708 Ext. 7383235  
[sarah.rogers@stantec.com](mailto:sarah.rogers@stantec.com)



[Home](#) > [City Hall](#) > [Planning, projects and reports](#) > [Public consultations](#) > [Combined Sewer Overflows](#) > [Open House March/April 2009](#)

[Open House March/April 2009](#)

## Open House March/April 2009

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. This project has been identified as a preferred alternative under the Ottawa River Action Plan to become fully compliant with provincial Procedure F-5-5.

**The Process:** This project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007, which is an approved process under the Environmental Assessment Act.

Public Open Houses have been arranged to present the study process, evaluation criteria and methodology, and the alternative solutions being considered, as well as provide the public with an opportunity to discuss the study with the study team and provide input and comment.

[Introduction](#) (pdf 55 KB)

[Project Overview](#) (pdf 59 KB)

[Municipal Class Environmental Assessment Process](#) (pdf 68 KB)

[Consultation](#) (pdf 55 KB)

[Glossary of Terms](#) (pdf 134 KB)

[What Causes Combined Sewer Overflows?](#) (pdf 198 KB)

[Existing Conditions](#) (pdf 148 KB)

[Evolution of Ottawa's Combined Sewer System](#) (pdf 156 KB)

[Alternative Solution 1 – Storage Tanks](#) (pdf 306 KB)

[Alternative Solution 2 – Short Storage Tunnels – part 1](#) (pdf 353 KB)

[Alternative Solution 2 – Short Storage Tunnels – part 2](#) (pdf 360 KB)

[Alternative Solution 3 – Long Storage Tunnels](#) (pdf 343 KB)

[Alternative Solution 4 – Tank/Tunnel Hybrids](#) (pdf 428 KB)

[Alternative Solution 5 – Dunker's System](#) (pdf 228 KB)

[Evaluation Methodology](#) (pdf 47 KB)

[Evaluation Criteria](#) (pdf 63 KB)

[Next Steps in the Project](#) (pdf 43 KB)

### Central

Tuesday March 30

6:30 – 9 p.m.

Presentation at 7:00 p.m.

Tom Brown Arena Hall (2nd Floor)

141 Bayview Rd.

### East

Thursday April 1

6:30 – 9 p.m.

Presentation at 7:00 p.m.

Bob MacQuarrie Recreation Complex: Hall A

1490 Youville Dr., Orléans

**Public comments** are welcome throughout the study and there will be several opportunities to learn more during the course of the study. All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record.



[Home](#) > [City Hall](#) > [Planning, projects and reports](#) > [Public consultations](#) > [Combined Sewer Overflows](#) > [Open House June 2010](#)

Open House June 2010

## Open House June 2010

Open Houses have been held in March/April of 2009 to present the study process, evaluation criteria and methodology, and the alternative solutions being considered, as well as provide the public with an opportunity to discuss the study with the study team and provide input and comment.

A second round of Open Houses have been arranged to present:

- A short list of alternative solutions
- Evaluation of these alternative solutions
- The recommended Preferred Alternative Solution

[Consultation](#) (PDF version 709 KB)

[Evaluation Alternative Solutions All](#) (PDF version 1.1 MB)

[Evaluation Alternative Solution Shortlist](#) (PDF version 1.1 MB)

[Recommended Preferred Solution](#) (PDF version 350 KB)

[Next Steps](#) (PDF version 861 KB)

### East

Tuesday June 15, 2010

6:30 to 9 p.m.

Presentation at 7 p.m.

Shenkman Arts Studio, Music Studio

245 Centrum Boulevard, Orléans

### Central

Wednesday June 16, 2010

6:30 – 9 p.m.

Presentation at 7:00 p.m.

Montgomery Legion 351, Upper Hall

330 Kent Street

**Public comments** are welcome throughout the study and there will be several opportunities to learn more during the course of the study. All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record.



Other City of Ottawa Websites

- [Roads and Transportation](#)
- [Water and Environment](#)
- [Garbage and Recycling](#)
- [Recreation and Culture](#)
- [Health and Safety](#)
- [Licences and Permits](#)
- [Social and Community Services](#)



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[Open House June 2012](#)

## Open House June 2012

[Doors Open June 2012 \[ PDF - 8 MB \]](#)

Permalink: <http://ottawa.ca/e/CAP170403>



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**A-6**  
**EA Phase 2 & 3 Notices**



**CITY OF OTTAWA  
CLASS ENVIRONMENTAL ASSESSMENT  
COMBINED SEWAGE STORAGE PROJECT  
NOTICE OF OPEN HOUSE**

**The City of Ottawa** is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. This project has been identified as a preferred alternative under the *Ottawa River Action Plan* to become fully compliant with provincial *Procedure F-5-5*.

**The Process:** This project is being planned as a Schedule C project in accordance with the requirements of the *Municipal Class Environmental Assessment, 2007*, which is an approved process under the *Environmental Assessment Act*.

A third and final **Open House** has been arranged to present the design alternatives for the recommended preferred solution, as well as provide the public with an opportunity to discuss the study with the study team and provide input and comments.

**Tuesday June 26**

**6:30 – 9 p.m.**

**Presentation at 7 p.m.**

**Ottawa City Hall – Jean Piggott Hall  
110 Laurier Avenue West**

**Public comments** are welcome throughout the study. All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record.

Additional information is available on [ottawa.ca](http://ottawa.ca). For more information, or if you wish to be placed on the study's mailing list, please contact:

**On the CSO Storage Project:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**On the EA Process:**

Sarah Rogers, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-0708 \*3235  
Fax: 613-738-0721  
Email: [Sarah.Rogers@stantec.com](mailto:Sarah.Rogers@stantec.com)

## PUBLIC MEETINGS

All public meetings will be held at Ottawa City Hall, 110 Laurier Avenue West, unless otherwise noted.

For a complete agenda, please visit **Public Meetings and Notices** on [ottawa.ca](http://ottawa.ca) or call 3-1-1.

### Monday, June 11

**Ottawa Public Library Board** – 5 p.m., City Hall (Colonel By Room) – 110 Laurier Avenue West

### Tuesday, June 12

**Planning Committee** – 9:30 a.m., Champlain Room

**Business Advisory Committee** – 3:30 p.m., Colonel By Room

**Poverty Issues Advisory Committee** – 6:30 p.m., Champlain Room

### Wednesday, June 13

**City Council Meeting** – 10 a.m., Andrew S. Haydon Hall

### Thursday, June 14

**Environmental Advisory Committee** – 6:30 p.m., Andrew S. Haydon Hall

**Did you know you can receive e-mail alerts regarding upcoming meetings?**

Sign up today at [ottawa.ca/subscriptions](http://ottawa.ca/subscriptions)

2012-01-6001-16130

## CITY OF OTTAWA CLASS ENVIRONMENTAL ASSESSMENT COMBINED SEWAGE STORAGE PROJECT NOTICE OF OPEN HOUSE

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. This project has been identified as a preferred alternative under the Ottawa River Action Plan to become fully compliant with provincial Procedure F-5-5.

**The Process:** This project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007, which is an approved process under the Environmental Assessment Act.

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**Tuesday June 26**  
**6:30 – 9 p.m.**  
**Presentation at 7 p.m.**  
**Ottawa City Hall – Jean Piggott Hall**  
**110 Laurier Avenue West**

**Public comments** are welcome throughout the study. All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record.

Additional information is available on [ottawa.ca](http://ottawa.ca). For more information, or if you wish to be placed on the study's mailing list, please contact:

On the CSO Storage Project:	On the EA Process:
Louis Julien, Project Manager Infrastructure Services Dept. 100 Constellation Cres. Ottawa, ON K2G 6J8 Phone: 613-580-2424 ext 21504 Fax: 613-560-6068 Email: <a href="mailto:Louis.Julien@ottawa.ca">Louis.Julien@ottawa.ca</a>	Sarah Rogers, Project Consultant Stantec Consulting Ltd. 2781 Lancaster Road, Suite 200 Ottawa, ON K1B 1A7 Phone: 613-738-0708 *3235 Fax: 613-738-0721 Email: <a href="mailto:Sarah.Rogers@stantec.com">Sarah.Rogers@stantec.com</a>

2012-06-7063-16090

## NOTICE OF COMPLETION OF ENVIRONMENTAL PROJECT REPORT WEST TRANSITWAY EXTENSION – BAYSHORE STATION TO MOODIE DRIVE, CITY OF OTTAWA

### The Project

The City of Ottawa has completed an Environmental Project Report in accordance with Ontario Regulation 231/08 for the West Transitway Extension between Bayshore Station and Moodie Drive.

The City of Ottawa is proposing to extend the City's bus rapid transit network (Transitway) from Bayshore Station to west of Moodie Drive. The proposed transit facility will include a fully grade-separated exclusive bus rapid transit corridor and a new station just east of Moodie Drive. The project will improve transit service reliability between downtown and the west urban community by removing the requirement to operate transit service in mixed traffic on Highway 417.

### The Process

The environmental impact of this transit project was assessed and an Environmental Project Report (EPR) prepared according to the transit project assessment process as prescribed in Ontario Regulation 231/08, Transit Projects and Greater Toronto Transportation Authority Undertakings. The EPR for the West Transitway Extension between Bayshore Station and Moodie Drive will be available for a 30 day public review period starting June 8, 2012 at the following locations:

#### Ministry of the Environment

Environmental Assessment and Approvals Branch  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario M4V 1L5  
Hours: Mon-Fri, 8:30 a.m. – 5 p.m.

#### City of Ottawa

Ben Franklin Place Client Service Centre  
101 Centrepointe Drive  
Nepean, ON K2G 0B5  
Hours: Mon-Fri, 8:30 a.m. – 4:30 p.m.

#### Ottawa Public Library

Centennial Branch  
3870 Richmond Road  
Ottawa, Ontario K2H 5C4  
Hours: Mon-Thurs, 10 a.m. – 8:30 p.m.  
Fri, 1 – 6 p.m.  
Sat, 10 a.m. – 5 p.m.

#### Ottawa District Office

2430 Don Reid Drive  
Ottawa, Ontario K1H 1E1  
Hours: Mon-Fri, 8:30 a.m. – 4:30 p.m.

There are circumstances where the Minister of the Environment has the authority to require further consideration of the transit project, or impose conditions on it. These include if the Minister is of the opinion that:

- The transit project may have a negative impact on a matter of provincial importance that relates to the natural environment or has cultural heritage value or interest; or,
- The transit project may have a negative impact on a constitutionally protected Aboriginal or treaty right.

Before exercising the authority referred to above, the Minister is required to consider any written objections the transit project that he or she may receive within 30 days after the Notice of Completion of the Environmental Project Report is first published.

If you have discussed your issues with the proponent and you object to the project, you can provide a written submission to the Minister of the Environment no later than July 9, 2012 to the address provided below. All submissions must clearly indicate that an objection is being submitted and describe any negative impacts to matters of provincial importance (natural/cultural environment) or Aboriginal rights.

Environmental Assessment and Approvals Branch  
Ministry of the Environment  
2 St. Clair Avenue West, Floor 12A  
Toronto ON M4V 1L5  
Attention: Gavin Battarino Project Officer  
Phone: 416-314-8001; Toll free: 1-800-461-6290  
Fax: 416-314-8452  
E-mail: [caabgen.moe@ontario.ca](mailto:caabgen.moe@ontario.ca)



If not already provided, a copy of the objection will be forwarded to the proponent by the ministry. For further information on the proposed transit project or if you have any accessibility requirements in order to participate in this project, please contact the Project Manager, Jeffrey Waara, at the following coordinates.

**Jeffrey Waara, P.Eng.**  
Senior Project Manager, City of Ottawa  
Infrastructure Services and Community Sustainability  
Tel: 613-580-2424 ext. 27805  
Email: [Jeffrey.Waara@ottawa.ca](mailto:Jeffrey.Waara@ottawa.ca)

Under the *Freedom of Information and Protection of Privacy Act* and the *Environmental Assessment Act*, unless otherwise stated in the submission, any personal information such as name, address, telephone number and property location included in a submission will become part of the public record files for this matter and will be release, if requested, to any person.

<<FIRST PUBLISHED JUNE 8, 2012>>

2012-01-7021-15773

## NOTICE OF STUDY COMMENCEMENT MANOTICK WATERMAIN LINK CLASS ENVIRONMENTAL ASSESSMENT AND FUNCTIONAL DESIGN

The City of Ottawa has initiated the Manotick Watermain Link (MWL) Class Environmental Assessment (Class EA) and Functional Design Study. The main objective of the study is to provide reliability and additional capacity to the central water supply in the Village of Manotick. Capacity is needed to facilitate new development as well as to provide for servicing of existing residents wanting access to the central water supply. Reliability will be achieved by providing an alternative supply to the existing feedermain from Barrhaven. The project is identified in the City's current Infrastructure Master Plan.

This study will be carried out in accordance with the requirements of Phases 1 and 2 of the Municipal Class EA. In order to satisfy the requirements of the Class EA process, the identification and evaluation of a range of alternatives will be undertaken that focus on potential watermain alignments and connections with the existing watermain infrastructure in Manotick. The study will also include the selection of a preferred alternative and a functional design of the MWL.

Interested persons can provide comments at any time during the Class EA process. With the exception of personal information, comments received become part of the public record. Information about the study will be available on [ottawa.ca/manotickwater](http://ottawa.ca/manotickwater).

For more information, or if you would like your name added to the mailing list, please contact:

John Bougadis, P. Eng.  
Engineer, Infrastructure Planning  
Planning and Growth Management  
110 Laurier Avenue West, 4th Floor  
Ottawa, ON K1P 1J1  
613-580-2424 ext. 14990  
Fax: 613-580-2578  
E-mail: [MWL@Ottawa.ca](mailto:MWL@Ottawa.ca)

This notice was first issued on May 25, 2012.

2012-05-7058-16050

## Expropriations Act, R.S.O. 1990, c. E.26. NOTICE OF APPLICATION FOR APPROVAL TO EXPROPRIATE LAND

IN THE MATTER OF an application by the City of Ottawa for approval to expropriate the lands described in Schedule A attached hereto for the purposes of facilitating the construction, operation and maintenance of the Ottawa Light Rail Transit system (the "OLRT") from Tunney's Pasture to Blair Road including a tunnel corridor, approximately 2.5 km in length, below the downtown core, including light rail infrastructure, tunnel guideway corridors, tunnel portals, at grade guideway corridors, guideways, stations, platforms, and including permanent easements to enter on the lands with all vehicles, machinery, workmen and other material for construction, relocation and maintenance of public utilities, storm drains and watermains, necessary and ancillary to the OLRT and including temporary easements as described in Schedule A, for the purposes of storage of excavated materials and construction materials and equipment, temporary power supply and entering on the lands with all vehicles, machinery, workmen and other material for construction, grading, relocation of utilities and construction of berms, walking paths, fences, retaining walls, landscaping features and all other improvements and works ancillary the OLRT.

The Property Sketches referred to in Schedule A forming part of this Notice, are available for viewing during regular business hours at the City's Client Service Centre, 1st Floor, City Hall, City of Ottawa, 110 Laurier Ave. West.

NOTICE IS HEREBY GIVEN that application has been made for approval to expropriate the lands described in Schedule A attached hereto.

Any owner of lands in respect of which notice is given who desires an inquiry into whether the taking of such land is fair, sound and reasonably necessary in the achievement of the objectives of the expropriating authority shall so notify the approving authority in writing

- in the case of a registered owner, served personally or by registered mail within thirty (30) days after the registered owner is served with the notice, or, when the registered owner is served by publication, within thirty (30) days after the first publication of the notice;
- in the case of an owner who is not a registered owner, within thirty (30) days after the first publication of the notice.

The approving authority is:

City of Ottawa  
110 Laurier Avenue West Ottawa ON K1P 1J1

The expropriating authority is:

City of Ottawa  
110 Laurier Avenue West Ottawa ON K1P 1J1

### CITY OF OTTAWA

#### Per: Gordon E. MacNair

Director, Real Estate Partnerships & Development Office  
This Notice first published on the 8<sup>th</sup> day of June, 2012.

### Schedule A

Those lands in the City of Ottawa described as follows:

#### Fee Simple

Part of Lots A, B, C & 1, Plan 25270; Lots 2, 3, 4, 5, 6 & 7, Plan 25270, E/S Waller St; Lots 2, 3, 4, 5, 6, 7, 8 & 9, Plan 25270, W/S Hastey Ave; Lot 8, Plan 25270, in Rear of Lot 8, Plan 25270, W/S Hastey; Lot 9, Plan 25270, in Rear of Lot 9, Plan 25270, W/S Hastey; Lots 1, 2 & 3, Plan 15632, N/S Osgoode Ave; Part Lot 17, Plan 3350, E/S Nicholas St, as in CR532831; Lots 18 & 19, Plan 3350, E/S Nicholas St, except Part 3, 5R-10729, Ottawa, designated as Parcels 1 and 6 on Property Sketch No. 14152p001-REV7-039b.dgn dated May, 2012.

Part of Lot 17, Plan 3350 (within Parts 1 & 4 on 5R4418), closed by N440798, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-061.dgn dated April, 2012.

Part of Lots 1, 2, 3 & 4, Plan 3613 East Nicholas St & Part of Lots 15 & 16, Plan 3350 East Nicholas St. Ottawa, designated as Parcel 2 on Property Sketch No. 14152p001-REV7-061.dgn dated April, 2012.

Part of Part Lots 4 & 5, Plan 3613, as Stopped up & Closed by By-law 285-68 registered as CR547924, Part of Part 1, 4R23790, Ottawa, designated as Parcel 3 on Property Sketch No. 14152p001-REV7-061.dgn dated April, 2012.

Part of Lots 6, 7, 8, 9, 10, 11 & 12, Plan 3613, E/S Nicholas St, except N412596; Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-062.dgn dated April, 2012.

Part of Lot E, Concession D Rideau Front (Formerly Somerset St), Reserve (West of Somerset St), Plan 15632, Part of Parts 2 & 3, 5R9797, closed by N381086, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-063.dgn dated April, 2012.

Part of Lot E, Concession D Rideau Front, Ottawa/Nepean, designated as Parcels 2 and 3 on Property Sketch No. 14152p001-REV7-063.dgn dated April, 2012.

#### Subsurface Fee Simple

Part of Lot B, Part Lots A & C, Plan 6412, Part Lots E, F & G, Plan 8609 & Part Lot 40, Concession A, Ottawa Front, Nepean, Part of Parts 1, 2 & 3, 4R-24496, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-005.dgn dated April, 2012.

Part of Part Lot 23, Plan 3922, South Sparks St, Numbering West, as in CR426365, Part Road Allowance between Concession A Ottawa Front and Concession C Rideau Front, closed by CR46272, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-170c.dgn dated April, 2012.

Part of Part Lot 23, Plan 3922, North Queen St, Numbering West, as in CR687629, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-171c.dgn dated April, 2012.

Part of Part Lot 23, Plan 3922, North Queen St, Numbering West, as in CR374668, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-172c.dgn dated April, 2012.

#### Permanent Easement

Part of Lot E, Concession D, Rideau Front, Ottawa/Nepean, designated as Parcel 4 on Property Sketch No. 14152p001-REV7-063.dgn dated April, 2012.

Part Block R, Plan 74, Part of Part 8, 5R10282; Ottawa/Nepean, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-152.dgn dated April, 2012.

#### Temporary Easement:

##### 8 Month Term:

Part of Lots A, B, C & 1, Plan 25270; Lots 2, 3, 4, 5, 6 & 7, Plan 25270, E/S Waller St; Lots 2, 3, 4, 5, 6, 7, 8 & 9, Plan 25270, W/S Hastey Ave; Lot 8, Plan 25270, in Rear of Lot 8, Plan 25270, W/S Hastey; Lot 9, Plan 25270, in Rear of Lot 9, Plan 25270, W/S Hastey; Lots 1, 2 & 3, Plan 15632, N/S Osgoode Ave; Part Lot 17, Plan 3350, E/S Nicholas St, as in CR532831; Lots 18 & 19, Plan 3350, E/S Nicholas St, except Part 3, 5R-10729, Ottawa, designated as Parcels 2, 3, 4 and 5 on Property Sketch No. 14152p001-REV7-039b.dgn dated May, 2012. Commencement Date April 15, 2013.

Part of Part Lots A, 1, 2, 3 & 4, Plan 9661, South Wilbrod St; Part of Lot 25, Plan 3922, West Waller St; Part Wilbrod St, Plan 3922, Closed by N356592, Parts 2, 4 to 12, 4R-21150, Ottawa, designated as Parcel 1 on Property Sketch No. 14152p001-REV7-059c.dgn dated May, 2012. Commencement Date April 15, 2013.

Part of Lot 17, Plan 3350 (within Parts 1 & 4 on 5R4418), closed by N440798, Ottawa, designated as Parcel 4 on Property Sketch No. 14152p001-REV7-061.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Lots 1, 2, 3 & 4, Plan 3613, East Nicholas St. & Part of Lots 15 & 16, Plan 3350 East Nicholas St., Ottawa, designated as Parcel 5 on Property Sketch No. 14152p001-REV7-061.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Part Lots 4 & 5, Plan 3613, as Stopped up & Closed by By-law 285-68 registered as CR547924, Part 1, 4R23790, Ottawa, designated as Parcel 6 on Property Sketch No. 14152p001-REV7-061.dgn Commencement Date April 15, 2013.

Part of Lots 6, 7, 8, 9, 10, 11 & 12, Plan 3613, E/S Nicholas St, except N412596; Part of Lot 22, Plan 40654, W/S Cumberland St, Ottawa, designated as Parcel 2 on Property Sketch No. 14152p001-REV7-062.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Cumberland St, Plan 15632, Part 8, 4R53, Part Cumberland St, Plan 15632, Part 5, 5R11667, Closed by CR578571 & N440800; Ottawa/Nepean, designated as Parcel 3 on Property Sketch No. 14152p001-REV7-062.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Lot 18, Plan 15632, E/S Cumberland St, as in CR532831; Ottawa, designated as Parcel 4 on Property Sketch No. 14152p001-REV7-062.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Lot E, Concession D, Rideau Front (Formerly Somerset St), Reserve (West of Somerset St), Plan 15632 & Part Somerset St, Plan 15632 (All within Parts 2, 3, 4, 5, 6 & 7 on 5R9797), closed by N381086, Ottawa, designated as Parcel 5 on Property Sketch No. 14152p001-REV7-063.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Lot E, Concession D, Rideau Front, Nepean & Part of Block 42, Plan 15632, Ottawa, designated as Parcel 6 on Property Sketch No. 14152p001-REV7-063.dgn dated April, 2012. Commencement Date April 15, 2013.

Part of Lot E, Concession D, Rideau Front, Ottawa/Nepean, designated as Parcel 7 on Property Sketch No. 14152p001-REV7-063.dgn dated April, 2012. Commencement Date April 15, 2013.

2011-07-7082-15780



**Information**  
**ottawa.ca**

**Services**  
**municipaux 3-1-1**

**ATS 613-580-2401**

**Évaluation environnementale de portée générale  
de la Ville d'Ottawa  
Projet d'entreposage des égouts unitaires  
Avis de séance « portes ouvertes »**

**La Ville d'Ottawa** effectue une évaluation environnementale (EE) et une étude fonctionnelle dans le but d'élaborer et d'établir une solution préférentielle qui permettra la création d'installations de stockage supplémentaires dans la zone d'égouts unitaires, en vue de réduire les surverses d'égout unitaire (SEU) dans la rivière des Outaouais. Ce projet est défini comme solution privilégiée dans le cadre du *Plan d'action de la rivière des Outaouais* pour être totalement conforme à la procédure provinciale F-5-5.

**Le processus :** Ce projet est planifié sous le régime de l'annexe C selon les conditions de l'Évaluation environnementale municipale de portée générale, 2007, qui constitue un processus agréé en vertu de la *Loi sur les évaluations environnementales*.

Une troisième et dernière **séance « portes ouvertes »** est organisée pour présenter les différentes solutions de conception et établir une solution préférentielle recommandée, ainsi que pour offrir l'occasion au public de discuter de l'étude avec le groupe d'étude et de transmettre ses idées et ses commentaires.

**Le mardi 26 juin  
De 18 h 30 à 21 h  
Présentation à 19 h**

**Hôtel de ville d'Ottawa – Place-Jean-Pigott  
110, avenue Laurier Ouest**

Nous acceptons **les commentaires du public** tout au long de la tenue de l'étude. Tous les commentaires reçus seront recueillis conformément à la Loi et (à l'exception des renseignements personnels) seront intégrés au registre public.

D'autres renseignements sont également publiés sur [ottawa.ca](http://ottawa.ca). Pour obtenir de plus amples renseignements, ou si vous voulez que votre nom soit ajouté à la liste d'envoi de cette étude, communiquez avec les personnes suivantes :

**Sur le projet d'entreposage lié au SEU :**

Louis Julien, gestionnaire de projet  
Services d'infrastructure  
100, croissant Constellation  
Ottawa (Ontario) K2G 6J8  
Téléphone : 613-580-2424, poste 21504  
Télécopieur : 613-560-6068  
Courriel : [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**Sur le processus d'évaluation environnementale :**

Sarah Rogers, consultante de projet  
Stantec Consulting Ltd.  
2781, chemin Lancaster, bureau 200  
Ottawa (Ontario) K1B 1A7  
Téléphone : 613-738-0708, poste 3235  
Télécopieur : 613-738-0721  
Courriel : [Sarah.Rogers@stantec.com](mailto:Sarah.Rogers@stantec.com)

## CLASS ENVIRONMENTAL ASSESSMENT CSO STORAGE PROJECT

### NOTICE OF PUBLIC OPEN HOUSE

**The City of Ottawa** is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. This project has been identified as a preferred alternative under the *Ottawa River Action Plan* to become fully compliant with provincial *Procedure F-5-5*.

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**Public Open Houses** have been arranged to present the study process, evaluation criteria and methodology, and the alternative solutions being considered, as well as provide the public with an opportunity to discuss the study with the study team and provide input and comment.

Central	East
<p><b>Tuesday March 30</b>  <b>6:30 – 9 p.m.</b>  <b>Presentation at 7 p.m.</b></p> <p><b>Tom Brown Arena Hall (2nd Floor)</b>  <b>141 Bayview Rd.</b></p>	<p><b>Thursday April 1</b>  <b>6:30 – 9 p.m.</b>  <b>Presentation at 7 p.m.</b></p> <p><b>Bob MacQuarrie Recreation Complex:</b>  <b>Hall A</b>  <b>1490 Youville Dr., Orléans</b></p>

**Public comments** are welcome throughout the study and there will be several opportunities to learn more during the course of the study. All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record.

Additional information is available on the City of Ottawa website at [ottawa.ca](http://ottawa.ca). For more information, or if you wish to be placed on the study's mailing list, please contact:

**On the CSO Storage Project:**

Louis Julien, Project Manager  
 Infrastructure Services Dept.  
 100 Constellation Cres.  
 Ottawa, ON K2G 6J8  
 Phone: 613-580-2424, ext 21504  
 Fax: 613-560-6068  
 Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**On the EA Process:**

Loretta Hardwick, Project Consultant  
 Stantec Consulting Ltd.  
 2781 Lancaster Road, Suite 200  
 Ottawa, ON K1B 1A7  
 Phone: 613-738-6056  
 Fax: 613-738-0721  
 Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

**ÉVALUATION ENVIRONNEMENTALE DE  
 PORTÉE GÉNÉRALE PROJET DE STOCKAGE DES SEU  
 AVIS DE SÉANCE PORTES OUVERTES**

**La Ville d'Ottawa** effectue une Évaluation environnementale (ÉE) et une étude fonctionnelle afin d'identifier et de développer une solution préférentielle qui augmentera le nombre d'installations de stockage dans la zone d'égouts unitaires et conséquemment réduira la fréquence et le volume de débordements d'égouts unitaires (DEU) qui s'introduisent dans la rivière des Outaouais. Ce projet est identifié comme étant une option privilégiée dans le cadre du *Plan d'action pour la rivière des Outaouais* afin de conformer aux critères de réglementation de la Procédure F-5-5 du Ministère de l'environnement.

**Le processus :** La planification de ce projet sera faite selon les procédures de l'Annexe C, tout en respectant les critères de l'*Évaluation environnementale municipale de portée générale, 2007*, ce qui est un processus agréé en vertu de la *Loi sur les évaluations environnementales*.

**Des séances portes-ouvertes** ont été préparées afin de présenter le processus d'étude, les critères et le barème d'évaluation, ainsi que les plusieurs solutions proposées. De plus, les séances portes-ouvertes encourageront la discussion entre le grand public et l'équipe responsable du projet, afin d'en retenir les opinions et commentaires.

Centre de la ville	Région Est
<b>Le mardi 30 mars</b> <b>18 h 30 – 21 h</b> <b>La présentation débutera à 19h</b> <b>Aréna Tom-Brown (2<sup>e</sup> étage)</b> <b>141 Bayview</b>	<b>Le jeudi 1<sup>er</sup> avril</b> <b>18 h 30 – 21 h</b> <b>La présentation débutera à 19 h</b> <b>Complexe récréatif Bob-MacQuarrie,</b> <b>salle A</b> <b>1490 Youville, Orléans</b>

Les membres du public pourront faire parvenir leurs commentaires tout au cours de l'étude et auront plusieurs occasions d'en apprendre davantage sur ce projet. Cette étude est menée conformément aux exigences de l'*Évaluation environnementale de portée générale municipale de 2007*, un processus approuvé en vertu de la *Loi sur les évaluations environnementales*. Tous les commentaires reçus seront recueillis conformément à la *Loi* (à l'exception des renseignements personnels), et seront rendus publics.

Des renseignements supplémentaires sont disponibles sur le site Web de la Ville d'Ottawa à [ottawa.ca](http://ottawa.ca). Pour obtenir plus de renseignements, ou si vous souhaitez vous inscrire à la liste de messagerie, veuillez communiquer avec les personnes suivantes :

**Projet de stockage des DEU :**  
 Louis Julien, gestionnaire de projet  
 Div. des services d'infrastructures  
 100 Constellation Cres.  
 Ottawa (Ontario) K2G 6J8  
 Tél. : 613-580-2424 poste 21504  
 Téléc. : 613-560-6068  
 Courriel : [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**Processus de l'ÉE :**  
 Loretta Hardwick, experte-conseil de projet  
 Stantec Consulting Ltd.  
 2781 Lancaster Road, Suite 200  
 Ottawa (Ontario) K1B 1A7  
 Tél. : 613-738-6056  
 Téléc. : 613-738-0721  
 Courriel : [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

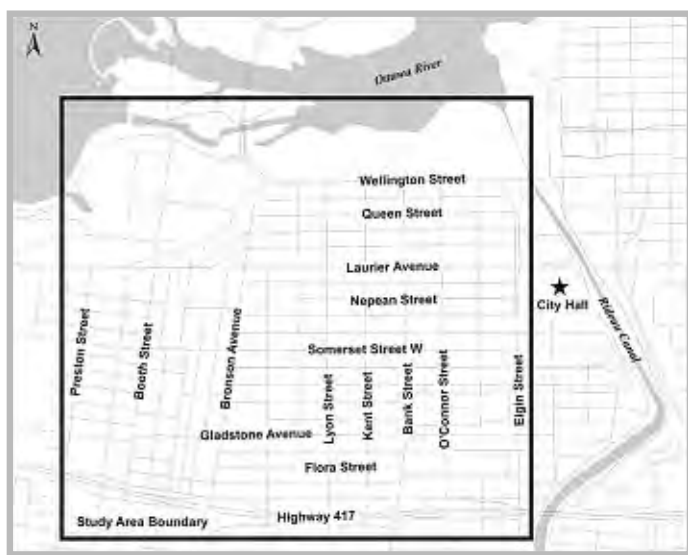
**East-West Downtown Segregated Bike Facility  
Pilot Project  
Public Meeting**

Monday June 7, 2010 6:30 to 8:30 p.m. Dalhousie Community Centre 755 Somerset Street West	Tuesday June 8, 2010 6:30 to 8:30 p.m. McNabb Community Centre 180 Percy Street	Thursday June 10, 2010 6:30 to 8:30 p.m. Dominion-Chalmers United Church, Woodside Hall 355 Cooper Street	Monday June 14, 2010 5 to 7 p.m. City Hall – Rotunda 110 Laurier Avenue West
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Each public meeting includes a presentation that begins 30 minutes after the start time followed by **discussion group** sessions.  
Pre-registration for discussion groups is required at [ottawa.ca/bikelane](http://ottawa.ca/bikelane) or call 3-1-1.  
Discussion group pre-registration **ends Monday, June 7 at 12 noon**

**What is this meeting about?**

The City of Ottawa has initiated a pilot project for the identification of an east-west downtown segregated bike facility within the area bounded by Elgin Street, Preston Street, the Ottawa River and Highway 417. The bicycle facility is intended to be installed for a minimum of one-year on the selected corridor and it is being planned to be maintained throughout the winter months. The intent of this undertaking is to develop a recommended plan to provide a safe, fully segregated bike facility that better connects cycling facilities through the downtown.



**Why Attend?**

The purpose of this meeting is to provide:

- A description and examples of segregated bike facilities
- A description of the potential corridors being considered
- A description of the evaluation criteria and analysis to date
- A description of the potential benefits and impacts
- Opportunities for you to become involved in the evaluation process, identification of local issues and the development of the facility.

**Need more information?**

If you are not available to attend the meeting or would like additional information, please visit the project webpage at [ottawa.ca/bikelane](http://ottawa.ca/bikelane) or direct your comments and questions to the project manager listed below. The presentation material for the meeting will be available on the project webpage after June 7.

Colin Simpson MCIP RPP  
Senior Project Manager  
City of Ottawa  
110 Laurier Avenue West, 4th Floor  
Ottawa, Ontario, K1P 1J1  
Tel: 613-580-2424, ext. 27881  
Fax: 613-580-2578  
E-mail: [colin.simpson@ottawa.ca](mailto:colin.simpson@ottawa.ca)

03-7036-8659

**CLASS ENVIRONMENTAL ASSESSMENT  
COMBINED SEWAGE STORAGE PROJECT  
NOTICE OF PUBLIC OPEN HOUSE**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. This project has been identified as a preferred alternative under the *Ottawa River Action Plan* to become fully compliant with provincial *Procedure F-5-5*.

**The Process:** This project is being planned as a Schedule C project in accordance with the requirements of the *Municipal Class Environmental Assessment, 2007*, which is an approved process under the *Environmental Assessment Act*.

A second set of **Public Open Houses** has been arranged to present the evaluation of alternative solutions and recommended preferred alternative, as well as provide the public with an opportunity to discuss the study with the study team and provide input and comment.

East	Central
<b>Tuesday, June 15</b>	<b>Wednesday, June 16</b>
<b>6:30 to 9 p.m.</b>	<b>6:30 to 9 p.m.</b>
<b>Presentation at 7 p.m.</b>	<b>Presentation at 7 p.m.</b>
<b>Shenkman Arts Centre, Music Rehearsal Hall</b>	<b>Montgomery Legion 351, Upper Hall</b>
<b>245 Centrum Boulevard, Orléans</b>	<b>330 Kent Street</b>

**Public comments** are welcome throughout the study and there will be several opportunities to learn more during the course of the study. All comments received will be collected in accordance with the Act, and (with the exception of personal information) will become part of the public record.

Additional information is available on the City of Ottawa website at [ottawa.ca](http://ottawa.ca). For more information, or if you wish to be placed on the study's mailing list, please contact:

**On the CSO Storage Project:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**On the EA Process:**

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

05-7073-8719

**DEVELOPMENT APPLICATIONS / AMENDMENTS  
UNDER THE PLANNING ACT  
NOTICE OF PLANNING AND ENVIRONMENT  
COMMITTEE MEETING**

**Tuesday, June 8, 2010 • 9:30 a.m.**

The items listed below, in addition to any other items previously scheduled, will be considered at this meeting which will be held in the Champlain Room, City Hall, 110 Laurier Avenue West, Ottawa

**Zoning - 150 and 160 Terence Matthews Crescent**  
613-580-2424, ext. 41396 – [mark.young@ottawa.ca](mailto:mark.young@ottawa.ca)

01-7001-8689

**West Transitway Extension:  
Terry Fox to Fernbank  
Open House #2**

Wednesday, June 2, 2010  
Earl of March Secondary School  
6 to 9 p.m.



The City of Ottawa has initiated its pre-consultation / initial planning process for the upcoming Environmental Assessment (EA) Study for the proposed West Transitway Connection. The West Transitway Connection is a key component of the recommended interconnected system of rapid transit corridors. This project is being undertaken to improve transit service from Ottawa's west end to central Ottawa; and address existing and future development issues.

The Terry Fox to Fernbank Connection proceeds through development areas known as Kanata West and Fernbank to the extent of the urban boundary at Fernbank Road and is the focus of this meeting and Environmental Assessment. The Kanata North (March Road) Connection section is being deferred in order to evaluate, in further detail, alternative routing options.

The formal EA process commences in the summer 2010. At that time, a Notice of EA Study Commencement will be issued. This EA Study will be undertaken in accordance with the new Ontario Transit Regulation 231/08 under the Ontario Environmental Assessment Act.

Public participation will form an integral part of the study. The second Public Open House has been arranged to present the study process, impact assessment and implementation, and also to provide the public and interested stakeholders an opportunity to discuss the study with the project team.

The City of Ottawa encourages interested persons to provide comments at any time during the pre-consultation or formal EA stages of this study. Please note that with the exception of personal information, all comments collected will become part of the public record.

If you are not available to attend the Public Open House and would like to discuss the project, or would like additional information, please direct your comments and questions to:

**Frank McKinney P.Eng.**  
Program Manager  
City of Ottawa  
110 Laurier Avenue West, 4th Floor  
Ottawa, ON K1P 1J1  
Telephone: 613-580-2424, ext. 28540  
Fax: 613-580-2578  
E-mail: [frank.mckinney@ottawa.ca](mailto:frank.mckinney@ottawa.ca)

03-7039-8639

**Getting Started: The Mid-Centretown  
Community Design Plan (CDP)  
—Your Opportunity to Be Involved—**

**Tuesday, June 8, 2010**

**Dominion-Chalmers  
United Church  
Woodside Hall,  
355 Cooper Street  
5:30 to 8:30 p.m.  
6.30 p.m. Presentation**

Join your neighbours and help to define a vision for new design and development opportunities in the Mid-Centretown community. City staff and the consulting team will be available to provide information about the process and outcomes of the upcoming Community Design Plan, such as:

- **Existing conditions:** What does the Mid-Centretown area look like now?
- **Priority issues:** What can change to create a more livable community?
- **Getting involved:** What is the CDP project and what happens next?

This project area is bounded by Kent Street on the west, Highway 417 on the south, Elgin Street on the east, and the Central Area boundary (mostly Gloucester Street) on the north.

**Want to share your ideas?**

Chat about your ideas as the plan comes to life on the Mid-Centretown Tomorrow community blog [midcentretowntomorrow.com](http://midcentretowntomorrow.com). Tell us what you think living in Mid-Centertown is all about and what you believe it can become in the future.

**Need more information?** Visit [ottawa.ca/midcentretown](http://ottawa.ca/midcentretown)

Or contact:

Bob Spicer, Planner III  
Planning and Growth Management Department  
City of Ottawa  
110 Laurier Avenue West  
Ottawa, ON K1P 1J1  
**Tel.** 613-580-2424 ext. 13858  
**Email:** [midcentretown@ottawa.ca](mailto:midcentretown@ottawa.ca)  
**BLOG:** [midcentretowntomorrow.com](http://midcentretowntomorrow.com)

02-7023-8440

**Proposed Roadway Modifications**

Pursuant to By-law No. 2006-483, the City of Ottawa is providing notice to the public of its intention to approve roadway modifications at the following location in accordance with the authority under By-laws No. 2009-231 and 2009-276:

**Bank Street at approximately 700 metres north of Conroy Road**

Installation of a pedestrian crossing signal for the proposed National Capital Commission Greenbelt pathway

For more information, please contact:

Robert Grimwood, P.Eng.  
Planning and Growth Management Department  
Infrastructure Services and Community Sustainability  
Tel: 613-580-2424, ext. 28757

Any person who wishes to raise objections to the modifications must contact the City Clerk, in writing, at the address below by Friday, June 4, 2010.

City Clerk  
110 Laurier Avenue West  
Ottawa, Ontario, K1P 1J1

02-7023-8610

## **Évaluation environnementale de portée générale projet de stockage des égouts unitaires avis de séance portes ouvertes**

**La Ville d'Ottawa** effectue une Évaluation environnementale (ÉE) et une étude fonctionnelle afin d'identifier et de développer une solution préférentielle qui augmentera le nombre d'installations de stockage dans la zone d'égouts unitaires et conséquemment réduira la fréquence et le volume de débordements d'égouts unitaires (DEU) qui s'introduisent dans la rivière des Outaouais. Ce projet est identifié comme étant une option privilégiée dans le cadre du *Plan d'action pour la rivière des Outaouais* afin de conformer aux critères de réglementation de la *Procédure F-5-5* du Ministère de l'environnement.

**Le processus :** La planification de ce projet sera faite selon les procédures de l'Annexe C, tout en respectant les critères de l'*Évaluation environnementale municipale de portée générale, 2007*, ce qui est un processus agréé en vertu de la *Loi sur les évaluations environnementales*.

**Une deuxième ronde de séances portes-ouvertes** a été préparée afin de présenter l'évaluation des solutions proposées et de la solution privilégiée. De plus, les séances portes-ouvertes encourageront la discussion entre le grand public et l'équipe responsable du projet, afin d'en retenir les opinions et commentaires.

<b>Centre de la ville</b>	<b>Région Est</b>
<p><b>Le mardi 15 juin</b>                      18 h 30 – 21 h                      La présentation débutera à 19 h</p> <p><b>Centre des arts Shenkman,                      la salle de répétition de musique                      245 boulevard Centrum, Orléans</b></p>	<p><b>Le mercredi 16 juin</b>                      18 h 30 – 21 h                      La présentation débutera à 19 h</p> <p><b>la Légion royale canadienne, section Montgomery                      351, salle supérieure                      330 rue Kent</b></p>

**Les membres du public pourront faire parvenir leurs commentaires** tout au cours de l'étude et auront plusieurs occasions d'en apprendre davantage sur ce projet. Cette étude est menée conformément aux exigences de l'*Évaluation environnementale de portée générale municipale de 2007*, un processus approuvé en vertu de la *Loi sur les évaluations environnementales*. Tous les commentaires reçus seront recueillis conformément à la *Loi* (à l'exception des renseignements personnels), et seront rendus publics.

Des renseignements supplémentaires sont disponibles sur le site Web de la Ville d'Ottawa à [ottawa.ca](http://ottawa.ca). Pour obtenir plus de renseignements, ou si vous souhaitez vous inscrire à la liste de messagerie, veuillez communiquer avec les personnes suivantes :

**Projet de stockage des DEU :**

Louis Julien, gestionnaire de projet  
 Div. des services d'infrastructures  
 100 Constellation Cres.  
 Ottawa (Ontario) K2G 6J8  
 Tél. : 613-580-2424 poste 21504  
 Téléc. : 613-560-6068  
 Courriel : [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**Processus de l'ÉE :**

Loretta Hardwick, experte-conseil de projet  
 Stantec Consulting Ltd.  
 2781 Lancaster Road, Suite 200  
 Ottawa (Ontario) K1B 1A7  
 Tél. : 613-738-6056  
 Téléc. : 613-738-0721  
 Courriel : [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

March 17, 2010

Dear Sir/Madam,

**Reference: Ottawa CSO Storage EA and Functional Design Project**

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the combined sewer area and thereby reduce combined sewer overflows (CSOs) to the Ottawa River. Your organization has been identified as one with potential interest in the project. The purpose of this letter is to inform you of the project, invite your participation in upcoming consultation, and request submissions outlining any comments, concerns or additional information that you or your organization may have regarding the proposed project.

The information below provides further information on the project background and consultation process. Should you require further information prior to upcoming public information sessions, please do not hesitate to contact the undersigned.

Comments and information regarding this project are being collected to assist in meeting the requirements of the EA process. These comments will be maintained for reference throughout the project and will become part of the Public Record. Your responses may be provided by letter or by e-mail. Should you or your organization decline to attend public meetings, please indicate whether you want to continue to receive correspondence on this project. If we do not receive any response to this request, for the purpose of documentation in the report, "no issues or concerns identified" will be recorded.

**Background**

Currently, CSOs to the Ottawa River do not meet all provincial CSO control targets. The City's Ottawa River Action Plan (ORAP) is a working plan to protect water quality in the Ottawa River, and includes a plan to control CSOs beyond regulatory compliance levels. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements. As such, the CSO Storage Project has been identified as a preferred alternative under ORAP, which includes 17 projects to address stormwater and wastewater discharges to the Ottawa River.

The City of Ottawa has been conducting public consultation on the ORAP in accordance with the Municipal Class EA master planning requirements since the fall of 2009. The Notice of Commencement for the CSO Storage project was issued as part of this process and is hereby attached. As one of the 17 projects identified in the ORAP, the CSO Storage Project will identify and develop, in form and function, the preferred alternative for providing additional storage to reduce CSOs within the Ultimate Combined Sewer Area (shown on the attached Figure) and attain the targets identified as part of the ORAP, as endorsed by City Council. The CSO Storage project will be designed to provide a level of protection that, at minimum, achieves the "Beach Protection" requirements defined within Section 9 of the Ministry of Environment's Procedure F-5-5. It is also identified as a cost-effective means of enhancing CSO control beyond regulatory compliance, and thus meet the City's policy of having zero combined sewer overflow (CSO) in an average year.

**EA Process**

The EA study and consultation program will be undertaken to conform to the Municipal Class EA Phase 2 requirements. At this stage of the EA process, alternative solutions are being identified and a preferred solution will be selected, taking into account public and regulatory agency input.

Public open houses (3) are planned to be held at key milestones of the project. An advertisement in the local newspapers (Ottawa Citizen and Le Droit) will announce the date, time and location of the open houses. Notice of the first public open house is attached.

All information, comments and questions may be directed to:

**On the CSO Storage Project:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

**On the EA Process:**

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

Sincerely,

**Sarah Rogers**  
Environmental Scientist  
Stantec Consulting Ltd.

On behalf of/

**Loretta Hardwick**  
Associate, Senior Environmental Scientist  
Stantec  
Ph: (613) 738-6056  
Fx: (613) 738-0721  
Cell: (613) 447-8766  
[loretta.hardwick@stantec.com](mailto:loretta.hardwick@stantec.com)  
**stantec.com**

## Rogers, Sarah

---

**From:** Rogers, Sarah  
**Sent:** Thursday, June 03, 2010 3:11 PM  
**To:** Rogers, Sarah  
**Cc:** Louis.Julien@ottawa.ca; Hardwick, Loretta  
**Subject:** Ottawa Combined Sewage Storage EA and Functional Design Project  
**Attachments:** Citizen\_May 28 2010.pdf; Droit\_May 28 2010\_FR.pdf

Good Afternoon,

As you may be aware, the second set of Public Open Houses for the Ottawa Combined Sewage Storage EA and Functional Design Project have been scheduled for June 15<sup>th</sup> and June 16<sup>th</sup>. At this open house, the evaluation of alternative solutions and recommended preferred alternative will be presented. Details on the times and locations are provided on the attached notices, which were published in the Citizen and Le Droit.

Comments and information regarding this project are being collected to assist in meeting the requirements of the EA process. These comments will be maintained for reference throughout the project and will become part of the Public Record. Your responses are encouraged and may be provided by letter or by e-mail.

Material presented at the Public Open Houses can be accessed through the City of Ottawa website at either of the following links for this project.

English: [http://ottawa.ca/residents/waterwaste/combined\\_overflows/index\\_en.html](http://ottawa.ca/residents/waterwaste/combined_overflows/index_en.html)

French: [http://ottawa.ca/residents/waterwaste/combined\\_overflows/index\\_fr.html](http://ottawa.ca/residents/waterwaste/combined_overflows/index_fr.html)

### Background

Currently, Combined Sewer Overflows (CSOs) to the Ottawa River do not meet all provincial CSO control targets. The City's Ottawa River Action Plan (ORAP) is a working plan to protect water quality in the Ottawa River, and includes a plan to control CSOs beyond regulatory compliance levels. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements. As such, the CSO Storage Project has been identified as a preferred alternative under ORAP, which includes 17 projects to address stormwater and wastewater discharges to the Ottawa River.

The City of Ottawa has been conducting public consultation on the ORAP in accordance with the Municipal Class EA master planning requirements since the fall of 2009. The Notice of Commencement for the CSO Storage project was issued as part of this process and is hereby attached. As one of the 17 projects identified in the ORAP, the CSO Storage Project will identify and develop, in form and function, the preferred alternative for providing additional storage to reduce CSOs within the Ultimate Combined Sewer Area (shown on the attached Figure) and attain the targets identified as part of the ORAP, as endorsed by City Council (City Council endorsement pending). The CSO Storage project will be designed to provide a level of protection that, at minimum, achieves the "Beach Protection" requirements defined within Section 9 of the Ministry of Environment's Procedure F-5-5. It is also identified as a cost-effective means of enhancing CSO control beyond regulatory compliance, and thus meet the City's policy of having zero combined sewer overflow (CSO) in an average year.

### EA Process

The EA study and consultation program will be undertaken to conform to the Municipal Class EA Phase 2 requirements. At this stage of the EA process, alternative solutions are being identified and a preferred solution will be selected, taking into account public and regulatory agency input.

All information, comments and questions may be directed to:

**On the CSO Storage Project:**

**On the EA Process:**

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Cres.  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

Sincerely,

**Sarah Rogers**

Environmental Scientist  
Stantec  
200 - 2781 Lancaster Road  
Ottawa ON K1B 1A7  
Ph: (613) 738-0708 Ext. 3271  
[sarah.rogers@stantec.com](mailto:sarah.rogers@stantec.com)  
**stantec.com**

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 Please consider the environment before printing this email.

## Rogers, Sarah

---

**To:** Rogers, Sarah  
**Cc:** 'Julien, Louis' (Louis.Julien@ottawa.ca)  
**Subject:** Final Open House: Ottawa Combined Sewage Storage EA and Functional Design Project  
**Attachments:** Citizen\_June82012\_EN.pdf; Droit\_June82012\_FR.pdf

Good Afternoon,

As you may be aware, the third and final Public Open House for the Ottawa Combined Sewage Storage Environmental Assessment and Functional Design Project has been scheduled for June 26<sup>th</sup> at City Hall . At this open house, the evaluation of alternative designs for the recommended preferred solution will be presented. Details on the time and location are provided in the attached notices, which were published in the Citizen and Le Droit.

Comments and information regarding this project are being collected to assist in meeting the requirements of the provincial Environmental Assessment process. These comments will be maintained for reference throughout the project and will become part of the Public Record. Your responses are encouraged and may be provided by letter or by e-mail.

Material presented at past Public Open Houses can be accessed through the City of Ottawa website at either of the following links for this project.

English: [http://ottawa.ca/en/city\\_hall/planningprojectsreports/public\\_consult/combined\\_overflows/](http://ottawa.ca/en/city_hall/planningprojectsreports/public_consult/combined_overflows/)  
French: [http://ottawa.ca/fr/city\\_hall/planningprojectsreports/public\\_consult/combined\\_overflows/](http://ottawa.ca/fr/city_hall/planningprojectsreports/public_consult/combined_overflows/)

### Background

Currently, Combined Sewer Overflows (CSOs) to the Ottawa River do not meet all provincial CSO control targets. The City's Ottawa River Action Plan (ORAP) is a working plan to protect water quality in the Ottawa River, and includes a plan to control CSOs beyond regulatory compliance levels. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) has identified that storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum provincial targets. As such, the CSO Storage Project has been identified as a preferred alternative under ORAP, which includes 17 projects to address stormwater and wastewater discharges to the Ottawa River.

The City of Ottawa has been conducting public consultation on the ORAP in accordance with the Municipal Class EA master planning requirements since the fall of 2009. City Council, with input from the public, has decided to reduce CSOs beyond Provincial targets. The Notice of Commencement for the CSO Storage project was issued as part of this process. As one of the 17 projects identified in the ORAP, the CSO Storage Environmental Assessment and Functional Design will identify and develop, in form and function, the preferred alternative for providing additional storage to reduce and attain the targets identified as part of the ORAP, as endorsed by City Council. The CSO Storage project will be designed to provide a level of protection that, at minimum, achieves the "Beach Protection" requirements defined within Section 9 of the Ministry of Environment's Procedure F-5-5. It is also identified as a cost-effective means of enhancing CSO control beyond regulatory compliance, and thus meet the City's policy of having zero combined sewer overflow (CSO) in an average year.

### EA Process

The EA study and consultation program will be undertaken to conform to the Municipal Class EA requirements. At this stage of the EA process, alternative designs for the recommended preferred solution will be presented, taking into account public and regulatory agency input.

All information, comments and questions may be directed to:

#### On the CSO Storage Project:

Louis Julien, Project Manager

#### On the EA Process:

Sarah Rogers, Project Consultant

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Sincerely,

**Sarah Rogers**

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**A-7**  
**Public Open House #1 Materials**

# Welcome to the City of Ottawa Combined Sewage Storage and Functional Design Project

Municipal Class Environmental Assessment  
Public Open House

# Bienvenue au projet de stockage et d'étude fonctionnelle visant les SEU de la ville d'Ottawa

Évaluation environnementale municipale de portée  
générale Journée porte ouverte



Please Sign In



Veillez vous inscrire

Take a comment sheet and information package to record your thoughts as you review the display materials and watch the presentation

City Staff and the Study Team are available to answer your questions

Public input will influence this study; please take the time to fill out a questionnaire and return it to the registration table

Prenez une fiche de commentaires et une trousse de renseignements pour prendre notes de vos impressions pendant que vous examinerez le matériel présenté et que vous assisterez à la présentation. Le personnel de la ville ainsi que l'équipe d'étude se feront un plaisir de répondre à vos questions

Cette étude sera influencée par les commentaires du public. Pour cette raison, nous vous prions de prendre un moment pour remplir un formulaire et le ramener à la table d'inscription.



## Introduction

### Background

The City of Ottawa has a working plan to protect water quality in the Ottawa River. The Ottawa River Action Plan (ORAP) identifies seventeen projects that will enable the City to improve water quality in the watershed and ensure compliance with provincial regulations.

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport combined sewage (wastewater and stormwater runoff) in the same pipe. These older systems were designed to overflow into the Ottawa River during medium and large rainfall events. This impacts the water quality of the Ottawa River.

### Problem Statement

Currently, combined sewer overflows (CSOs) to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in an average year, while accepting some overflows during rainy years or heavy rainfall events.

### Opportunity

The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified combined sewage storage within the Ultimate Combined Sewer Area as the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

### Contexte

La ville d'Ottawa dispose d'un plan de travail pour protéger la qualité de l'eau de la rivière des Outaouais. Le Plan d'action de la rivière des Outaouais (PARO) identifie dix-sept projets qui permettront à la ville d'améliorer la qualité de l'eau du bassin-versant et de s'assurer de conformer entièrement aux règlements provinciaux.

Comme la plupart des municipalités, la ville d'Ottawa possède des égouts unitaires, dans les secteurs les plus anciens de la ville, qui transportent aussi bien les eaux de ruissellement que les eaux usées. Ces systèmes plus anciens sont conçus pour déborder dans la rivière des Outaouais lors de précipitations moyennes et extrêmes. Ceci a une influence sur la qualité de l'eau de la rivière des Outaouais.

### Énoncé du problème

Actuellement, les débordements d'égouts unitaires (DEU) dans la rivière des Outaouais ne sont pas entièrement conformes aux objectifs de contrôle des DEU fixés par le ministère de l'Environnement. En février 2010, la ville d'Ottawa a adopté une politique afin de n'avoir aucun événement de DEU pendant la saison de baignade lors d'une année normale, en acceptant un certain nombre de débordements au cours d'années très pluviales ou lors d'événements extrêmes.

### Opportunité

Le plan de prévention et de contrôle de la pollution de la ville pour la zone d'égouts unitaires a permis de déterminer que le stockage des DEU dans la dernière zone d'égouts unitaires constituait la méthode la plus rentable pour réduire les DEU au-delà des exigences minimales des règlements.



## Project Overview

The Interceptor-Outfall Sewer (IOS) collects wastewater (sanitary) and some stormwater from west to east across the city to the wastewater treatment plant. The IOS cannot handle all of the stormwater runoff that enters the sewer system during wet weather. Frequent and large volume overflows have been identified at three locations: West End (W), Rideau Canal (R) and Keefer (K) regulators.

Storage facilities at these locations will hold excess combined sewage until it can be transferred to the Robert O. Pickard Environmental Centre (ROPEC) for treatment. Storage facilities will lower the amount of combined sewage released to the Ottawa River during larger wet weather events. This will help to reduce the number of beach closures at Petrie Island.

### Project Objectives

When implemented, the Combined Sewage Storage Project will:

- Reduce CSOs from the Ultimate Combined Sewer Area
- Improve water quality in the Ottawa River
- Assist City in coming into compliance with Ministry of Environment's Procedure F-5-5

A **combined sewer** collects and transports sanitary wastewater and stormwater runoff in a single pipe.

An **interceptor sewer** captures all of the wastewater flow from the combined sewers and carries it to the wastewater treatment plant for processing during dry weather conditions.

A **combined sewer overflow**, or CSO, occurs when wastewater and stormwater from a combined sewer system are discharged directly into a local waterbody because the flow rate exceeds the capacity of the interceptor sewer lines.



## Aperçu du Projet

L'égout de décharge – intercepteur (ÉDI) recueille les eaux usées (sanitaires) et certaines eaux de ruissellement, d'ouest en est de la ville et les achemine vers l'usine de traitement des eaux usées. L'ÉDI n'est pas en mesure de recevoir toute l'eau de ruissellement qui y entre en période de précipitation. Des débordements fréquents et de volumes importants ont été identifiés à trois emplacements : aux régulateurs du « West End » (W), du canal Rideau (R) et de la rue Keefer (K).

À ces emplacements, les installations de stockage recueilleront les excédents d'eaux usées jusqu'à ce qu'elles puissent être transférées au Centre environnemental R.-O.-Pickard (CEROP) pour y être traitées. Les installations de stockage de eaux usées réduiront la quantité d'eaux d'égouts diluées rejetée dans la rivière des Outaouais pendant les périodes de précipitation. Cela aidera à réduire le nombre de fermetures de la plage de l'île Petrie.

### Objectifs du projet

Une fois qu'il aura été mis en œuvre, le projet de stockage des eaux usées aidera de la manière suivante :

- Il réduira les DEU provenant de la zone ultime d'égouts unitaires
- Il améliorera la qualité de l'eau de la rivière des Outaouais
- Il assistera à la Ville à atteindre la conformité à la procédure F-5-5 du ministère de l'Environnement

Un **égout unitaire** recueille et transporte les eaux usées sanitaires et les eaux de ruissellement dans un seul tuyau.

Lorsque le temps est sec, un **égout intercepteur** capture le débit des eaux usées provenant des égouts unitaires et le transporte vers l'usine de traitement des eaux usées.

Un **débordement d'égouts unitaires**, ou DEU, se produit lorsque les eaux usées et l'eau de ruissellement provenant d'un système d'égouts unitaires sont déchargées directement dans une étendue d'eau parce que le débit d'écoulement dépasse la capacité de l'intercepteur.



## Municipal Class Environmental Assessment Process

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the ultimate combined sewer area and thereby reduce CSOs to the Ottawa River.

### Phase I

Was completed through the ORAP process. This Phase identified and described the problem and opportunity: **To achieve a service level for combined sewer overflows (CSO) of zero overflows during the swimming season in the "average year," while accepting some overflows during rainy years or very large rain events.**

### Phase II

The project is currently in Phase II of the EA process. This Phase involves the identification and evaluation of alternative solutions, including consultation, resulting in the selection of a preferred alternative solution. This project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007, which is an approved process under the Environmental Assessment Act.

Following Phase II, completion of the EA will involve evaluation of alternative design concepts of the preferred alternative solutions, additional consultation and filing an environmental study report.

## Processus d'évaluation environnementale municipale de portée générale

La Ville d'Ottawa mène actuellement une évaluation environnementale et une étude fonctionnelle en vue de désigner et d'élaborer une solution qui permettra la mise à disposition d'installations supplémentaires de stockage dans la zone ultime d'égouts unitaires et, par conséquent, une réduction des débordements d'égouts unitaires (DEU) dans la rivière des Outaouais.

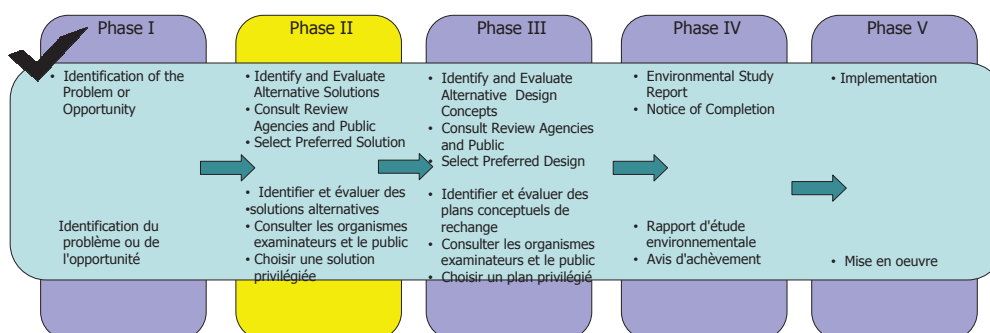
### Phase I

Elle a été complétée par l'entremise du processus du PARO. Cette phase a permis d'identifier et de décrire le problème et l'opportunité : **Atteindre un niveau de service correspondant à aucun débordement d'égouts unitaires (DEU) pendant la saison de baignade; pour une « année normale », en acceptant un certain nombre de débordements au cours d'années très pluviales ou lors d'événements extrêmes.**

### Phase II

Le projet se trouve actuellement à la phase II du processus d'ÉE. Cette phase implique l'identification et l'évaluation d'une solution, incluant des périodes de consultation publique résultant en la sélection de la solution alternative privilégiée. Ce projet est planifié sous la forme d'un projet de l'annexe C conformément aux exigences d'une évaluation environnementale municipale de portée générale, 2007, qui constitue un processus approuvé en vertu de la loi sur les évaluations environnementales.

Suite à la phase II, l'achèvement de l'ÉE impliquera l'évaluation d'alternatives de conception de la solution alternative privilégiée, des consultations publiques additionnelles et le dépôt d'un rapport d'étude environnementale.



## Consultation

Consultation is a key component of an environmental assessment (EA).

The purpose of consultation is to raise awareness and to solicit input fulfilled in part through Public Open Houses. Throughout Phase II of the EA, there will be opportunity for the public to comment at key milestones of the project. This is the first of three Public Open Houses planned for this Phase of the EA.

### This Public Open House presents:

- Alternative solutions to the problem
- Evaluation criteria
- Evaluation methodology

As you read through the presentation boards and view the presentation, we invite you to share your feedback on the list of alternative solution and evaluation criteria.

### Your input is important!

...and your comments will influence this project. So please take the time to give us your feedback by filling out a questionnaire and returning it to the registration table.

La consultation est un élément clé d'une évaluation environnementale (ÉE).

Elle vise à sensibiliser le public et à obtenir des commentaires, en partie par des journées portes ouvertes. Tout au long de la phase II de l'ÉE, le public aura l'occasion de se faire entendre à des étapes clés du projet. Il s'agit de la première de trois journées portes ouvertes planifiées pour cette phase de l'ÉE.

### Cette journée portes ouvertes présentera les éléments suivants :

- Des solutions alternatives au problème
- Les critères d'évaluation
- La méthodologie d'évaluation

Au fur et à mesure que vous examinerez les tableaux de présentation et lorsque vous regarderez la présentation, nous vous invitons à nous faire part de vos commentaires sur la liste des solutions alternatives et les critères d'évaluation.

### Votre participation est importante pour nous!

...et vos commentaires auront un impact sur ce projet. Par conséquent, nous vous prions de prendre un moment pour remplir un formulaire et le ramener à la table d'inscription.



## Glossary of Terms / Glossaire

**Average Year:** The Ontario Ministry of the Environment has accepted 1980 as having "average year" wet weather patterns for engineering design purposes.

**Collector sewers:** A collector sewer is a conduit that receives sewage and/or stormwater from local sewers.

**Interceptor Outfall Sewer:** An interceptor sewer captures all of the wastewater flow from the collector and combined sewers and carries it to the wastewater treatment plant for processing during dry weather conditions.

**Regulator:** A regulator directs and controls flows in the sewer system.

**ROPEC:** The Robert O. Pickard Environmental Centre is Ottawa's wastewater treatment plant.

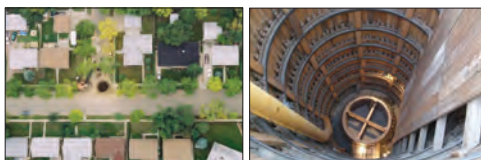
**Shafts:** A shaft provides an access point for construction and/or inspection and maintenance of underground facilities, such as tunnels and storage tanks.

**Tunnel Storage:** An underground tunnel can be used to capture, convey and store combined sewage that would otherwise overflow.

**Underground Storage Tank:** An underground storage tank consists of a large concrete box constructed to temporarily store combined sewage that would otherwise overflow.



Example of tunnel under construction using a tunnel boring machine (right).  
Exemple d'un tunnel en construction utilisant un tunnelier (photo de droite).



Example of an access shaft used for tunnel construction. Once construction is complete, the shaft allows maintenance access to the tunnel.  
Exemple d'un puits servant à la construction d'un tunnel. Une fois la construction terminée, le puits sert de point d'accès pour l'entretien.



Example of underground storage tank under construction. Once construction is complete, the open space over the storage tank can return to its original function. Note control building in the background (at right in bottom photo).  
Exemple d'un réservoir souterrain en construction. Une fois la construction terminée, l'espace au dessus du réservoir peut retourner à son utilisation d'origine. Notez l'édifice de contrôle (dans le coin droit de la photo du bas).

**Année moyenne:** Le Ministère de l'environnement de l'Ontario a accepté l'année 1980 comme étant « l'année moyenne », ayant des caractéristiques de précipitation « moyennes » pour fins de conception en génie.

**Égouts collecteurs:** Un égout collecteur récolte les eaux usées et de ruissellement provenant des égouts locaux.

**Égout de décharge-intercepteur:** Un égout de décharge-intercepteur récolte toutes les eaux usées provenant des égouts collecteurs et des égouts unitaires et les achemine vers l'usine de traitement des eaux usées.

**Régulateur:** Un régulateur dirige et contrôle les débits dans le système d'égouts.

**CEROP:** Le Centre environnemental Robert O. Pickard est l'usine de traitement des eaux usées pour la ville d'Ottawa.

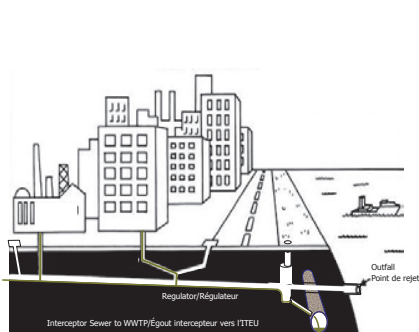
**Puits d'accès:** Un puits d'accès sert de point d'accès pour la construction, l'inspection and l'entretien des installations souterraines, tel que les tunnels et les réservoirs de stockage.

**Tunnel de stockage:** Un tunnel souterrain peut capter, transporter et stocker des eaux usées excédentaires, qui autrement déborderaient du système d'égouts et déverseraient dans une étendue d'eau.

**Réservoir de stockage souterrain:** Un réservoir de stockage consiste en une grosse boîte de béton construite afin de stocker de façon temporaire les eaux usées excédentaires, qui autrement déborderaient du système d'égouts et déverseraient dans une étendue d'eau.

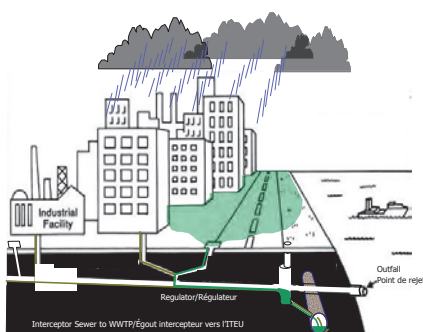


# What Causes Combined Sewer Overflows? Qu'est-ce qui cause les débordements des égouts unitaires?



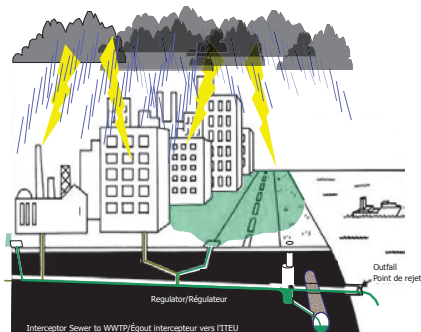
**Dry weather (no rain)** – system captures all wastewater flows and conveys the flow to the wastewater treatment plant

**Temps sec (sans pluie)** – le système capte tous les débits d'eaux usées et transporte le tout vers l'installation de traitement des eaux usées



**Small Rain Event** – system captures wastewater and stormwater flows and conveys them to the wastewater treatment plant

**Évènement de faible précipitation** – le système capte les eaux usées et les eaux de ruissellement et transporte le tout vers l'installation de traitement des eaux usées



**Larger Rain Event** – volume of flow can exceed the capacity of the wastewater collection and treatment systems. The amount of flow captured and treated is limited by flow regulators that protect the system resulting in overflows to the Ottawa River

**Évènement de forte précipitation** – le volume du débit peut excéder la capacité des systèmes de collecte et de traitement des eaux usées. Le montant du débit capté et traité est limité par les régulateurs de débit qui protègent le système; ce qui entraîne les débordements dans la rivière des Outaouais



## Existing Conditions

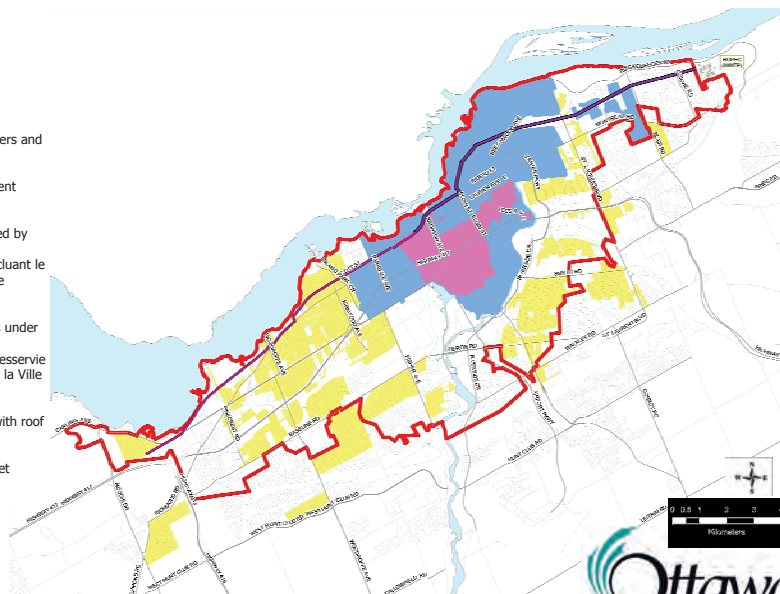
Combined Sewer Overflows (CSOs) to the River originate from the sewershed serviced by the Interceptor-Outfall Sewer (IOS) that services a population of 350,000. This one pipe conveys wastewater from a 107 km<sup>2</sup> area to the Robert O. Pickard Environmental Centre for treatment. When the IOS or collector sewers reach capacity under wet weather conditions, they can cause overflows (CSO) to the Ottawa River. A key objective of the *Ottawa River Action Plan* is to minimize overflows to the River.

## Conditions Présentes

Les débordements d'égouts unitaires (DEU) dans la rivière des Outaouais proviennent du bassin tributaire desservi par l'égout de décharge-intercepteur (EDI), qui dessert une population de 350 000 habitants. Ce tuyau unique draine une superficie de 107 km<sup>2</sup> jusqu'au Centre Environnemental de Robert O. Pickard, pour que les eaux usées y soient traitées. Un DEU à la rivière survient lors de périodes de précipitation, lorsque le EDI ou un égout collecteur drainant dans le EDI atteint sa capacité. L'objectif premier du plan d'action pour la rivière des Outaouais est de limiter les débordements d'égouts unitaires dans la rivière.

### Legend

- Interceptor-Outfall Sewer (IOS)  
Égout de décharge- intercepteur (EDI)
- West Nepean Collector (WNC)  
Collecteur Nepean-ouest (CNO)
- IOS Sewershed** – A 107 km<sup>2</sup> area comprised of combined sewers, partially separated sewers and fully separated sanitary sewers.  
**Bassin tributaire de l'égout de décharge-intercepteur** - Cette superficie de 107 km<sup>2</sup> comprend des égouts unitaires, des égouts partiellement séparés et des égouts complètement séparés.
- Original Combined Sewer Area** – A 2,952 ha area (including the UCSA) originally serviced by combined sewers. Approximately 65% of this area has undergone sewer separation.  
**Bassin tributaire original des égouts unitaires** - Cette superficie de 2952 hectares (incluant le SMEU) était desservie précédemment par des égouts unitaires. Environ 65% de la superficie consiste d'égouts séparés.
- Ultimate Combined Sewer Area** – A 675 ha area to remain serviced by combined sewers under the City's 2008 Pollution Prevention & Control Plan.  
**Zone ultime d'égouts unitaires** - Cette superficie de 675 hectares va continuer à être desservie par un égout unitaire d'après le Plan de contrôle et de prévention de la pollution établie par la Ville en 2008.
- Partially Separated Areas** – Communities with separate storm and sanitary sewers, but with roof downspouts and building foundations draining to the sanitary sewer that can cause system surcharges and overflows under wet weather conditions.  
**Bassin tributaire partiellement séparé** - Les communautés avec des égouts pluviaux et sanitaires, mais avec des gouttières et des drains de fondations raccordés dans les égouts sanitaires peuvent causer des surcharges



# Evolution of Ottawa's Combined Sewer System

**Originally**  
All flows to the River



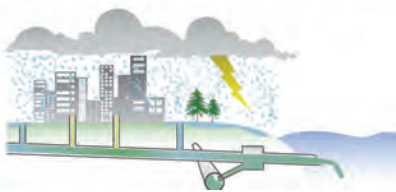
## Past

1960s: Interceptor Sewer and Sewage Treatment



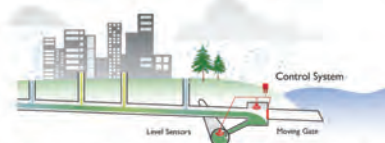
The above diagram shows how dry weather flow and some wet weather flow is captured and treated using a regulator and an interceptor sewer.

The diagram below shows how the combined sewer system overflows during heavier rainfall and snowmelt.



## Present

Real Time Control – Currently being commissioned (2010)



The above diagram shows how the new control system uses sensors to maximize flow to the sewage treatment facility. With this system, we can capture the flow from a bigger storm that would have caused an overflow in the past.

The diagram below shows how the control system will open the gate in case of extreme rainfall to avoid overload or flooding.



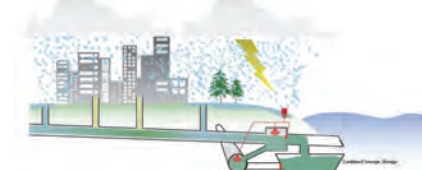
## Future

Combined Sewage Storage - Soon to be commissioned (2014)



The above diagram shows that wet weather flow from frequent rainfall events is sent to the sewage treatment facility without the need for storage.

The diagram below shows that during extreme rainfall events, excess wet weather flow is sent to a storage facility. Once the event has passed, the stored water is transferred to the interceptor sewer and treatment facility.



Past:  
Volume\*: 405,000m<sup>3</sup>

65% reduction of CSO Volume

Present:  
Volume\*: 140,000m<sup>3</sup>

100% reduction\* of CSO Volume

Future  
Volume\*: 0



\* During average annual control period of April 15 to November 15

# Évolution du réseau d'égouts unitaires d'Ottawa

**Initialement**

À l'origine, tous les débits du réseau se déversaient dans la rivière des Outaouais



## Dans la passé

Années 1960: égout intercepteur et installation de traitement des eaux usées



Le schéma ci-dessus démontre comment les débits sanitaires et une partie des débits des eaux pluviales sont récoltés et traités par le biais d'un régulateur et d'un égout intercepteur.

Le schéma ci-dessous illustre comment le système d'égouts déborde suite à la fonte des neiges.



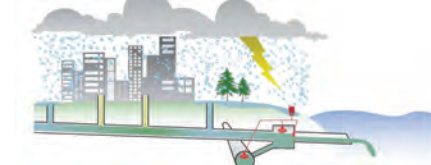
## Présentement

Système de régulation en temps réel – Mise en œuvre actuelle (2010)



L'illustration ci-dessus montre comment le système de contrôle a recours à des détecteurs de niveau afin de maximiser le débit acheminé à l'usine de traitement des eaux usées. Avec ce système en place, il est possible de récolter le débit d'une période de forte précipitation qui aurait autrefois résulté en un débordement.

L'illustration ci-dessous montre que lors des périodes de forte précipitation, le système de contrôle ouvre la barrière afin de prévenir des inondations ou la surcharge du système.



## Dans le futur

Stockage des eaux usées - Mise en œuvre prochainement (2014)



L'illustration ci-dessus montre comment le débit en période de précipitation est acheminé à l'usine de traitement des eaux usées sans avoir besoin d'être stocké.

L'illustration ci-dessous montre que lors des périodes de forte précipitation, le débit excédentaire est détourné vers un unité de stockage. Une fois la précipitation terminée, les eaux usées sont réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.



Dans le passé:  
Volume\*: 405 000m<sup>3</sup>

Volume des débordements réduit de 65%

Présentement:  
Volume\*: 140 000m<sup>3</sup>

Volume des débordements réduit de 100%\*

Dans le futur:  
Volume\*: 0m<sup>3</sup>



\* Durant la période de contrôle annuelle moyenne, du 15 avril au 15 novembre

## Alternative Solution 1- Storage Tanks Solution alternative 1- Réservoirs de stockage



\* Federal approval is required for use of this site. Approval is not guaranteed at this time.  
\* L'utilisation de ce site requiert l'approbation fédérale. Cette approbation n'est pas garantie.



Two possible tank locations have been identified in the West End. Deux emplacements potentiels ont été identifiés près du régulateur du « West End ».



Three possible tank locations have been identified near the Rideau Canal. Trois emplacements potentiels ont été identifiés près du canal Rideau.



Three possible tank locations have been identified near Keefer St., by the Rideau River. Trois emplacements potentiels ont été identifiés près de la rue Keefer, à proximité de la rivière Rideau.

**Description:** For this alternative solution, an underground storage tank would be required near each of the 3 main collector sewers near the downtown core (for a total of 3 storage tanks). One of the possible tank locations must be chosen near each of the 3 main collector sewers.

**After a heavy rainfall event:** The tanks would temporarily store combined sewage to prevent an overflow. After the event, the tanks would be emptied using small pumps and the combined sewage would be pumped back into the sewer system ultimately ending up at the wastewater treatment plant.

**Above ground control building:** Required near each tank.

**Access shafts:** Typical access covers visible at surface.

**Description:** Pour cette alternative, un réservoir souterrain serait requis près de chacun des égouts collecteurs principaux du centre-ville (pour un total de 3 réservoirs). Un des emplacements potentiels doit être choisi près de chacun des 3 égouts collecteurs.

**Suite à une forte précipitation:** Les réservoirs stockeraient temporairement les eaux usées afin d'empêcher un débordement. Une fois la précipitation terminée, les réservoirs seraient vidés avec l'aide de pompes et les eaux usées seraient réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.

**Edifice de contrôle hors-terre:** Requis à proximité de chaque réservoir.

**Puits d'accès:** Couvertures d'accès visibles à la surface.



## Alternative Solution 2- Short Storage Tunnels Solution alternative 2- Tunnels de stockage (courts)



**Description:** Pour cette solution alternative, un tunnel souterrain serait construit entre et connecterait les 3 égouts collecteurs principaux du centre-ville afin de fournir le stockage requis. Un des 2 alignements potentiels (2A-Sud ou 2B-Nord) doit être choisi.

**Suite à une forte précipitation:** Le tunnel stockerait temporairement les eaux usées afin d'empêcher un débordement. Une fois la précipitation terminée, le tunnel se viderait par gravité et les eaux usées seraient réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.

**Edifice de contrôle hors-terre:** Pas requis, puisque les contrôles pourraient être placés sous terre. Une unité de contrôle des odeurs pourrait être requise à proximité de certains puits d'accès.

**Puits d'accès:** Requis pour l'accès à chaque extrémité et au long du tunnel.



**Description:** For this alternative solution, a tunnel would be constructed between and connect the 3 main collector sewers to provide the needed storage. One of the two short tunnel alignments (2A-South or 2B-North) must be chosen.

**After a heavy rainfall event:** The tunnel would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by gravity and the combined sewage ultimately ends up at the wastewater treatment plant.

**Above ground control building:** Not required, since controls could be placed underground. A building for odor control may be necessary at some access shafts.

**Access shafts:** Required for access at each end and along the route of the tunnel.



\* Federal approval is required for tunnel alignments going through federally owned land. Approval is not guaranteed at this time.  
\* L'approbation fédérale est requise pour les sections du tunnel passant par les sites fédéraux. Cette approbation n'est pas garantie.



## Alternative Solution 2- Short Storage Tunnels Solution alternative 2- Tunnels de stockage (courts)



**Description:** Pour ces solutions alternatives, un tunnel serait construit soit le long de la rue Somerset ou en conjonction avec le tunnel de système léger sur rail (SLR) proposé au centre-ville d'Ottawa afin de connecter les 3 égouts collecteurs principaux afin de fournir le stockage requis.

**Suite à une forte précipitation:** Le tunnel stockerait temporairement les eaux usées afin d'empêcher un débordement. Une fois la précipitation terminée, le tunnel serait vidé avec l'aide de pompes et les eaux usées seraient réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.

**Edifice de contrôle hors-terre:** Requis afin de contenir les contrôles du système de chasse d'eau et les composantes de la station de pompage. Une unité de contrôle des odeurs pourrait être requise à proximité de certains puits d'accès.

**Puits d'accès:** Requis pour l'accès à chaque extrémité et au long du tunnel.

**Description:** For these alternative solutions, a tunnel would be constructed either along Somerset Street or as part of the proposed Downtown Ottawa Transit Tunnel and connect the 3 main collector sewers to provide the needed storage.

**After a heavy rainfall event:** The tunnel would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by pumps and the combined sewage ultimately ends up at the wastewater treatment plant.

**Above ground control building:** Control buildings would be necessary to house any necessary flushing system controls and to house the pump station controls. A control building for odor control may also be necessary at some access shafts.

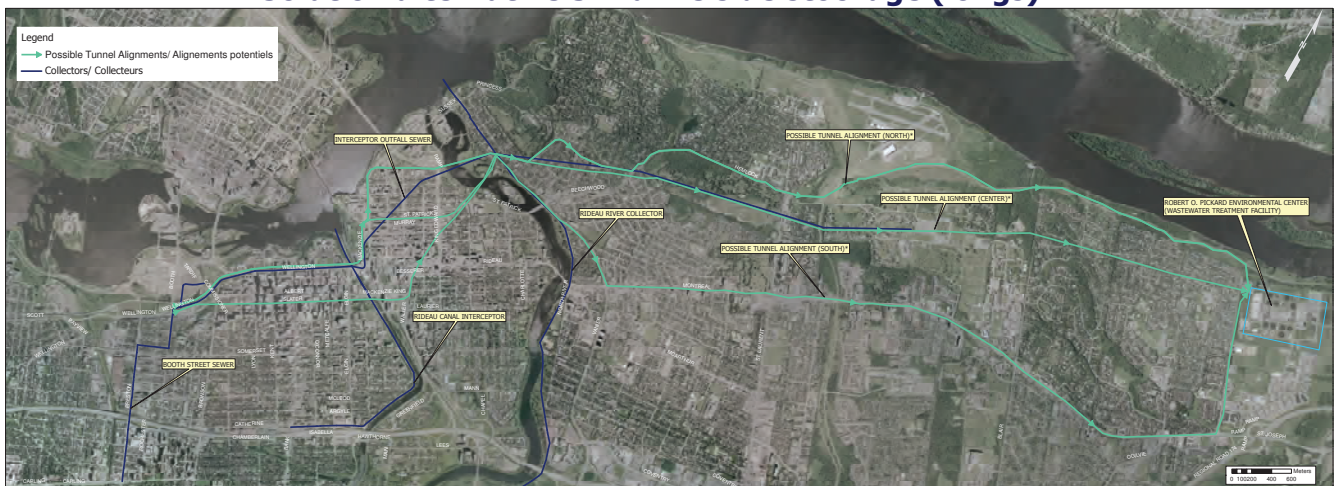
**Access shafts:** Required for access at each end and along the route of the tunnel.



\* Federal approval is required for tunnel alignments going through federally owned land. Approval is not guaranteed at this time.  
\* L'approbation fédérale est requise pour les sections du tunnel passant par les sites fédéraux. Cette approbation n'est pas garantie.



## Alternative Solution 3- Long Storage Tunnels Solution alternative 3- Tunnels de stockage (longs)



**Description:** For this alternative solution, a tunnel would be constructed between and connect the 3 main collector sewers to provide the needed storage and extend all the way to the wastewater treatment plant. One of several possible tunnel alignments must be chosen.

**After a heavy rainfall event:** The tunnel would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by gravity and the combined sewage ultimately ends up at the wastewater treatment plant.

**Above ground control building:** Not required, since controls could be placed underground. A building for odor control may be necessary at some access shafts.

**Access shafts:** Required for access at each end and along the route of the tunnel.

**Description:** Pour cette solution alternative, un tunnel souterrain serait construit entre et connecterait les 3 égouts collecteurs principaux du centre-ville afin de fournir le stockage requis. Un des plusieurs alignements potentiels doit être choisi.

**Suite à une forte précipitation:** Le tunnel stockerait temporairement les eaux usées afin d'empêcher un débordement. Une fois la précipitation terminée, le tunnel se viderait par gravité et les eaux usées seraient réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.

**Edifice de contrôle hors-terre:** Pas requis, puisque les contrôles pourraient être placés sous terre. Une unité de contrôle des odeurs pourrait être requise à proximité de certains puits d'accès.

**Puits d'accès:** Requis pour l'accès à chaque extrémité et au long du tunnel.

\* Federal approval is required for tunnel alignments going through federally owned land. Approval is not guaranteed at this time.

\* L'approbation fédérale est requise pour les sections du tunnel passant par les sites fédéraux. Cette approbation n'est pas garantie.



## Alternative Solution 4 - Tank/Tunnel Hybrids Solution alternative 4- Combinaisons tunnel/réservoir



**Description:** For this alternative solution, a tunnel would be combined with a storage tank to provide the needed storage. One of the tank/tunnel combinations (4A, 4B, or 4C) must be chosen.

**After a heavy rainfall event:** The tunnel and the storage tank would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by gravity and the storage tank would be emptied using small pumps, so the combined sewage ultimately ends up at the wastewater treatment plant.

**Above ground control building:** Required near each tank. A building for odor control may be necessary at some access shafts.

**Access shafts:** Required for access at each end and along the route of the tunnel.



**Description:** Pour cette solution alternative, un tunnel combiné à un réservoir souterrain fournirait le stockage requis. Une des combinaisons tunnel/réservoir (4A, 4B ou 4C) doit être choisie.

**Suite à une forte précipitation:** Le tunnel et le réservoir stockeraient temporairement les eaux usées afin d'empêcher un débordement. Une fois la précipitation terminée, le tunnel se viderait par gravité et le réservoir serait vidé avec l'aide de pompes et les eaux usées seraient réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.

**Édifice de contrôle hors-terre:** Requis à proximité de chaque réservoir. Une unité de contrôle des odeurs pourrait être requise à proximité de certains puits d'accès.

**Puits d'accès:** Requis pour l'accès à chaque extrémité et au long du tunnel.



\* Federal approval is required for use of this site. Approval is not guaranteed at this time.  
 \* L'utilisation de ce site requiert l'approbation fédérale. Cette approbation n'est pas garantie.

## Alternative Solution 5- Dunker's System Solution alternative 5- Système Dunker



**Description:** Cette solution alternative repose sur un système de stockage en-rivière, qui consiste en un réservoir souple près des trois déversoirs existants. L'enclos serait suspendu par des bouées (visibles à la surface) et serait seulement installé pendant la période de contrôle.

**Suite à une forte précipitation:** L'enclos en-rivière stockerait temporairement les eaux usées afin d'empêcher un débordement. Une fois la précipitation terminée, l'enclos serait vidé avec l'aide de pompes et les eaux usées seraient réacheminées vers l'usine de traitement des eaux usées.

**Édifice de contrôle hors-terre:** Requis afin de contenir les contrôles de la station de pompage.

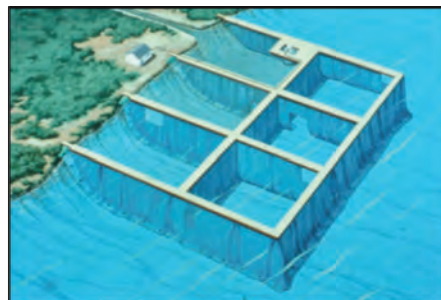
**Puits d'accès:** Pas requis.

**Description:** This alternative relies on an in-river storage system which would rely on a bladder like enclosure near the three existing outfalls. The enclosure would be suspended by buoys (floats visible at surface) and would only be installed during the control period.

**After a heavy rainfall event:** The in-river enclosure would temporarily store combined sewage to prevent an overflow. After the event, the enclosure would be emptied by pumps and the combined sewage ultimately ends up at the wastewater treatment plant.

**Above ground control building:** A control building would be necessary at each outfall to house the pump station controls.

**Access shafts:** Not required.



Schematic example of the Dunker System  
Exemple schématique du système Dunker



Note: Federal approval is required for any portion of this alternative solution proposed on federally owned land. Approval is not guaranteed at this time.

Note: L'approbation fédérale est requise pour toute portion de cette solution alternative qui est proposée d'être construite sur des terrains fédéraux. Cette approbation n'est pas garantie.



## Evaluation Methodology

Draft evaluation criteria have been developed to compare alternative combined sewage storage solutions. The draft evaluation criteria are based on City policies contained in the Wastewater Master Plan.

Proposed alternative combined sewage storage solutions will be compared and ranked against each other using a "High", "Medium", or "Low" ranking system. This type of evaluation represents the degree to which each alternative solution achieves the stated policy objective and is preferred over other alternative solutions. The results of the evaluation will be used to generate a short-list of alternative solutions for further refinement and identification of a preferred solution.

<b>L</b>	This score indicates that the alternative solution will have a Low Impact on that component and is more desirable.
<b>M</b>	This score indicates that the alternative solution will have a Medium Impact on that component and is neutral.
<b>H</b>	This score indicates that the alternative solution will have a High Impact on that component and is less desirable.

**You are invited** to review the draft evaluation criteria and provide feedback using the questionnaire provided.

**Your feedback** will help inform the study team's recommendation, and will be provided to City Council.



## Méthodologie d'évaluation

Afin de comparer les solutions alternatives pour le stockage des eaux usées, des critères d'évaluation préliminaires ont été élaborés. Les critères d'évaluation préliminaires sont basés sur les politiques de la ville contenues dans le Plan directeur des eaux usées.

Les solutions alternatives proposées de stockage des eaux usées seront comparées les unes aux autres et catégorisées à l'aide d'un système de classement « Élevé », « Moyen » et « Faible ». Ce type d'évaluation illustre le niveau de conformité de chacune des solutions alternatives par rapport à l'objectif énoncé de la politique ainsi que sa préférence sur les autres solutions alternatives. Les résultats de l'évaluation seront utilisés pour générer une courte liste de solutions alternatives qui servira pour faire le choix et le raffinement supplémentaire d'une solution alternative privilégiée.

<b>F</b>	Ce résultat indique que l'option aura un Faible impact sur cet élément et qu'il s'agit d'un choix plus souhaitable.
<b>M</b>	Ce résultat indique que l'option aura un impact Moyen sur cet élément et qu'elle n'engage aucune préférence.
<b>É</b>	Ce résultat indique que l'option aura un impact Élevé sur cet élément et qu'il s'agit d'un choix moins souhaitable.

**Nous vous invitons** à examiner les critères d'évaluation préliminaires et à nous fournir vos commentaires à l'aide du questionnaire fourni.

**Vos commentaires** aideront l'équipe d'étude à élaborer des recommandations. De plus, elle sera présentée au conseil municipal.



## Evaluation Criteria

Criteria	Rationale for Inclusion / Indicator
<b>Technical</b>	
T1 Construction Risks	<ul style="list-style-type: none"> <li>Potential for construction difficulties due to bedrock-soil-groundwater, conflicts with existing infrastructure or utilities or contaminated sites</li> </ul>
T2 Schedule	<ul style="list-style-type: none"> <li>Anticipated start time and duration of construction. Approval Needs.</li> </ul>
T3 Flexibility	<ul style="list-style-type: none"> <li>Potential for addressing other system issues and/or future regulatory changes such as treatment stormwater discharges</li> <li>Works provide additional system benefits such as flood control or system redundancy</li> </ul>
T4 Reliability/Complexity	<ul style="list-style-type: none"> <li>Complexity of operation and maintenance of the infrastructure</li> <li>Ability to consistently meet Co uncil directive for CSO control</li> </ul>
<b>Natural Environment</b>	
N1 Impact on Significant Natural Features (Terrestrial/Aquatic)	<ul style="list-style-type: none"> <li>Natural woodlands</li> <li>Provincially significant wetlands</li> <li>Area of Natural &amp; Scientific Interest (ANSI)</li> <li>River crossings or riparian area disruptions</li> </ul>
N2 Impact on Ecological processes	<ul style="list-style-type: none"> <li>Disruption to wildlife linkages</li> <li>Potential effects on known fish habitat</li> </ul>
N3 Impact on quality of receiving water	<ul style="list-style-type: none"> <li>Number and volume of wastewater overflows</li> </ul>
<b>Socio-cultural</b>	
S1 Effect on urban greenspace/open space	<ul style="list-style-type: none"> <li>Quality and quantity of open space</li> <li>Urban tree removal</li> <li>Loss of use during construction</li> </ul>
S2 Cultural heritage values or features	<ul style="list-style-type: none"> <li>Symbolic cultural value - cultural landscapes</li> <li>Potential for heritage significance - build heritage</li> <li>Requirement for special architectural treatments</li> <li>Potential for archaeological significance</li> </ul>
S3 Disruption to community	<ul style="list-style-type: none"> <li>Duration of construction</li> <li>Permanent structures that would impact views or aesthetics</li> <li>Impacts to recreational activities (events, pathways, boating)</li> <li>Impacts due to odors and/or operation and maintenance activities</li> </ul>
S4 Consistency with planning policies/processes	<ul style="list-style-type: none"> <li>Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies.</li> <li>Effect on potential site development</li> </ul>
S5 Impact on level of service	<ul style="list-style-type: none"> <li>Potential for flooding and ponding during the full range of wet weather events.</li> </ul>
S6 Property Issues	<ul style="list-style-type: none"> <li>Ownership - City owned versus publicly owned versus private</li> <li>Possible access restrictions - site security requirements</li> <li>Right of way or land acquisition needed</li> </ul>
<b>Economy</b>	
E1 Impact on businesses and land owners	<ul style="list-style-type: none"> <li>Number/extent of businesses affected (during and/or after construction)</li> <li>Duration of construction /impact</li> <li>Loss of opportunity costs</li> </ul>
E2 Affordability	<ul style="list-style-type: none"> <li>Capital cost</li> <li>Cost of property / easement</li> </ul>
E3 Sustainability	<ul style="list-style-type: none"> <li>Operation &amp; maintenance costs</li> </ul>



## Critères d'évaluation

Critères	Justification de l'inclusion/indicateur
<b>Technique</b>	
T1 Risques reliés à la construction	<ul style="list-style-type: none"> <li>Possibilité de rencontrer des difficultés de construction en raison des conditions existantes (c. à-d., géotechniques), des conflits avec l'infrastructure ou les services existants, ou des sites contaminés.</li> </ul>
T2 Horaire de construction	<ul style="list-style-type: none"> <li>Effets sur la date de début prévue et sur la durée de la phase de construction. Des approbations sont requises.</li> </ul>
T3 Flexibilité	<ul style="list-style-type: none"> <li>Possibilité de résoudre d'autres problèmes du système ou de traiter des modifications futures aux règlements, comme le traitement des eaux pluviales.</li> <li>Les travaux fournissent des bénéfices supplémentaires au système, tel que le contrôle d'inondations ou la redondance du système.</li> </ul>
T4 Fiabilité/c complexité	<ul style="list-style-type: none"> <li>Complexité/simplicité des exigences de fonctionnement et d'entretien de l'infrastructure de la solution alternative.</li> <li>Habilité de suivre les directives du Conseil pour le contrôle des débordements d'égouts unitaires.</li> </ul>
<b>Milieu naturel</b>	
N1 Effet sur des caractéristiques naturelles importantes (Terrestres et aquatiques)	<ul style="list-style-type: none"> <li>Perte de zones naturelles (déplacement ou perturbation de terrains boisés naturels)</li> <li>Terres humides (marécages) d'importance provinciale</li> <li>Zones d'intérêt naturels et scientifiques</li> <li>Dérangement des zones de traversée des cours d'eau</li> </ul>
N2 Effet sur les processus écologiques	<ul style="list-style-type: none"> <li>Effets possibles sur l'habitat connu du poisson</li> <li>Perturbation des liens avec la faune</li> </ul>
N3 Effet sur la quantité et la qualité des eaux superficielles et souterraines	<ul style="list-style-type: none"> <li>Nombre et volume des débordements d'eaux usées</li> </ul>
<b>Socio-culturel</b>	
S1 Effet sur les espaces verts et ouverts urbains	<ul style="list-style-type: none"> <li>Qualité et quantité de l'espace vert</li> <li>Déboisement urbain</li> <li>Perte d'usage pendant la construction</li> </ul>
S2 Valeur culturelle et historique	<ul style="list-style-type: none"> <li>Paysages culturels ou de valeur symbolique</li> <li>Structure ayant besoin d'avoir recours à des traitements architecturaux spéciaux</li> <li>Possibilité de désignation historique</li> <li>Possibilité de désignation archéologique</li> </ul>
S3 Perturbation de la communauté	<ul style="list-style-type: none"> <li>Durée de la construction</li> <li>Effets sur les activités récréatives</li> <li>Présence à long terme et effets de l'infrastructure</li> <li>Effets dus aux odeurs et/ou activités opérationnelles ou d'entretien</li> </ul>
S4 Cohérence avec les politiques/processus de planification	<ul style="list-style-type: none"> <li>Compatibilité avec les zones actuelles, le plan de la ceinture de verdure de la CCN, Parcs Canada, TPSGC, et autres politiques actuelles du MEO</li> <li>Effets sur le développement potentiel de certains sites</li> </ul>
S5 Effet sur le niveau de service	<ul style="list-style-type: none"> <li>Possibilité d'inondation et accumulation d'eau lors de période de précipitation</li> </ul>
S6 Questions de propriété	<ul style="list-style-type: none"> <li>Propriété publique versus municipale versus privée</li> <li>Possibilité d'accès restreints - règlements sur la sécurité des sites</li> <li>Acquisition de terrain et/ou voie de passage possiblement requise</li> </ul>
<b>Économie</b>	
E1 Effets sur les entreprises et les propriétaires fonciers	<ul style="list-style-type: none"> <li>Nombre d'entreprises affectées (pendant et/ou après la construction)</li> <li>Durée des travaux de construction et des séquences</li> <li>Pertes en coûts d'opportunité</li> </ul>
E2 Effets sur les finances municipales/capacité	<ul style="list-style-type: none"> <li>Coût en capital</li> <li>Coût des propriétés</li> </ul>
E3 Effets durables	<ul style="list-style-type: none"> <li>Coûts opérationnels et d'entretien</li> </ul>



## Next Steps in the Project

- Review and document input received from this Public Open House
- Refine the evaluation criteria and the list of alternative solutions based on feedback from this Public Open House and stakeholder meetings
- Evaluate alternative solutions and identify preferred solution
- Hold next Public Open House on evaluation of alternative solution and recommended solution. Anticipated late May/early June
- Develop functional designs for preferred alternative solution

## Étapes suivantes du projet

- Examiner et documenter les commentaires reçus par le biais de la journée portes ouvertes
- Raffiner les critères d'évaluation et la liste des solutions alternatives en fonction des commentaires obtenus de la journée portes ouvertes et des réunions d'intervenants
- Évaluer les solutions alternatives et déterminer la solution privilégiée
- Réaliser la journée portes ouvertes suivante sur l'évaluation des solutions alternatives et la solution recommandée. Date prévue : fin mai/début juin
- Élaborer des études fonctionnelles pour la solution alternative privilégiée



## Thank you!

- Thank you for coming to our Public Open House
- Please let us know what you thought by filling out a questionnaire and returning it to the registration table.
- If you have any questions about this study, feel free to ask any member of the Study Team.
- For more information you can also visit the City of Ottawa's website for this project at:  
**<http://www.city.ottawa.on.ca>**
- Following this session comments may be directed to:

### **On the Combined Sewage Storage Project: Projet de stockage des eaux usées:**

Louis Julien, Project Manager/ gestionnaire de projet

Infrastructure Services Dept.  
Div. des services d'infrastructures

100 Constellation Crescent  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext/poste 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@ottawa.ca](mailto:Louis.Julien@ottawa.ca)

## Merci!

- Nous vous remercions d'avoir assisté à notre journée portes ouvertes
- Nous vous prions de prendre un moment pour nous faire part de vos impressions en remplissant un formulaire et le ramenant à la table d'inscription.
- Si vous avez des questions au sujet de cette étude, n'hésitez pas à les poser à un membre de l'équipe d'étude.
- De plus, pour obtenir de plus amples renseignements, vous pouvez visiter le site de la ville d'Ottawa pour ce projet à l'adresse suivante : **<http://www.city.ottawa.on.ca>**
- Après cette session, vous pouvez adresser vos commentaires à :

### **On the EA Process: Processus de l'ÉE:**

Loretta Hardwick, Project Consultant/ experte-conseil de projet

Stantec Consulting Ltd.

2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)





# Combined Sewage Storage Project

EA & Functional Design  
Public Open House No. 1

March 30, 2010

One Team. Infinite Solutions.

The Stantec logo, consisting of a stylized globe icon with blue and yellow waves and the word "Stantec" in red below it.

Cleaning the River: Need your support in meeting your expectations.

A photograph of Parliament Hill in Ottawa, Canada, viewed from across the Ottawa River. In the foreground, a man and a woman are sitting on a grassy bank, looking at the water.The Stantec logo, consisting of a stylized globe icon with blue and yellow waves and the word "Stantec" in red below it.

## Agenda

- Project Background and Objectives
- EA Process
- Evaluation Criteria
- Review of Alternatives
- Next Steps



- Real Time Control
- CSO & Storm Outfall Monitoring
- Storage for CSO Control
- Sewer Separation
- Wet Weather Management
- Floatable Traps
- Public Consultation and Education
- Pinecrest Creek / Westboro Pilot
- Expand and Implement Retrofits
- ROPEC Dechlorination
- Water Environment Strategy
- Monitoring & Source Control
- Environmental Management System
- Water Quality Model

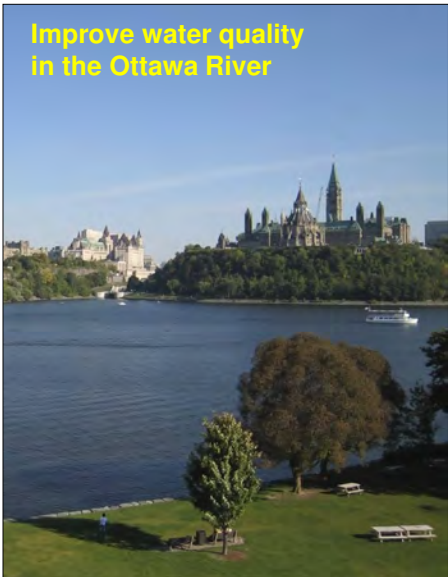


Ottawa River Action Plan  
Plan d'action de la rivière  
des Outaouais



# PROJECT OBJECTIVES

## ENHANCED CSO CONTROL – BEYOND REGULATIONS



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## Regulations for CSO Control

### MOE Procedure F-5-5: Minimum requirements

- No Sanitary Sewer Overflows ✓ Complete
- Maximize storage in Collection System and flow to Treatment Plant ✓ RTC
- Capture and treat 90% of wet weather flows ✓ RTC
- Beach Protection (as a result of CSOs) ! Storage
  - Not to exceed E.coli PWQO
  - Control to 2 overflow events per swimming season

Stantec

## Combined Sewers in Ottawa



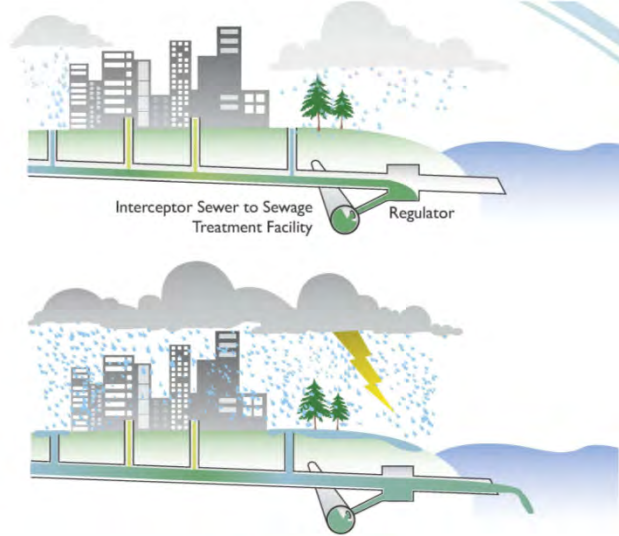
Stantec

## Originally: All flows to river



Stantec

## 1960's: Interceptor Sewer and Treatment Plant

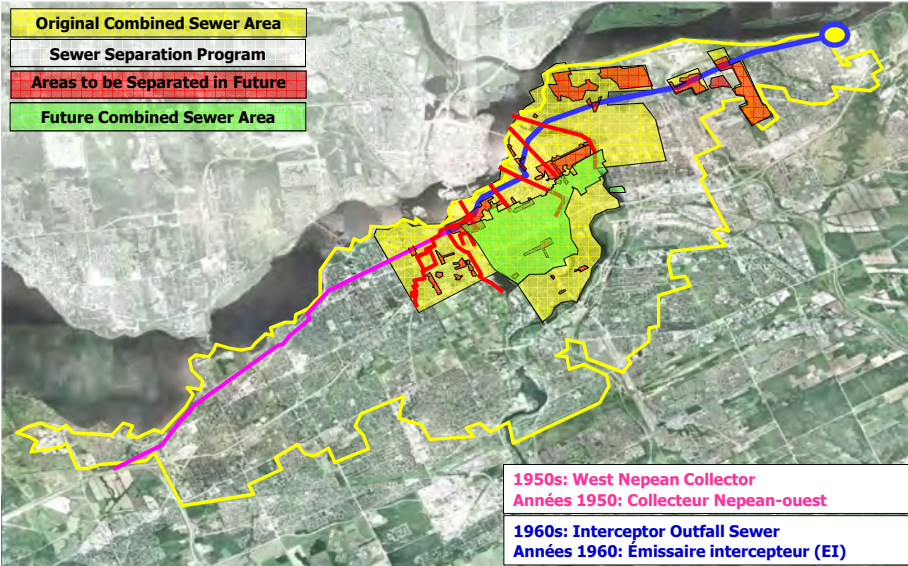


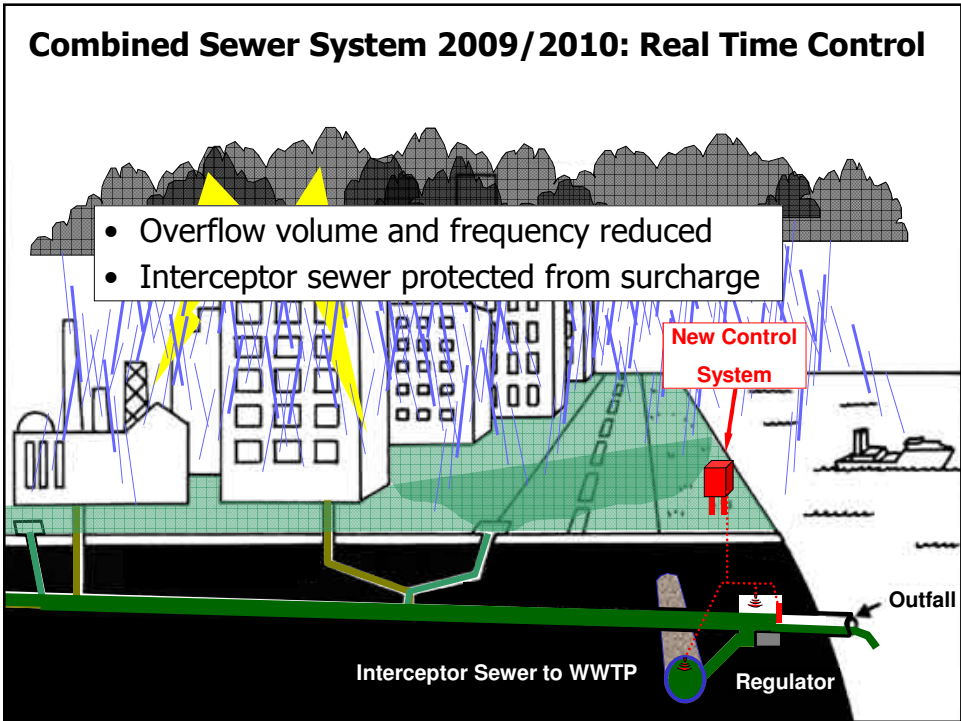
Capture/treat all dry weather flow + some storm water

Overflow during larger rainfalls



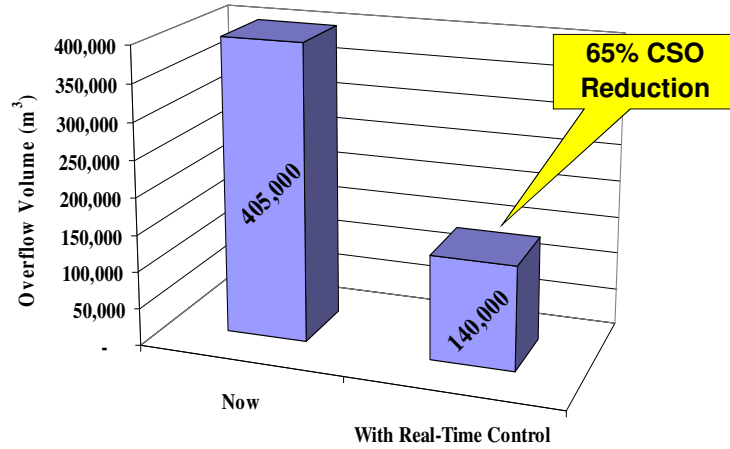
## 1970-90's Sewer Separation OTTAWA'S COMBINED SEWER SYSTEM





## System Capture Performance

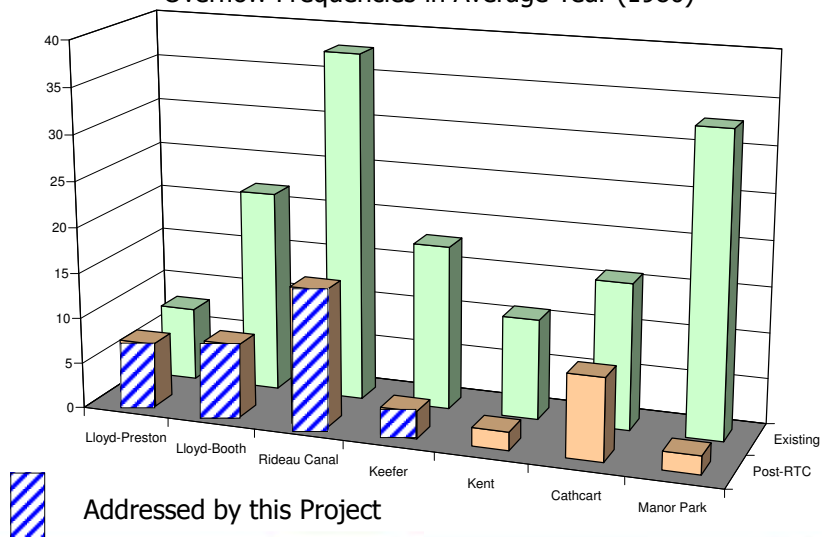
System-Wide Overflow Volume  
(Average Year - Control Period)



Stantec

## How Much Overflows and How Often?

Overflow Frequencies in Average Year (1980)



Stantec

## Problem Definition/Opportunity

### Problem Statement

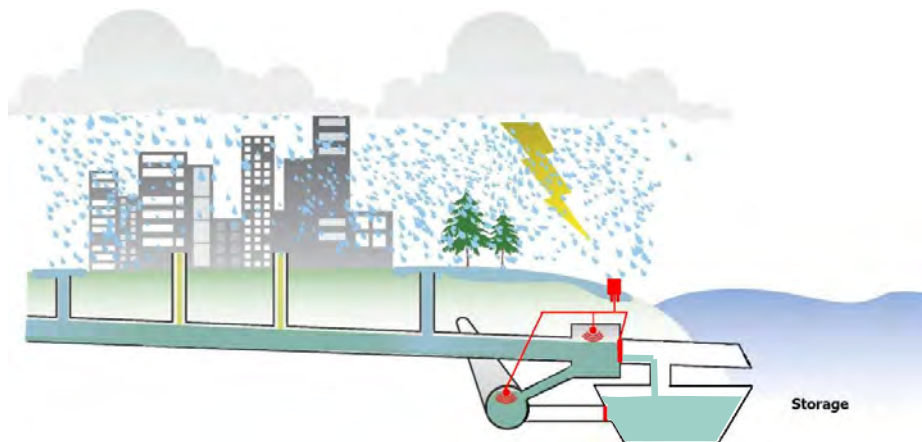
- CSOs to the Ottawa River meet most but not all provincial CSO control targets.
- The City of Ottawa adopted a policy of having zero CSO events during the swimming season in the average year (with the understanding that overflows will occur during large events).

### Opportunity

- Combined sewage storage is identified (PPCP) as the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.



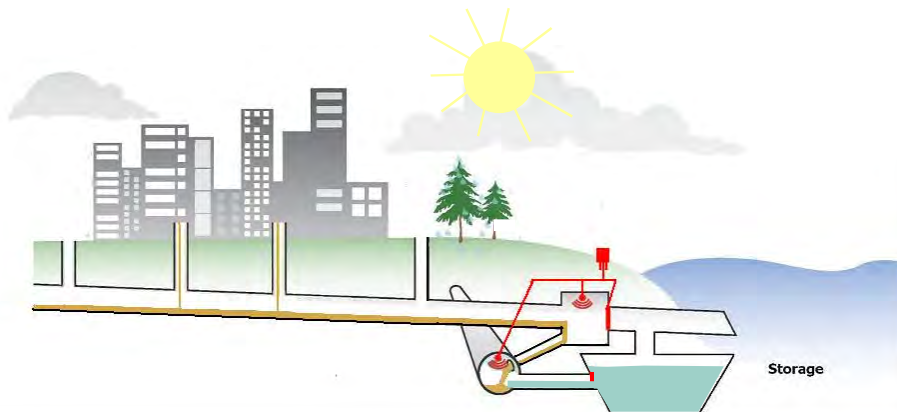
## Next: Storage to Achieve Objectives



**Capture excess during  
larger rainfalls in  
average year**



## Next: Storage to Achieve Objectives

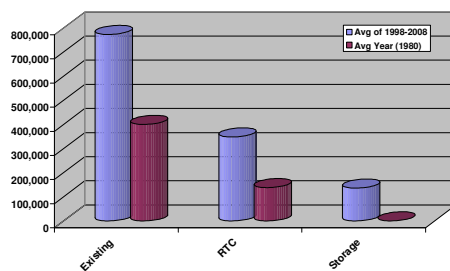


Returned to system  
when flows subside

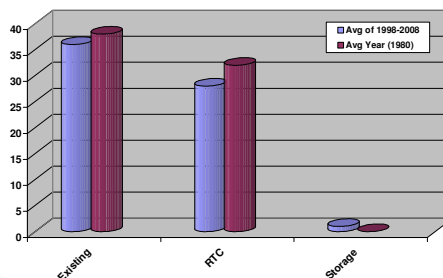
Stantec

## Impacts to the Ottawa River

Annual Volume of Overflows (m<sup>3</sup>)

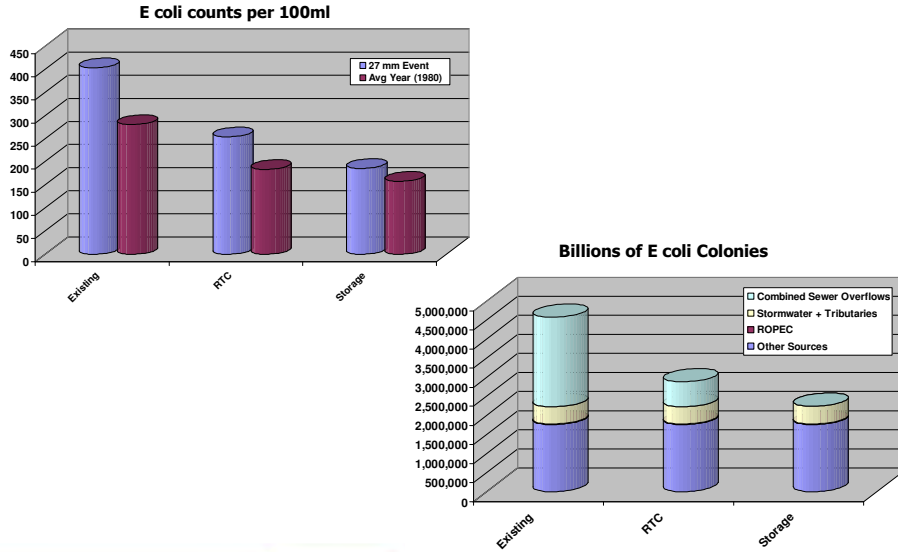


Number of Overflows Per Year



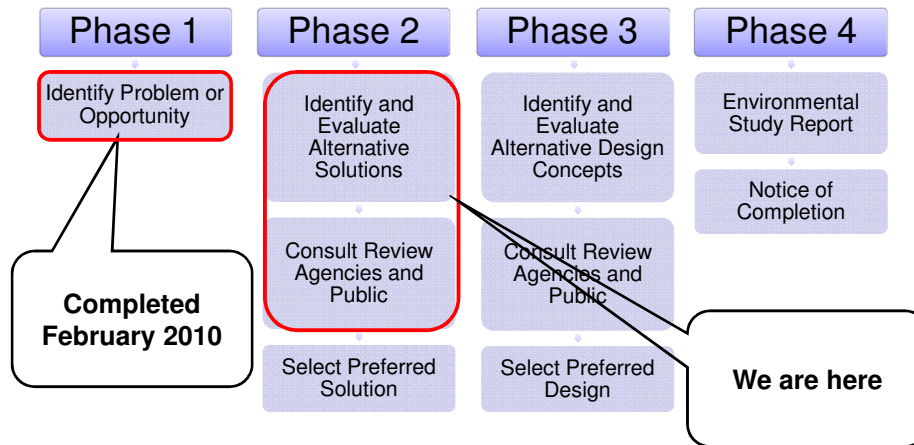
Stantec

## Impacts at Petrie Island



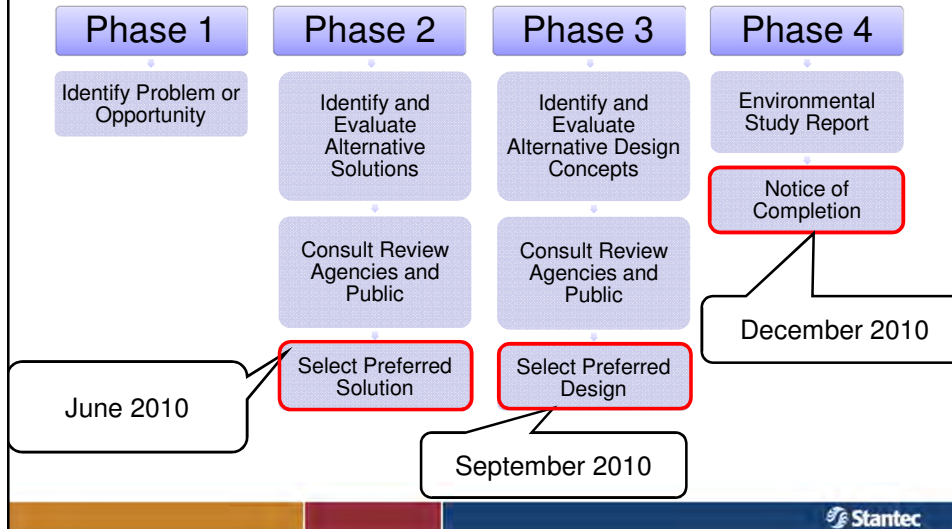
Stantec

## Municipal Class EA Process



Stantec

## Municipal Class EA Process: Anticipated Timelines



## Preliminary Evaluation Criteria

### Criteria Categories

- Natural Environment
- Socio-cultural
- Technical
- Economy

# Preliminary Evaluation Criteria

## Natural Environment

	Criteria	Rationale for inclusion
N1	Impact on Significant Natural Features (Terrestrial/Aquatic)	<ul style="list-style-type: none"> <li>Natural woodlands</li> <li>Provincially significant wetlands</li> <li>Area of Natural &amp; Scientific Interest (ANSI)</li> <li>River crossings or riparian area disruptions</li> </ul>
N2	Impact on Ecological processes	<ul style="list-style-type: none"> <li>Disruption to wildlife linkages</li> <li>Potential effects on known fish habitat</li> </ul>
N3	Impact on quality of receiving water	<ul style="list-style-type: none"> <li>Number and volume of wastewater overflows</li> </ul>

# Preliminary Evaluation Criteria

## Socio-cultural

	Criteria	Rationale for inclusion
S1	Effect on urban greenspace/open space	<ul style="list-style-type: none"> <li>Quality and quantity of open space</li> <li>Urban tree removal</li> <li>Loss of use during construction</li> </ul>
S2	Cultural heritage values or features	<ul style="list-style-type: none"> <li>Symbolic cultural value - cultural landscapes</li> <li>Potential for heritage significance - build heritage</li> <li>Requirement for special architectural treatments</li> <li>Potential for archaeological significance</li> </ul>
S3	Disruption to community	<ul style="list-style-type: none"> <li>Duration of construction</li> <li>Permanent structures that would impact views or aesthetics</li> <li>Impacts to recreational activities (events, pathways, boating)</li> <li>Impacts due to odors and/or operation and maintenance activities</li> </ul>
S4	Consistency with planning policies/processes	<ul style="list-style-type: none"> <li>Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies.</li> <li>Effect on potential site development</li> </ul>
S5	Impact on level of service	<ul style="list-style-type: none"> <li>Potential for flooding and ponding during the full range of wet weather events.</li> </ul>
S6	Property Issues	<ul style="list-style-type: none"> <li>Ownership - City owned versus publicly owned versus private</li> <li>Possible access restrictions - site security requirements</li> <li>Right of way or land acquisition needed</li> </ul>

# Preliminary Evaluation Criteria

## Technical

	Criteria	Rationale for inclusion
T1	Construction Risks	<ul style="list-style-type: none"> <li>Potential for construction difficulties due to bedrock-soil-groundwater, conflicts with existing infrastructure or utilities or contaminated sites</li> </ul>
T2	Schedule	<ul style="list-style-type: none"> <li>Anticipated start time and duration of construction. Approval Needs.</li> </ul>
T3	Flexibility	<ul style="list-style-type: none"> <li>Potential for addressing other system issues and/or future regulatory changes such as treatment stormwater discharges</li> <li>Works provide additional system benefits such as flood control or system redundancy</li> </ul>
T4	Reliability/Complexity	<ul style="list-style-type: none"> <li>Complexity of operation and maintenance of the infrastructure</li> <li>Ability to consistently meet Council directive for CSO control</li> </ul>

# Preliminary Evaluation Criteria

## Economy

	Criteria	Rationale for inclusion
E1	Impact on businesses and land owners	<ul style="list-style-type: none"> <li>Number/extent of businesses affected (during and/or after construction)</li> <li>Duration of construction/impact</li> <li>Loss of opportunity costs</li> </ul>
E2	Affordability	<ul style="list-style-type: none"> <li>Capital cost</li> <li>Cost of property / easement</li> </ul>
E3	Sustainability	<ul style="list-style-type: none"> <li>Operation &amp; maintenance costs</li> </ul>

## Evaluation Methodology

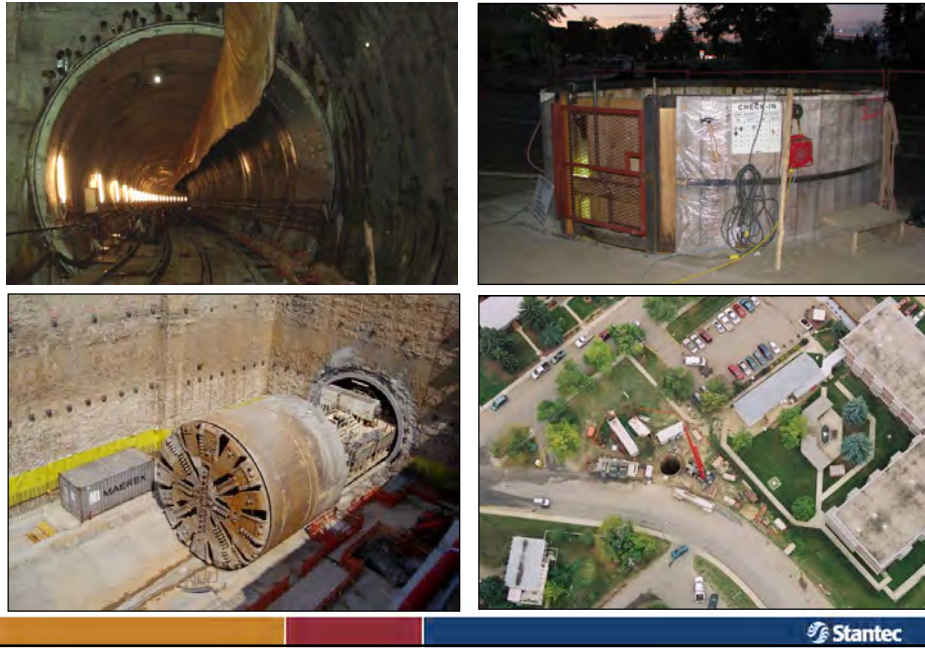
CRITERIA	ALT 1	ALT 2	ALT 3
Natural Environment	H	H	M
Socio-cultural	M	H	L
Technical	H	M	L
Economy	M	M	H

## Preliminary Evaluation Criteria

Criteria	In Relation To			Criteria
	Is More Important Than	Is As Important As	Is Less Important Than	
Natural Environment				Socio-cultural
Natural Environment				Technical
Natural Environment				Economy
Socio-cultural				Technical
Socio-cultural				Economy
Technical				Economy



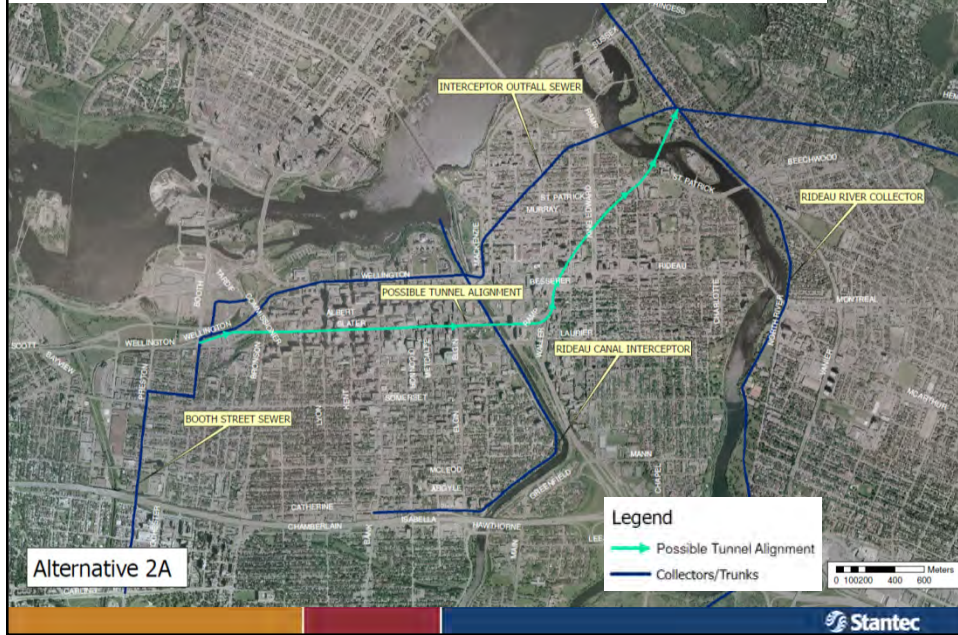
## Combined Sewage Storage: Tunnels



## Alternative Solution 1: Storage Tanks



## Alternative Solution 2: Short Tunnels



## Alternative Solution 2: Short Tunnels



## Alt 2c: Somerset Wastewater Storage Facility

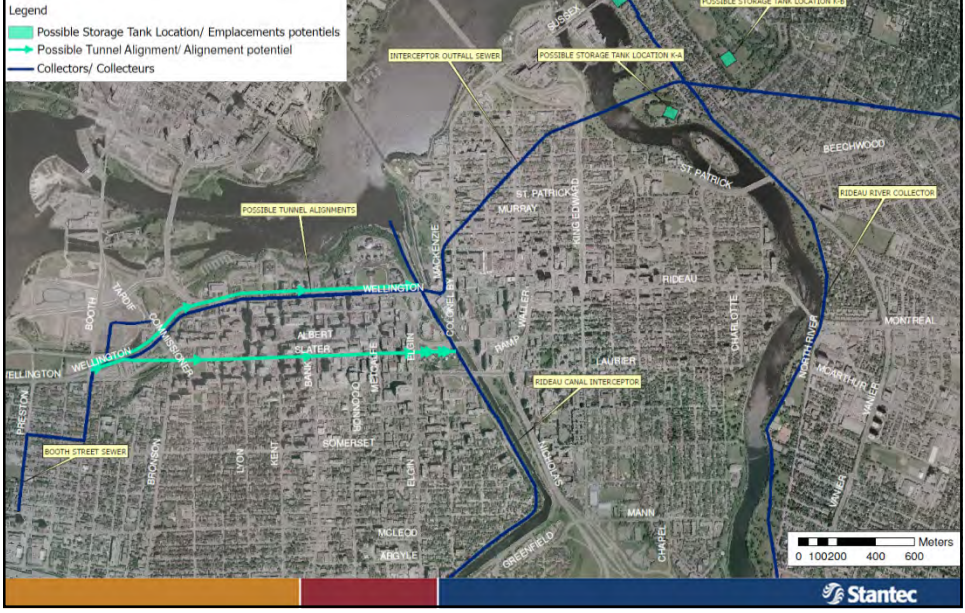


## Alt 2d: Combine Storage with DOTT

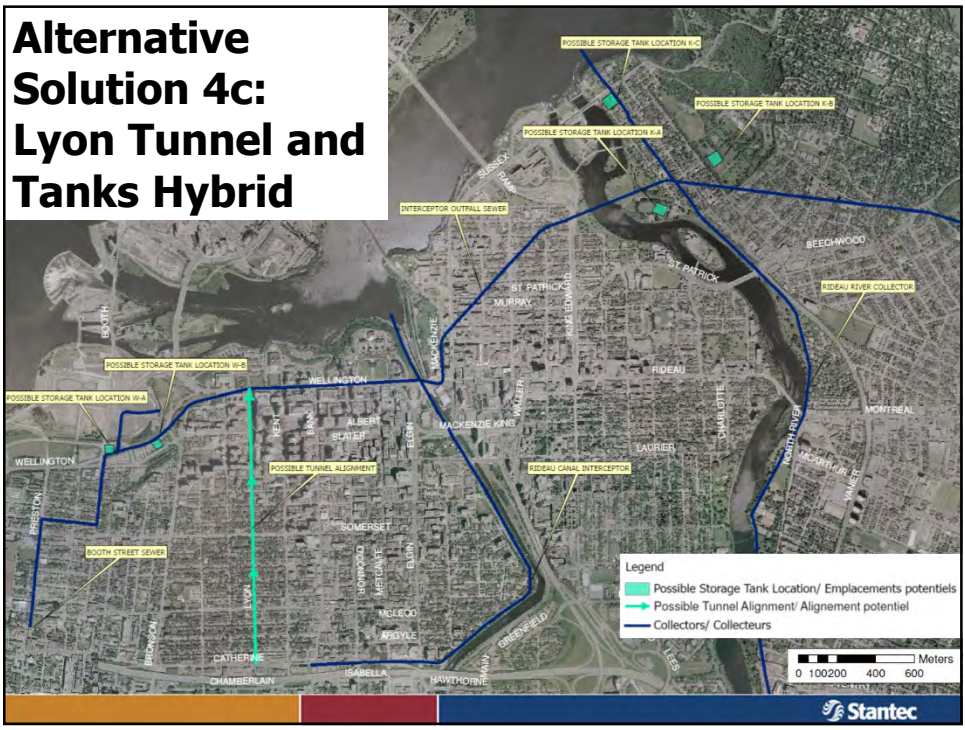




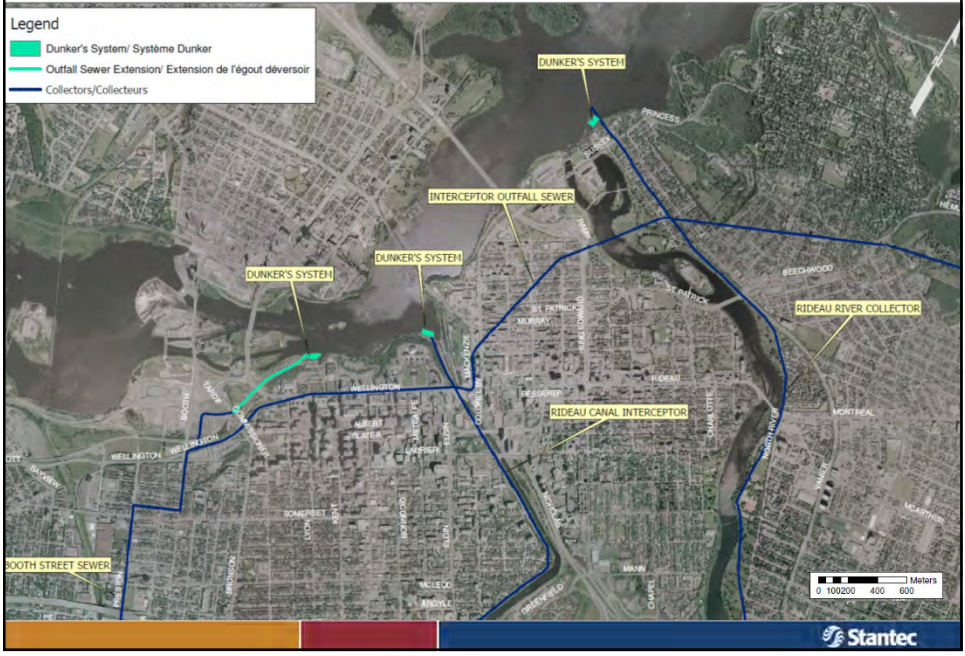
# Alternative Solution 4b: West Tunnel Hybrid



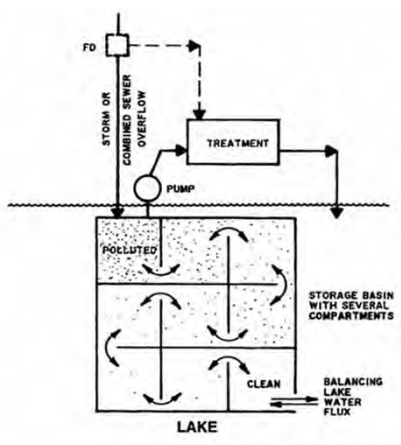
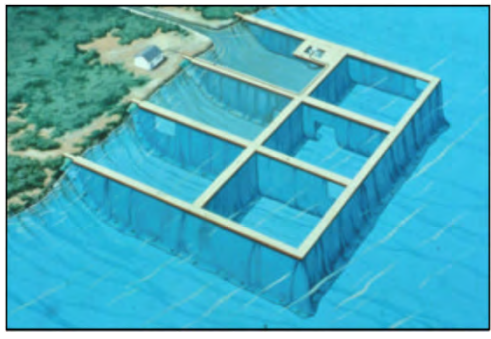
# Alternative Solution 4c: Lyon Tunnel and Tanks Hybrid



# Alternative Solution 5: Dunker's System



# Dunker's Flow Balance System



## So How Can You Help?





# Combined Sewage Storage Project Class Environmental Assessment Public Open House



March 30 and April 1, 2010

## Presentation @ 7:00 PM

Thank you for coming to the City of Ottawa Combined Sewage Storage Project Public Open House.

At this Public Open House you will learn more about the background of this project and where it is going. You will also be introduced to the environmental assessment (EA) process, how it applies to this project and its purpose.

## Background

The City of Ottawa has a working plan to protect water quality in the Ottawa River. The Ottawa River Action Plan (ORAP) identifies seventeen projects that will enable the City improve water quality in the watershed and to ensure compliance with provincial regulations.

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport combined sewage (wastewater and stormwater runoff) in the same pipe. These older systems were designed to overflow into the Ottawa River during medium and large rainfall events. This impacts the water quality of the Ottawa River.

## Problem Statement

Currently, combined sewer overflows (CSOs) to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in an average year, while accepting some overflows during rainy years or heavy rainfall events.

## Opportunity

The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified combined sewage storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

## Project Overview

The existing Interceptor-Outfall Sewer (IOS) collects wastewater (sanitary) and some stormwater from west to east across the city to the wastewater treatment plant. The IOS cannot handle all of the stormwater runoff that enters the sewer system during wet weather. Frequent and large volume overflows have been identified at three locations: West End (W), Rideau Canal (R) and Keefer (K).

Storage facilities at these locations will hold excess combined sewage until it can be transferred to the Robert O. Pickard Environmental Centre (ROPEC) for treatment. Storage facilities will lower the amount of combined sewage released to the Ottawa River during larger wet weather events. This will help to reduce the number of beach closures at Petrie Island.

Alternative sewage storage solutions could consist of storage tanks, tunnels or a combination of tanks and tunnels. Four alternative solutions are presented tonight, along with proposed criteria and methodology to evaluate them.

## The EA Process

This project is being planned as a Schedule C project in accordance with the requirements of the *Municipal Class Environmental Assessment, 2007*.



# Combined Sewage Storage Project Class Environmental Assessment Public Open House



March 30 and April 1, 2010

The Municipal Class EA is divided into five Phases.

**Phase I** for this project was completed through the ORAP consultation process. This Phase identified and described the problem and opportunity: *To achieve a service level for combined sewer overflows (CSO) of zero overflows during the swimming season in the "average year," while accepting some overflows during rainy years or very large rain events.*

The project is currently in **Phase II** of the EA process. This Phase involves the identification and evaluation of alternative solutions, including consultation, resulting in the selection of a preferred alternative solution using approved criteria.

Following Phase II, completion of the EA will involve evaluation of alternative design concepts of the preferred alternative solutions, additional consultation and filing of an environmental study report.

## Consultation

Public consultation is an important component of the Municipal Class EA process. Throughout Phase II of the EA, there will be opportunity for the public to comment at key milestones of the project. This is the first of three Public Open Houses planned for this Phase of the EA.

This Public Open House presents:

- **Alternative solutions to the problem**
- **Evaluation criteria**
- **Evaluation methodology**

As you read through the presentation boards and view the presentation, we invite you to share your feedback on the list of alternatives, evaluation criteria and methodology.

## Your input is important

The feedback we receive from this Public Open House will influence the outcome of this study, so please take the time to fill out the questionnaire and return it to us.

## Thank you!

Thank you for coming to our Public Open House. If you have any questions about this study, feel free to ask any member of the Study Team. For more **information you can also visit the City of Ottawa's** website for this project at:

[http://www.city.ottawa.on.ca/residents/waterwaste/combined\\_overflows/index\\_en.html](http://www.city.ottawa.on.ca/residents/waterwaste/combined_overflows/index_en.html)

Following this session, comments may be directed to:

### On the Combined Sewage Storage Project:

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Crescent  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext. 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@Ottawa.ca](mailto:Louis.Julien@Ottawa.ca)

### On the EA Process:

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)

## Combined Sewage Storage Project Class Environmental Assessment Evaluation Methodology

Draft evaluation criteria have been developed to compare alternative combined sewage storage solutions. The draft evaluation criteria are based on City policies contained in the Wastewater Master Plan.

Proposed alternative combined sewage storage solutions will be compared **and ranked against each other using a “High”, “Medium”, or “Low” ranking** system. This type of evaluation represents the degree to which each alternative solution achieves the stated policy objective and is preferred over other alternative solutions. The results of the evaluation will be used to generate a short-list of alternative solutions for further refinement and identification of a preferred solution.

<b>L</b>	This score indicates that the alternative solution will have a Low Impact on that component and is more desirable.
<b>M</b>	This score indicates that the alternative solution will have a Medium Impact on that component and is neutral.
<b>H</b>	This score indicates that the alternative solution will have a High Impact on that component and is less desirable.

**You are invited** to review the draft evaluation criteria and provide feedback using the questionnaire provided.

**Your feedback** will help inform the study team’s recommendation, and will be provided to City Council.

# Combined Sewage Storage Project Class Environmental Assessment Evaluation Criteria

Criteria		Rationale for Inclusion / Indicator
Technical		
T1	Construction Risks	<ul style="list-style-type: none"> <li>Potential for construction difficulties due to bedrock-soil-groundwater, conflicts with existing infrastructure or utilities or contaminated sites</li> </ul>
T2	Schedule	<ul style="list-style-type: none"> <li>Anticipated start time and duration of construction. Approval Needs.</li> </ul>
T3	Flexibility	<ul style="list-style-type: none"> <li>Potential for addressing other system issues and/or future regulatory changes such as treatment stormwater discharges</li> <li>Works provide additional system benefits such as flood control or system redundancy</li> </ul>
T4	Reliability/Complexity	<ul style="list-style-type: none"> <li>Complexity of operation and maintenance of the infrastructure</li> <li>Ability to consistently meet Council directive for CSO control</li> </ul>
Natural Environment		
N1	Impact on Significant Natural Features (Terrestrial/Aquatic)	<ul style="list-style-type: none"> <li>Natural woodlands</li> <li>Provincially significant wetlands</li> <li>Area of Natural &amp; Scientific Interest (ANSI)</li> <li>River crossings or riparian area disruptions</li> </ul>
N2	Impact on Ecological processes	<ul style="list-style-type: none"> <li>Disruption to wildlife linkages</li> <li>Potential effects on known fish habitat</li> </ul>
N3	Impact on quality of receiving water	<ul style="list-style-type: none"> <li>Number and volume of wastewater overflows</li> </ul>
Socio-cultural		
S1	Effect on urban greenspace/open space	<ul style="list-style-type: none"> <li>Quality and quantity of open space</li> <li>Urban tree removal</li> <li>Loss of use during construction</li> </ul>
S2	Cultural heritage values or features	<ul style="list-style-type: none"> <li>Symbolic cultural value - cultural landscapes</li> <li>Potential for heritage significance - build heritage</li> <li>Requirement for special architectural treatments</li> <li>Potential for archaeological significance</li> </ul>
S3	Disruption to community	<ul style="list-style-type: none"> <li>Duration of construction</li> <li>Permanent structures that would impact views or aesthetics</li> <li>Impacts to recreational activities (events, pathways, boating)</li> <li>Impacts due to odors and/or operation and maintenance activities</li> </ul>
S4	Consistency with planning policies/processes	<ul style="list-style-type: none"> <li>Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies.</li> <li>Effect on potential site development</li> </ul>
S5	Impact on level of service	<ul style="list-style-type: none"> <li>Potential for flooding and ponding during the full range of wet weather events.</li> </ul>
S6	Property Issues	<ul style="list-style-type: none"> <li>Ownership - City owned versus publicly owned versus private</li> <li>Possible access restrictions - site security requirements</li> <li>Right of way or land acquisition needed</li> </ul>
Economy		
E1	Impact on businesses and land owners	<ul style="list-style-type: none"> <li>Number/extent of businesses affected (during and/or after construction)</li> <li>Duration of construction/impact</li> <li>Loss of opportunity costs</li> </ul>
E2	Affordability	<ul style="list-style-type: none"> <li>Capital cost</li> <li>Cost of property / easement</li> </ul>
E3	Sustainability	<ul style="list-style-type: none"> <li>Operation &amp; maintenance costs</li> </ul>

## Alternative Solutions for Combined Sewage Storage within the Ultimate Combined Sewer Area

	<b>Alternative Solution #1 Storage Tanks</b>	<b>Alternative Solution #2 Short Tunnels A &amp; B</b>	<b>Alternative Solution # 2 Short Tunnels C &amp; D</b>	<b>Alternative Solution #3 Long Tunnels</b>	<b>Alternative Solution #4 Tank/Tunnel Hybrid</b>	<b>Alternative Solution #5 Dunker's System</b>
<b>Description</b>	For this alternative solution, an underground storage tank would be required near each of the 3 main collector sewers near the downtown core (for a total of 3 storage tanks). One of the possible tank locations must be chosen near each of the 3 main collector sewers.	For this alternative solution, a tunnel would be constructed between and connect the 3 main collector sewers to provide the needed storage. One of the two short tunnel alignments (2A-South or 2B-North) must be chosen.	For these alternative solution, a tunnel would be constructed either along Somerset Street or as part of the proposed Downtown Ottawa Transit Tunnel and connect the 3 main collector sewers to provide the needed storage.	For this alternative solution, a tunnel would be constructed between and connect the 3 main collector sewers to provide the needed storage and extend all the way to the wastewater treatment plant. One of several possible tunnel alignments must be chosen.	For this alternative solution, a tunnel would be combined with a storage tank to provide the needed storage. One of the tank/tunnel combinations (4A, 4B, or 4C) must be chosen.	This alternative relies on an in-river storage system which would rely on a bladder like enclosure near the three existing outfalls. The enclosure would be suspended by buoys (floats visible at surface) and would only be installed during the control period.
<b>After a heavy rainfall event</b>	The tanks would temporarily store combined sewage to prevent an overflow. After the event, the tanks would be emptied using small pumps and the combined sewage would be pumped back into the sewer system ultimately ending up at the wastewater treatment plant.	The tunnel would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by gravity and the combined sewage ultimately ends up at the wastewater treatment plant.	The tunnel would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by pumps and the combined sewage ultimately ends up at the wastewater treatment plant.	The tunnel would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by gravity and the combined sewage ultimately ends up at the wastewater treatment plant.	The tunnel and the storage tank would temporarily store combined sewage to prevent an overflow. After the event, the tunnel would empty by gravity and the storage tank would be emptied using small pumps, so the combined sewage ultimately ends up at the wastewater treatment plant.	The in-river enclosure would temporarily store combined sewage to prevent an overflow. After the event, the enclosure would be emptied by pumps and the combined sewage ultimately ends up at the wastewater treatment plant.
<b>Above ground control building</b>	Required near each tank	Not required - since controls could be placed underground. A building for odor control may be necessary at some access shafts.	Control buildings would be necessary to house any necessary flushing system controls and to house the pump station controls. A control building for odor control may also be necessary at some access shafts.	Not required - since controls could be placed underground. A building for odor control may be necessary at some access shafts.	Required near each tank	A control building would be necessary at each outfall to house the pump station controls.
<b>Access shafts</b>	Typical access covers visible from surface.	Required for access at each end and along the route of the tunnel.	Required for access at each end and along the route of the tunnel.	Required for access at each end and along the route of the tunnel.	Required for access at each end and along the route of the tunnel. A building for odor control may be necessary at some access shafts.	Not required.



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



*After having reviewed all of the project information provided at this meeting, please complete this questionnaire and return it to the box at the entrance. Should you require assistance or clarification while completing the questionnaire please see any City staff or Stantec during this Open House.*

**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant ( )

Please Specify: \_\_\_\_\_

**2. There are 5 alternative solutions, which consist of storage tanks, tunnels or a combination. Do you have comments about any of the proposed alternative solutions being considered?**

Alternative Solution	Comments
<b>#1 Storage Tanks</b>	
<b>#2 Storage Tunnels (short) A &amp; B</b>	
<b>#2 Storage Tunnels (short) C &amp; D</b>	
<b>#3 Storage Tunnels (long)</b>	
<b>#4 Tank/Tunnel Hybrid</b>	
<b>#5 Dunker's System</b>	

# Combined Sewage Storage Project Class Environmental Assessment Questionnaire

**3. We will evaluate each set of alternative solutions using the criteria categories: Natural Environment, Socio-cultural, Technical and Economy listed below. Do you have any comments on the evaluation criteria presented?**

**4. By using a check mark (✓), please indicate the level of importance each category of evaluation criteria in the left-most column has in relation to the one in the right-most column.**

Criteria	In Relation To			Criteria
	Is More Important Than	Is As Important As	Is Less Important Than	
Natural Environment				Socio-cultural
Natural Environment				Technical
Natural Environment				Economy
Socio-cultural				Technical
Socio-cultural				Economy
Technical				Economy



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**5. Are there any other criteria that you feel should be included?**

**6. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

**7. Do you have any additional comments you would like to make?**



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



## Thank you for participating!

To ensure that your comments are considered during the evaluation of alternatives, please return this completed **Comment Sheet** no later than **April 30, 2010**

Paper copies of the information posters can be mailed upon request. Alternately, they can be found on the City of Ottawa's website for this project at:

[http://www.city.ottawa.on.ca/residents/waterwaste/combined\\_overflows/index\\_en.html](http://www.city.ottawa.on.ca/residents/waterwaste/combined_overflows/index_en.html)

The comments you have provided above will be used for the purposes of creating an environmental assessment report which will be a part of the public record and will be made available to individuals or organizations with an interest in this project. Please indicate below (mark an X in the brackets) if you consent to the inclusion of your name, address and telephone number in the report. If you do not mark either selection below, we will assume, for the purposes of documentation, that you wish to have your name, address and telephone number be kept confidential.

( ) I consent to my name, address and telephone number being included in the report as part of the public record for this project.

( ) I wish my name, address and telephone number to be kept confidential and not included in the report as part of the public record for this project.

<b>Name:</b>	
<b>Address:</b>	
<b>Phone/Fax No.:</b>	
<b>Email:</b>	



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



*After having reviewed all of the project information provided at this meeting, please complete this questionnaire and return it to the box at the entrance. Should you require assistance or clarification while completing the questionnaire please see any City staff or Stantec during this Open House.*

**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant ( )

Please Specify: \_\_\_\_\_

**2. There are 5 alternative solutions, which consist of storage tanks, tunnels or a combination. Do you have comments about any of the proposed alternative solutions being considered?**

Alternative Solution	Comments
#1 Storage Tanks	What is the time projected in the completion of this project?
#2 Storage Tunnels (short) A & B	Has routes been picked that have bedrock close enough to the surface
#2 Storage Tunnels (short) C & D	for the lengths of both short and long tunnel systems?
#3 Storage Tunnels (long)	What is the maximum depth the tunnel from ground level
#4 Tank/Tunnel Hybrid	
#5 Dunker's System	



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**3. We will evaluate each set of alternative solutions using the criteria categories: Natural Environment, Socio-cultural, Technical and Economy listed below. Do you have any comments on the evaluation criteria presented?**

**4. By using a check mark (✓), please indicate the level of importance each category of evaluation criteria in the left-most column has in relation to the one in the right-most column.**

Criteria	In Relation To			Criteria
	Is More Important Than	Is As Important As	Is Less Important Than	
Natural Environment	✓			Socio-cultural
Natural Environment		✓		Technical
Natural Environment		✓		Economy
Socio-cultural			✓	Technical
Socio-cultural			✓	Economy
Technical			✓	Economy



**Combined Sewage Storage Project  
Class Environmental Assessment  
Questionnaire**



**5. Are there any other criteria that you feel should be included?**

Why was 1980 picked for the year of average rainfall when in recent years more water has fallen.

**6. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

**7. Do you have any additional comments you would like to make?**

With sewage pouring into the regulators has a system been developed to prevent clogging of the hatches blocking them opened or closed? Is such a case possible?



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**Thank you for participating!**

To ensure that your comments are considered during the evaluation of alternatives, please return this completed **Comment Sheet** no later than **April 30, 2010**

Paper copies of the information posters can be mailed upon request. Alternately, they can be found on the City of Ottawa's website for this project at:

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<b>Name:</b>	
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<b>Phone/Fax No.:</b>	
<b>Email:</b>	



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



*After having reviewed all of the project information provided at this meeting, please complete this questionnaire and return it to the box at the entrance. Should you require assistance or clarification while completing the questionnaire please see any City staff or Stantec during this Open House.*

**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant ( )

Please Specify: HOMEOWNER  
TAXPAYER

**2. There are 5 alternative solutions, which consist of storage tanks, tunnels or a combination. Do you have comments about any of the proposed alternative solutions being considered?**

Alternative Solution	Comments
#1 Storage Tanks	
#2 Storage Tunnels (short) A & B	
#2 Storage Tunnels (short) C & D	
#3 Storage Tunnels (long)	
#4 Tank/Tunnel Hybrid	
#5 Dunker's System	



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**3. We will evaluate each set of alternative solutions using the criteria categories: Natural Environment, Socio-cultural, Technical and Economy listed below. Do you have any comments on the evaluation criteria presented?**

WELL PRESENTED.  
IDENTIFICATION OF COSTS WOULD BE HELPFUL

**4. By using a check mark (✓), please indicate the level of importance each category of evaluation criteria in the left-most column has in relation to the one in the right-most column.**

Criteria	In Relation To			Criteria
	Is More Important Than	Is As Important As	Is Less Important Than	
Natural Environment	✓			Socio-cultural
Natural Environment		✓		Technical
Natural Environment		✓		Economy
Socio-cultural			✓	Technical
Socio-cultural		✓		Economy
Technical		✓		Economy



**Combined Sewage Storage Project  
Class Environmental Assessment  
Questionnaire**



**5. Are there any other criteria that you feel should be included?**

**6. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

**7. Do you have any additional comments you would like to make?**



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**Thank you for participating!**

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Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant ( )

Please Specify: Educational

**2. There are 5 alternative solutions, which consist of storage tanks, tunnels or a combination. Do you have comments about any of the proposed alternative solutions being considered?**

Alternative Solution	Comments
#1 Storage Tanks	
#2 Storage Tunnels (short) A & B	
#2 Storage Tunnels (short) C & D	
#3 Storage Tunnels (long)	
#4 Tank/Tunnel Hybrid	
#5 Dunker's System	<p><i>This solution deserves consideration beyond the criteria of high O&amp;M costs</i></p> <p><i>It seems that it could be cost effective (at least in the short term).</i></p>

## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



3. We will evaluate each set of alternative solutions using the criteria categories: Natural Environment, Socio-cultural, Technical and Economy listed below. Do you have any comments on the evaluation criteria presented?

*As suggested in item 5) perhaps there is a way to separate criteria in short and long term.*

4. By using a check mark (✓), please indicate the level of importance each category of evaluation criteria in the left-most column has in relation to the one in the right-most column.

Criteria	In Relation To			Criteria
	Is More Important Than	Is As Important As	Is Less Important Than	
Natural Environment	✓			Socio-cultural
Natural Environment		✓		Technical
Natural Environment	✓		<del>✓</del>	Economy
Socio-cultural			✓	Technical
Socio-cultural		✓		Economy
Technical	✓			Economy



**Combined Sewage Storage Project  
Class Environmental Assessment  
Questionnaire**



**5. Are there any other criteria that you feel should be included?**

*long term vs. short term benefits & effects*

**6. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

**7. Do you have any additional comments you would like to make?**



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



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## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



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**1. Please describe your interest in this project (please check one):**

Landowner ()    Agency ()    Municipal ()    Interest Group ()    Consultant ()

Please Specify: own + live in Dalhousie (West part of Centretown)  
 + member of CC CA. Since a lot of " " roads/streets  
 have undergone/are undergoing major sewer/tunnel reconstruction  
 anything that might expand this activity

**2. There are 5 alternative solutions, which consist of storage tanks, tunnels or a combination. Do you have comments about any of the proposed alternative solutions being considered?**

Alternative Solution	Comments
#1 Storage Tanks	convince me this isn't going to be the best solution.
#2 Storage Tunnels (short) A & B	
#2 Storage Tunnels (short) <u>C &amp; D</u>	definitely not a good idea
#3 Storage Tunnels (long)	
#4 Tank/Tunnel Hybrid	to - under Lyon & relieve Gable!
#5 Dunker's System	FORGET THIS ONE!

in all neighbour hood has to see evaluate



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



3. We will evaluate each set of alternative solutions using the criteria categories: Natural Environment, Socio-cultural, Technical and Economy listed below. Do you have any comments on the evaluation criteria presented?

The division "Natural Environment" should be revised because 3 of the "Socio-cultural" criteria is environmental, ~~not~~ yes, but environmental. The division should be "Environment" with 2 sub-categories: 1) "natural" 2) urban "green"

4. By using a check mark (✓), please indicate the level of importance each category of evaluation criteria in the left-most column has in relation to the one in the right-most column.

Criteria	In Relation To			Criteria
	Is More Important Than	Is As Important As	Is Less Important Than	
Natural Environment	✓			Socio-cultural
Natural Environment	✓			Technical
Natural Environment		✓		Economy
Socio-cultural	✓			Technical
Socio-cultural		✓		Economy
Technical		✓		Economy

⚠ This is a fallacious comparison. In the long run, our economy MUST be based on safeguarding the natural environment or the economy will be wrecked.



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**5. Are there any other criteria that you feel should be included?**

**6. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

**7. Do you have any additional comments you would like to make?**

*Handwritten notes:*

100 Upper Lawrence Blvd  
R10 100

100 Upper Lawrence Blvd  
R10 100



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



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<b>Phone/Fax No.:</b>	
<b>Email:</b>	

**A-8**  
**Public Open House #2 Materials**

# Welcome to the City of Ottawa Combined Sewage Storage and Functional Design Project

Municipal Class Environmental Assessment  
Public Open House

# Bienvenue au projet de stockage et d'étude fonctionnelle visant les SEU de la ville d'Ottawa

Évaluation environnementale municipale de portée  
générale Journée porte ouverte



Please Sign In



Veillez vous inscrire

Take a comment sheet and information package to record your thoughts as you review the display materials and watch the presentation

City Staff and the Study Team are available to answer your questions

Public input will influence this study; please take the time to fill out a questionnaire and return it to the registration table

Prenez une fiche de commentaires et une trousse de renseignements pour prendre notes de vos impressions pendant que vous examinerez le matériel présenté et que vous assisterez à la présentation.

Le personnel de la ville ainsi que l'équipe d'étude se feront un plaisir de répondre à vos questions

Cette étude sera influencée par les commentaires du public. Pour cette raison, nous vous prions de prendre un moment pour remplir un formulaire et le ramener à la table d'inscription.



## Introduction

### Background

The City of Ottawa has a working plan to protect water quality in the Ottawa River. The Ottawa River Action Plan (ORAP) identifies seventeen projects that will enable the City to improve water quality in the watershed and ensure compliance with provincial regulations.

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport combined sewage (wastewater and stormwater runoff) in the same pipe. These older systems were designed to overflow into the Ottawa River during medium and large rainfall events. This impacts the water quality of the Ottawa River.

### Problem Statement

Currently, combined sewer overflows (CSOs) to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in an average year, while accepting some overflows during rainy years or heavy rainfall events.

### Opportunity

The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified combined sewage storage within the Ultimate Combined Sewer Area as the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

### Contexte

La ville d'Ottawa dispose d'un plan de travail pour protéger la qualité de l'eau de la rivière des Outaouais. Le Plan d'action de la rivière des Outaouais (PARO) identifie dix-sept projets qui permettront à la ville d'améliorer la qualité de l'eau du bassin-versant et de s'assurer de conformer entièrement aux règlements provinciaux.

Comme la plupart des municipalités, la ville d'Ottawa possède des égouts unitaires, dans les secteurs les plus anciens de la ville, qui transportent aussi bien les eaux de ruissellement que les eaux usées. Ces systèmes plus anciens sont conçus pour déborder dans la rivière des Outaouais lors de précipitations moyennes et extrêmes. Ceci a une influence sur la qualité de l'eau de la rivière des Outaouais.

### Énoncé du problème

Actuellement, les débordements d'égouts unitaires (DEU) dans la rivière des Outaouais ne sont pas entièrement conformes aux objectifs de contrôle des DEU fixés par le ministère de l'Environnement. En février 2010, la ville d'Ottawa a adopté une politique afin de n'avoir aucun événement de DEU pendant la saison de baignade lors d'une année normale, en acceptant un certain nombre de débordements au cours d'années très pluviales ou lors d'événements extrêmes.

### Opportunité

Le plan de prévention et de contrôle de la pollution de la ville pour la zone d'égouts unitaires a permis de déterminer que le stockage des DEU dans la dernière zone d'égouts unitaires constituait la méthode la plus rentable pour réduire les DEU au-delà des exigences minimales des règlements.



## Project Overview

The Interceptor-Outfall Sewer (IOS) collects wastewater (sanitary) and some stormwater from west to east across the city to the wastewater treatment plant. The IOS cannot handle all of the stormwater runoff that enters the sewer system during wet weather. Frequent and large volume overflows have been identified at three locations: West End (W), Rideau Canal (R) and Keefer (K) regulators.

Storage facilities at these locations will hold excess combined sewage until it can be transferred to the Robert O. Pickard Environmental Centre (ROPEC) for treatment. Storage facilities will lower the amount of combined sewage released to the Ottawa River during larger wet weather events. This will help to reduce the number of beach closures at Petrie Island.

### Project Objectives

When implemented, the Combined Sewage Storage Project will:

- Reduce CSOs from the Ultimate Combined Sewer Area
- Improve water quality in the Ottawa River
- Assist City in coming into compliance with Ministry of Environment's Procedure F-5-5

A **combined sewer** collects and transports sanitary wastewater and stormwater runoff in a single pipe.

An **interceptor sewer** captures all of the wastewater flow from the combined sewers and carries it to the wastewater treatment plant for processing during dry weather conditions.

A **combined sewer overflow**, or CSO, occurs when wastewater and stormwater from a combined sewer system are discharged directly into a local waterbody because the flow rate exceeds the capacity of the interceptor sewer lines.



## Aperçu du Projet

L'égout de décharge – intercepteur (ÉDI) recueille les eaux usées (sanitaires) et certaines eaux de ruissellement, d'ouest en est de la ville et les achemine vers l'usine de traitement des eaux usées. L'ÉDI n'est pas en mesure de recevoir toute l'eau de ruissellement qui y entre en période de précipitation. Des débordements fréquents et de volumes importants ont été identifiées à trois emplacements : aux régulateurs du « West End » (W), du canal Rideau (R) et de la rue Keefer (K).

À ces emplacements, les installations de stockage recueilleront les excédents d'eaux usées jusqu'à ce qu'elles puissent être transférées au Centre environnemental R.-O.-Pickard (CEROP) pour y être traitées. Les installations de stockage de eaux usées réduiront la quantité d'eaux d'égouts diluées rejetée dans la rivière des Outaouais pendant les périodes de précipitation. Cela aidera à réduire le nombre de fermetures de la plage de l'île Petrie.

### Objectifs du projet

Une fois qu'il aura été mis en œuvre, le projet de stockage des eaux usées aidera de la manière suivante :

- Il réduira les DEU provenant de la zone ultime d'égouts unitaires
- Il améliorera la qualité de l'eau de la rivière des Outaouais
- Il assistera à la Ville à atteindre la conformité à la procédure F-5-5 du ministère de l'Environnement

Un **égout unitaire** recueille et transporte les eaux usées sanitaires et les eaux de ruissellement dans un seul tuyau.

Lorsque le temps est sec, un **égout intercepteur** capture le débit des eaux usées provenant des égouts unitaires et le transporte vers l'usine de traitement des eaux usées.

Un **débordement d'égouts unitaires**, ou DEU, se produit lorsque les eaux usées et l'eau de ruissellement provenant d'un système d'égouts unitaires sont déchargées directement dans une étendue d'eau parce que le débit d'écoulement dépasse la capacité de l'intercepteur.



## Project Overview

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## Aperçu du Projet

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### Objectifs du projet

Une fois qu'il aura été mis en œuvre, le projet de stockage des eaux usées aidera de la manière suivante :

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Un **débordement d'égouts unitaires**, ou DEU, se produit lorsque les eaux usées et l'eau de ruissellement provenant d'un système d'égouts unitaires sont déchargées directement dans une étendue d'eau parce que le débit d'écoulement dépasse la capacité de l'intercepteur.



## Municipal Class Environmental Assessment Process

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the ultimate combined sewer area and thereby reduce CSOs to the Ottawa River.

### Phase I

Was completed through the ORAP process. This Phase identified and described the problem and opportunity: **To achieve a service level for combined sewer overflows (CSO) of zero overflows during the swimming season in the "average year," while accepting some overflows during rainy years or very large rain events.**

### Phase II

The project is currently in Phase II of the EA process. This Phase involves the identification and evaluation of alternative solutions, including consultation, resulting in the selection of a preferred alternative solution. This project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007, which is an approved process under the Environmental Assessment Act.

Following Phase II, completion of the EA will involve evaluation of alternative design concepts of the preferred alternative solutions, additional consultation and filing an environmental study report.

## Processus d'évaluation environnementale municipale de portée générale

La Ville d'Ottawa mène actuellement une évaluation environnementale et une étude fonctionnelle en vue de désigner et d'élaborer une solution qui permettra la mise à disposition d'installations supplémentaires de stockage dans la zone ultime d'égouts unitaires et, par conséquent, une réduction des débordements d'égouts unitaires (DEU) dans la rivière des Outaouais.

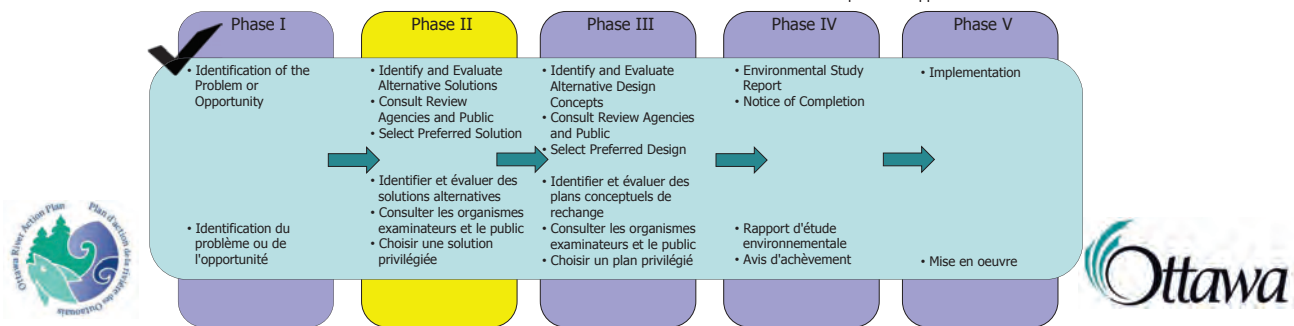
### Phase I

Elle a été complétée par l'entremise du processus du PARO. Cette phase a permis d'identifier et de décrire le problème et l'opportunité : **Atteindre un niveau de service correspondant à aucun débordement d'égouts unitaires (DEU) pendant la saison de baignade; pour une « année normale », en acceptant un certain nombre de débordements au cours d'années très pluviales ou lors d'événements extrêmes.**

### Phase II

Le projet se trouve actuellement à la phase II du processus d'ÉE. Cette phase implique l'identification et l'évaluation d'une solution, incluant des périodes de consultation publique résultant en la sélection de la solution alternative privilégiée. Ce projet est planifié sous la forme d'un projet de l'annexe C conformément aux exigences d'une évaluation environnementale municipale de portée générale, 2007, qui constitue un processus approuvé en vertu de la loi sur les évaluations environnementales.

Suite à la phase II, l'achèvement de l'ÉE impliquera l'évaluation d'alternatives de conception de la solution alternative privilégiée, des consultations publiques additionnelles et le dépôt d'un rapport d'étude environnementale.



## Consultation

Consultation is a key component of an environmental assessment (EA).

The purpose of consultation is to raise awareness and to solicit input fulfilled in part through Public Open Houses. Throughout Phase II of the EA, there will be opportunity for the public to comment at key milestones of the project. This is the first of three Public Open Houses planned for this Phase of the EA.

### This Public Open House presents:

- Alternative solutions to the problem
- Evaluation criteria
- Evaluation methodology

As you read through the presentation boards and view the presentation, we invite you to share your feedback on the list of alternative solution and evaluation criteria.

### Your input is important!

...and your comments will influence this project. So please take the time to give us your feedback by filling out a questionnaire and returning it to the registration table.

La consultation est un élément clé d'une évaluation environnementale (ÉE).

Elle vise à sensibiliser le public et à obtenir des commentaires, en partie par des journées portes ouvertes. Tout au long de la phase II de l'ÉE, le public aura l'occasion de se faire entendre à des étapes clés du projet. Il s'agit de la première de trois journées portes ouvertes planifiées pour cette phase de l'ÉE.

### Cette journée portes ouvertes présentera les éléments suivants :

- Des solutions alternatives au problème
- Les critères d'évaluation
- La méthodologie d'évaluation

Au fur et à mesure que vous examinerez les tableaux de présentation et lorsque vous regarderez la présentation, nous vous invitons à nous faire part de vos commentaires sur la liste des solutions alternatives et les critères d'évaluation.

### Votre participation est importante pour nous!

...et vos commentaires auront un impact sur ce projet. Par conséquent, nous vous prions de prendre un moment pour remplir un formulaire et le ramener à la table d'inscription.



# Analysis of Short-Listed Alternatives/Evaluation des solutions privilégiées

	Alt. 2a: Core Tunnel South Alt. 2a: Tunnel court, alignement sud	Alt. 2b: Core Tunnel North Alt. 2b: Tunnel court, alignement nord	Alt. 3: Long Tunnel Alt. 3: Tunnel long
<b>Technical Technique</b>	<ul style="list-style-type: none"> <li>+ Less congestion near Rideau Canal Interceptor simplifies design and reduces construction risks</li> <li>- Special attention required to cross the proposed downtown transit tunnel near Laurier</li> <li>- Less effective location to intercept Rideau Canal Interceptor flows. Leads to more complex operation and need to retrofit Rideau Canal Regulator to maintain level of service during flood events</li> <li>+ Moins de congestion près de l'intercepteur du canal Rideau - simplifie et réduit les risques durant la construction</li> <li>- Attention particulière requise pour traverser le tunnel de transport en commun proposé</li> <li>- Endroit le moins efficace pour intercepter les débits de l'intercepteur du canal Rideau. Résulte en une opération plus complexe et un besoin d'adapter le régulateur du canal Rideau afin de prévenir les inondations.</li> </ul>	<ul style="list-style-type: none"> <li>+ Most effective location to intercept flows from Rideau Canal Interceptor</li> <li>- Underground canyons near Rideau Canal and convergence of bedrock faults may require significant ground improvements</li> <li>- Alignment adjacent to proposed downtown transit tunnel, Château Laurier and American Embassy requires sharp turns leading to more complex design and increased costs</li> <li>+ Endroit le plus efficace pour intercepter les débits de l'intercepteur du canal Rideau.</li> <li>- Canyons souterrain proche du canal Rideau et convergence des failles du substratum rocheux nécessiter des améliorations au sol</li> <li>- Alignement adjacent au tunnel de transport en commun proposé, au Château Laurier et à l'ambassade américaine - requiert des virages abruptes, résultant en une conception plus complexe et des coûts plus élevés.</li> </ul>	<p>Refer to comments for Alternatives 2a / 2b for tunnel section through City core</p> <p>Se référer aux commentaires pour les alternatives 2a / 2b pour la section centre ville du tunnel</p> <ul style="list-style-type: none"> <li>- Presence of deep clay overburden east of Blair Rd requires different tunneling equipment and increases risks of overhead settlements</li> <li>- Construction at bedrock and clay overburden interface requires special attention</li> <li>- Présence d'argile profonde à l'est du chemin Blair requiert un équipement de forage particulier et augmente le risque de tassement du sol.</li> <li>- Construction à l'interface de l'argile et du substratum rocheux requiert une attention particulière</li> </ul>
<b>Natural Environment Environnement naturel</b>	<ul style="list-style-type: none"> <li>- No improvement to conveyance capacity to WWTP</li> <li>- Offers collection system redundancy only in City core</li> <li>- Aucun impact sur la capacité d'adduction vers le centre de traitement des eaux usées (CTEU)</li> <li>- Offre de la redondance au système d'égouts seulement au centre-ville</li> </ul>	<ul style="list-style-type: none"> <li>- No improvement to conveyance capacity to WWTP</li> <li>- Offers collection system redundancy only in City core</li> <li>- Aucun impact sur la capacité d'adduction vers le CTEU</li> <li>- Offre de la redondance au système d'égouts seulement au centre-ville</li> </ul>	<ul style="list-style-type: none"> <li>+ Ability to provide greater flow conveyance to WWTP and potentially a further reduction in combined sewer overflows</li> <li>+ Offers collection system redundancy over entire length of Interceptor Outfall Sewer</li> <li>+ Possibilité de fournir une plus grande capacité d'adduction vers le CTEU et de réduire davantage les débordements d'égouts unitaires</li> <li>+ Offre de la redondance tout au long de l'égout intercepteur</li> </ul>
<b>Socio-Cultural Socio-culturel</b>	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Likely need for private/public property easements may increase implementation schedule</li> <li>+ Temps de construction raccourci</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics peut augmenter le temps d'implémentation</li> </ul>	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Need for private/public property easements may increase implementation schedule</li> <li>+ Temps de construction raccourci</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics peut augmenter le temps d'implémentation</li> </ul>	<ul style="list-style-type: none"> <li>- Longest construction schedule</li> <li>- Greatest need for private/public property easements may increase implementation schedule</li> <li>- Temps de construction allongé</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics augmente le temps d'implémentation</li> </ul>
<b>Economy Economie</b>	<ul style="list-style-type: none"> <li>- No phasing opportunities</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> <li>+ Opinion of Probable cost \$90 to 115M</li> <li>- Aucune opportunité d'implémentation par tranches</li> <li>+ Solution la plus efficace par m<sup>3</sup> de stockage</li> <li>+ Estimé du coût probable 90 à 115M\$</li> </ul>	<ul style="list-style-type: none"> <li>- No phasing opportunities</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> <li>+ Opinion of Probable cost \$90 to 115M</li> <li>- Aucune opportunité d'implémentation par tranches</li> <li>+ Solution la plus efficace par m<sup>3</sup> de stockage</li> <li>+ Estimé du coût probable 90 à 115M\$</li> </ul>	<ul style="list-style-type: none"> <li>+ Offers opportunities for phased implementation</li> <li>- Least cost effective per m<sup>3</sup> of storage</li> <li>- Opinion of Probable cost \$180 to 225M</li> <li>+ Opportunité d'implémentation par tranches</li> <li>- Solution la moins efficace par m<sup>3</sup> de stockage</li> <li>- Estimé du coût probable 180 à 225M\$</li> </ul>

- Impacts or Issues / - Impacts ou Problèmes + Benefits / + Bénéfices



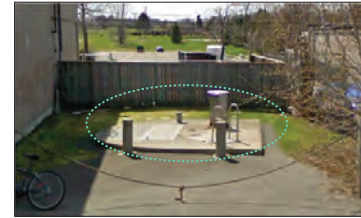
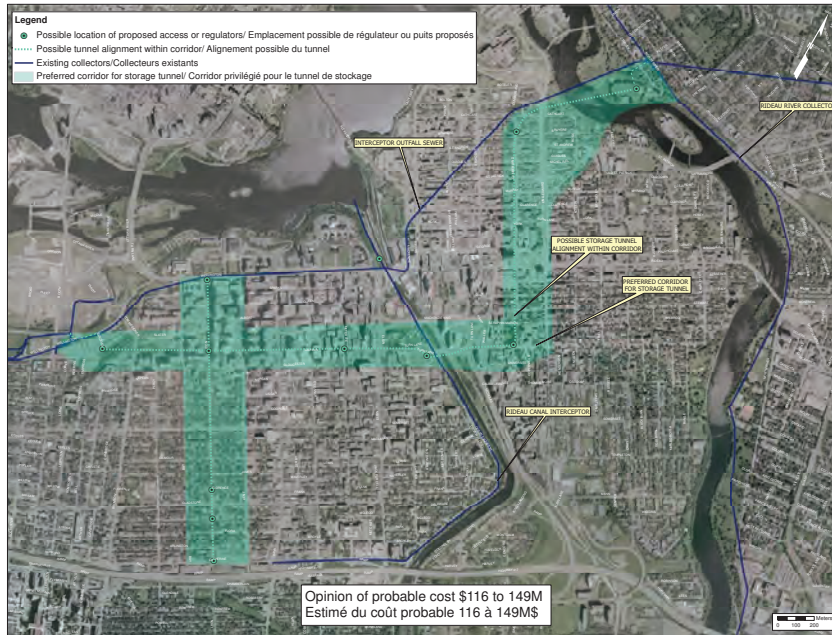
## Evaluation of alternative solutions

## Evaluation des solutions proposées

Alternatives	Short-List Pré-sélection	Criteria categories Catégories de critères					(+/-) Benefits (-) Impacts/Issues		(+/-) Bénéfices (-) Impacts/Problèmes		
		Technical Technique	Natural Environment Environnement naturel	Socio-Cultural Socio-culturel	Economy Economie	Other Autre	(+) Benefits (-) Impacts/Issues	(-) Impacts/Issues	(+) Bénéfices (-) Impacts/Problèmes		
1 Storage Tanks Réservoirs de stockage	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Common construction methods</li> <li>+ 18 month implementation period</li> <li>+ Deep excavations with extensive shoring needs. Some sites prone to high groundwater infiltration</li> <li>+ Tank dewatering and flushing systems increase complexity, operational/maintenance costs and reduce reliability</li> <li>+ Control buildings may impact available green/open space</li> <li>+ Some sites will result in loss of development opportunities</li> <li>+ Tunnel storage offers redundancy to interceptor</li> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Subsurface easements likely required for private and public lands</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Méthodes de construction courantes</li> <li>+ Période d'implémentation de 18 mois</li> <li>+ Excavations profondes avec besoin extensif d'étayage. Certains sites sont susceptibles à beaucoup d'infiltration d'eau souterraine</li> <li>+ Drainage de l'eau dans le réservoir et système de chasse augmentent la complexité et les coûts d'opération/entretien et réduisent la fiabilité</li> <li>+ Bâti de contrôle pourrait avoir un impact sur les espaces verts/aires de loisirs</li> <li>+ Certains sites vont résulter en pertes d'opportunités de développement</li> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Droits d'usage souterrain probablement requis pour terrains privés et publics</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(2a) Core Tunnel South (2a) Tunnel court - sud	✓	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor</li> <li>+ Subsurface easements will be required for private and public lands</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Droits d'usage souterrain probablement requis pour terrains privés et publics</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(2b) Core Tunnel North (2b) Tunnel court - nord	✓	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor</li> <li>+ Subsurface easements will be required for private and public lands</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Droits d'usage souterrain probablement requis pour terrains privés et publics</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
2 (2c) Hurdman-Lyon Tunnel (2c) Tunnel Hurdman-Lyon	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Provides some much needed flood relief for the O'Connor area</li> <li>+ Tunnel located within City owned lands for the most part with crossing of MTO lands</li> <li>+ Soft ground tunnelling increases overhead settlement risks and is prone to construction challenges</li> <li>+ Alignment is such that it is not easily expanded in the future</li> <li>+ Tank dewatering and flushing systems increase complexity, operational/maintenance costs and reduce reliability</li> <li>+ Control buildings may impact available green/open space</li> <li>+ Tank in west will result in loss of development opportunities</li> <li>+ Among the most expensive of alternatives</li> <li>+ May provide some much needed flood relief for the O'Connor area if oversized</li> <li>+ Tunnel alignment and elevation is such that it is not easily expanded in the future</li> <li>+ Tunnel dewatering &amp; flushing systems increase complexity, operational and maintenance needs and reduce reliability</li> <li>+ Location where flows are intercepted will decrease reliability in achieving control targets</li> <li>+ Large shaft and permanent control building necessary in Stratcona Park</li> <li>+ Underground storage tank likely required at Keeler Regulator</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Fourni une protection contre les inondations dans le bassin-versant O'Connor</li> <li>+ Tunnel traversé majoritairement des terrains appartenant à la Ville, incluant la traversée de terrains du MTO</li> <li>+ Forage dans un sol mou augmente le risque de tassement et les défis de construction</li> <li>+ Alignement du tunnel est tel qu'il ne sera pas facile d'en faire l'expansion dans le futur</li> <li>+ Drainage de l'eau dans le réservoir et système de chasse augmentent la complexité et les coûts d'opération/entretien et réduisent la fiabilité</li> <li>+ Bâti de contrôle pourrait avoir un impact sur les espaces verts/aires de loisirs</li> <li>+ Réservoir dans le West End va résulter en pertes d'opportunités de développement</li> <li>+ Parmi les alternatives les plus dispendieuses</li> <li>+ Peut fournir une protection contre les inondations dans le bassin-versant O'Connor</li> <li>+ L'alignement et l'élevation du tunnel est tel qu'il ne sera pas facile d'en faire l'expansion dans le futur</li> <li>+ Drainage de l'eau dans le tunnel et système de chasse augmentent la complexité et les coûts d'opération/entretien et réduisent la fiabilité</li> <li>+ Endroits où les débits seront interceptés diminuera la fiabilité d'atteindre les objectifs de contrôle</li> <li>+ Un grand puits d'accès et un bâtiment de contrôle permanent seront nécessaires dans le parc Stratcona</li> <li>+ Réservoir de stockage souterrain probablement requis près du régulateur de la rue Keeler</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(2d) Somerset Tunnel (2d) Tunnel Somerset	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Potential for economies of scale</li> <li>+ Risk associated with accommodations dual purpose tunnel (sewage/transport) increase complexity</li> <li>+ Coordination of both projects and added complexity will lead to longer implementation time</li> <li>+ Construction disruptions are expected to be longer with a combined DOTT/Storage Tunnel construction</li> <li>+ Tunnel dewatering &amp; flushing systems increase complexity, operational/maintenance needs and reduce reliability</li> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor and added capacity to ROPEC</li> <li>+ Soft ground tunnelling increases overhead settlement risks and is prone to construction challenges</li> <li>+ Longest implementation time</li> <li>+ Possible conflicts with Interceptor sewer</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Potentiel pour économies d'échelle</li> <li>+ Risque associé avec un tunnel à double fonction (sewage/transport) augmente la complexité</li> <li>+ Coordination des deux projets et complexité totale augmente le temps d'implémentation</li> <li>+ Perturbations dues à la construction d'un tunnel DOTT/stockage</li> <li>+ Drainage de l'eau dans le tunnel et système de chasse augmentent la complexité et les coûts d'opération/entretien et réduisent la fiabilité</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur et augmente la capacité de ROPEC</li> <li>+ Forage dans un sol mou augmente le risque de tassement et les défis de construction</li> <li>+ Plus long temps d'implémentation</li> <li>+ Conflits potentiels avec égout intercepteur</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(2e) Opportunities with proposed Transit Tunnel (2e) Opportunités avec le tunnel de transport en commun	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor and added capacity to ROPEC</li> <li>+ Soft ground tunnelling increases overhead settlement risks and is prone to construction challenges</li> <li>+ Longest implementation time</li> <li>+ Possible conflicts with Interceptor sewer</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur et augmente la capacité de ROPEC</li> <li>+ Forage dans un sol mou augmente le risque de tassement et les défis de construction</li> <li>+ Plus long temps d'implémentation</li> <li>+ Conflits potentiels avec égout intercepteur</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
3 Long Tunnel to ROPEC Tunnel long	✓	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Tunnel storage offers some redundancy to Interceptor</li> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor and added capacity to ROPEC</li> <li>+ Soft ground tunnelling increases overhead settlement risks and is prone to construction challenges</li> <li>+ Longest implementation time</li> <li>+ Possible conflicts with Interceptor sewer</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur et augmente la capacité de ROPEC</li> <li>+ Forage dans un sol mou augmente le risque de tassement et les défis de construction</li> <li>+ Plus long temps d'implémentation</li> <li>+ Conflits potentiels avec égout intercepteur</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(4a) East Tunnel Hybrid (4a) Hybride - est	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor and added capacity to ROPEC</li> <li>+ Soft ground tunnelling increases overhead settlement risks and is prone to construction challenges</li> <li>+ Longest implementation time</li> <li>+ Possible conflicts with Interceptor sewer</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur et augmente la capacité de ROPEC</li> <li>+ Forage dans un sol mou augmente le risque de tassement et les défis de construction</li> <li>+ Plus long temps d'implémentation</li> <li>+ Conflits potentiels avec égout intercepteur</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(4b) West Tunnel Hybrid (4b) Hybride - ouest	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Tunnel provides ability to share storage</li> <li>+ Civilly designed reduces complexity</li> <li>+ Limited and localized disruptions</li> <li>+ Tunnel storage offers redundancy to interceptor and added capacity to ROPEC</li> <li>+ Soft ground tunnelling increases overhead settlement risks and is prone to construction challenges</li> <li>+ Longest implementation time</li> <li>+ Possible conflicts with Interceptor sewer</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur</li> <li>+ Tunnel fournit la possibilité de partager le stockage</li> <li>+ Conçue par gravité réduit la complexité</li> <li>+ Dérangements limités et localisés</li> <li>+ Tunnel de stockage offre de la redondance à l'intercepteur et augmente la capacité de ROPEC</li> <li>+ Forage dans un sol mou augmente le risque de tassement et les défis de construction</li> <li>+ Plus long temps d'implémentation</li> <li>+ Conflits potentiels avec égout intercepteur</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
(4c) Lyon Tunnel Hybrid (4c) Hybride - tunnel rue Lyon	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Provides some much needed flood relief for the O'Connor area</li> <li>+ Alignment is such that it is not easily expanded in the future</li> <li>+ Use of publicly owned lands for tanks will result in loss of development opportunities</li> <li>+ Tank dewatering and flushing systems increase complexity, operational/maintenance costs and reduce reliability</li> <li>+ Control buildings may impact available green/open space</li> <li>+ Among the most expensive of alternatives</li> </ul>	<ul style="list-style-type: none"> <li>+ Fourni une protection contre les inondations dans le bassin-versant O'Connor</li> <li>+ L'alignement du tunnel est tel qu'il ne sera pas facile d'en faire l'expansion dans le futur</li> <li>+ Utilisation de terrains appartenant à la Ville pour les réservoirs va résulter en pertes d'opportunités de développement</li> <li>+ Drainage de l'eau dans le réservoir et système de chasse augmentent la complexité et les coûts d'opération/entretien et réduisent la fiabilité</li> <li>+ Bâti de contrôle pourrait avoir un impact sur les espaces verts/aires de loisirs</li> <li>+ Parmi les alternatives les plus dispendieuses</li> </ul>
5 In-Bank Storage Stockage en berge	X	N	N	N	N	N	N	N	N	<ul style="list-style-type: none"> <li>+ Lowered capital costs and shorter construction schedule</li> <li>+ Dewatering and flushing systems increase complexity, operational and maintenance needs</li> <li>+ Occasional dewatering increases complexity, reliability of curbs unknown</li> <li>+ Possible impacts on the Ottawa River (Ottawa River) and Lake Ontario (Lac Ontario)</li> <li>+ High heritage values adjacent to Rideau Canal and Canal locks (UNESCO world heritage site)</li> <li>+ Possible impacts on the Ottawa River (Ottawa River) and Lake Ontario (Lac Ontario)</li> <li>+ Possible impacts on the Ottawa River (Ottawa River) and Lake Ontario (Lac Ontario)</li> <li>+ May not be acceptable to Approval Agencies (may be considered as river treatment by Ottawa R.)</li> <li>+ High costs associated with deployment/insertion and fencing/tying curbs</li> </ul>	<ul style="list-style-type: none"> <li>+ Coûts en capital le plus faible et temps de construction le plus court</li> <li>+ Stations de pompage pour l' drainage augmentent la complexité et diminuent la fiabilité</li> <li>+ Drainage occasionnel augmente la complexité, fiabilité des berges incertaine</li> <li>+ Impacts possibles sur les poissons et habitat benthique (fond de la rivière) dans l'entree</li> <li>+ Possibilité de graves vagues aux abords du canal Rideau et des écluses Rideau (site de patrimoine mondial UNESCO)</li> <li>+ Possibilité de graves vagues aux abords du canal Rideau et des écluses Rideau (site de patrimoine mondial UNESCO)</li> <li>+ Possibilité de graves vagues aux abords du canal Rideau et des écluses Rideau (site de patrimoine mondial UNESCO)</li> <li>+ Peut ne pas être acceptable par les agences d'approbation</li> <li>+ Coûts élevés associés avec le déploiement/insertion et réparation/embarquement des rideaux</li> </ul>



## Recommended Preferred Solution/ Solution privilégiée recommandée



Visible portion of tunnel maintenance access shaft  
Portion visible d'un puits servant de point d'accès pour l'entretien du tunnel.

The recommended solution is a combination of Alternative 2a, Core Tunnel South, combined with a tunnel along Lyon Street to help fulfill the storage requirement and also provide much needed flood protection for the downtown core. The proposed storage tunnels will be located within the east-west and north-south corridors identified on the plan to the left. Maintenance access shafts will be required roughly every 500m along the alignment. The exact locations of the tunnels and access shafts will be determined as part of the functional and preliminary designs. The 6km long tunnel is expected to have an inside diameter between 2.44 and 3.05m in order to store between 25,000 and 43,000m<sup>3</sup> of water.

La solution privilégiée recommandée est une combinaison de la solution alternative 2a, soit un tunnel de stockage court avec l'alignement sud, et un tunnel au long de la rue Lyon. Cette combinaison fournirait le stockage requis et aiderait à protéger le centre-ville des inondations de sous-sols. Les tunnels de stockages recommandés seraient situés dans les corridors est-ouest et nord-sud présentés dans la figure à gauche. Des puits d'accès pour l'entretien seraient nécessaires aux 500 mètres le long du tunnel. L'emplacement exact des puits et des tunnels sera déterminé lors de la conception fonctionnelle préliminaire. Le tunnel de 6km aura un diamètre interne de 2.44m à 3.05m afin de stocker entre 25 000 et 43 000m<sup>3</sup> d'eau.



## Next Steps in the Project

- Review and document input received from this Public Open House
- Confirm the preferred alternative solution
- Develop functional design for preferred alternative solution
- Hold next Public Open House on the functional design of the preferred alternative solution. Anticipated early September

## Prochaines étapes du projet

- Examiner et documenter les commentaires reçus lors de la journée portes ouvertes
- Confirmer la sélection de la solution alternative privilégiée
- Entamer la conception fonctionnelle de la solution alternative privilégiée
- Réaliser la journée portes ouvertes suivante sur la conception fonctionnelle de la solution privilégiée recommandée. Prévu pour début septembre





# Combined Sewage Storage Project

EA & Functional Design  
Public Open House No. 2

June 15 & 16, 2010





## Agenda

- Project Background and Objectives
- EA Process
- Evaluation Criteria
- Review of Alternatives
- Selection of Recommended Solution
- Next Steps




- Real Time Control
- CSO & Storm Outfall Monitoring
- Storage for CSO Control
- Sewer Separation
- Wet Weather Management
- Floatable Traps
- Public Consultation and Education
- Pinecrest Creek / Westboro Pilot
- Expand and Implement Retrofits
- ROPEC Dechlorination
- Water Environment Strategy
- Monitoring & Source Control
- Environmental Management System
- Water Quality Model






Ottawa River Action Plan  
Plan d'action de la rivière  
des Outaouais




## PROJECT OBJECTIVES

### ENHANCED CSO CONTROL – BEYOND REGULATIONS


**Improve water quality in the Ottawa River**




**Reduce CSOs from the Combined Sewer Area**



**Full Compliance with Regulations**





## MOE Procedure F-5-5: Minimum requirements for CSO Control

- No Sanitary Sewer Overflows ✓ Complete
- Maximize storage in Collection System and flow to Treatment Plant ✓ RTC
- Capture and treat 90% of wet weather flows ✓ RTC
- Beach Protection (as a result of CSOs) ! Storage
  - Not to exceed E.coli PWQO
  - Control to 2 overflow events per swimming season

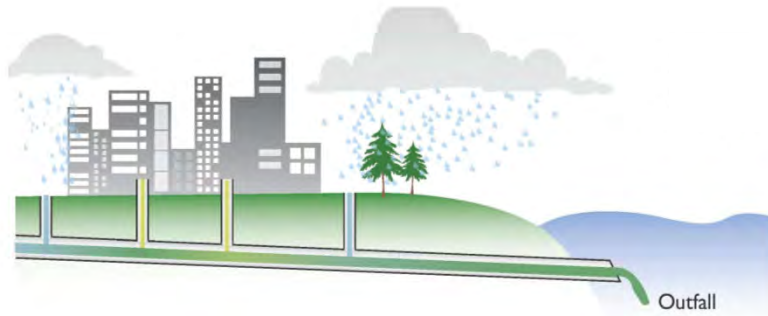
Stantec

## Combined Sewers in Ottawa



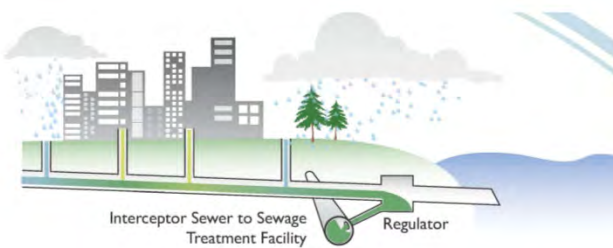
Stantec

## Originally: All flows to river



Stantec

## 1960's: Interceptor Sewer and Treatment Plant



Capture/treat all  
dry weather  
flow + some  
storm water

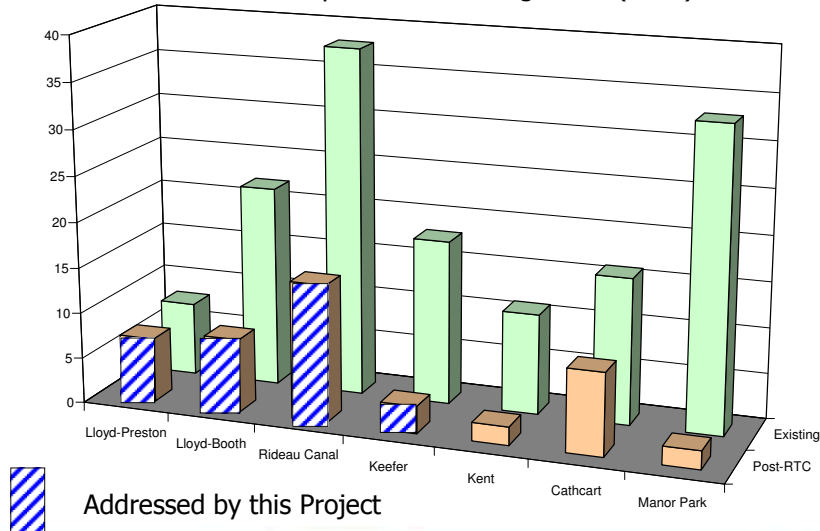


Overflow during  
larger rainfalls

Stantec

## How Much Overflows and How Often?

Overflow Frequencies in Average Year (1980)



Stantec

## Problem Definition/Opportunity

### Problem Statement

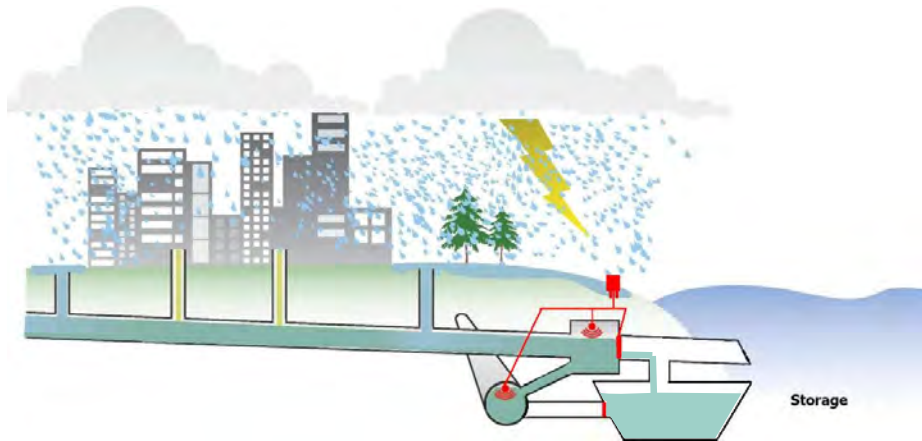
- CSOs to the Ottawa River meet most but not all provincial CSO control targets.
- The City of Ottawa adopted a policy of having zero CSO events during the swimming season in the average year (with the understanding that overflows will occur during large events).

### Opportunity

- Combined sewage storage is identified (PPCP) as the most cost effective way of further reducing CSO beyond the minimum control targets.

Stantec

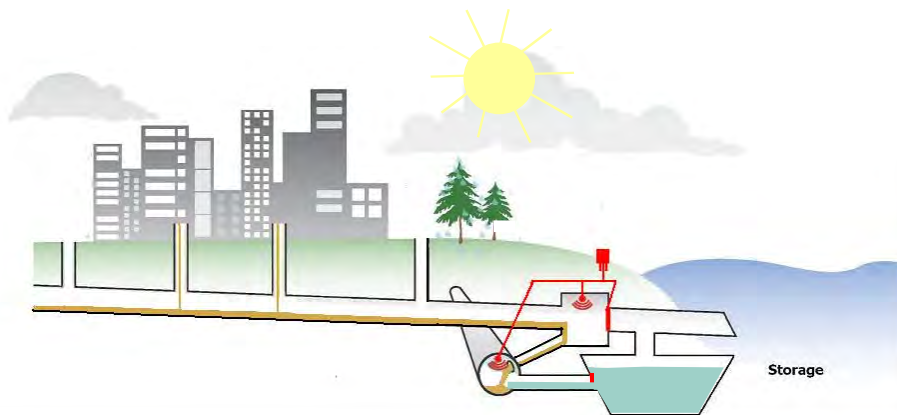
## Next: Storage to Achieve Objectives



Capture excess during  
larger rainfalls in  
average year

Stantec

## Next: Storage to Achieve Objectives

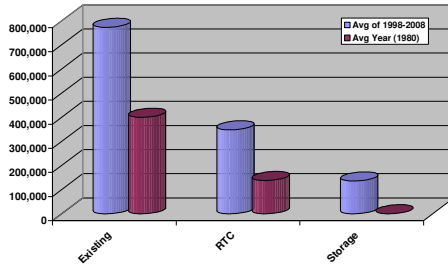


Returned to system  
when flows subside

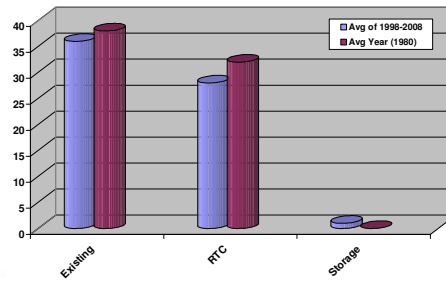
Stantec

# Impacts to the Ottawa River

Annual Volume of Overflows (m3)

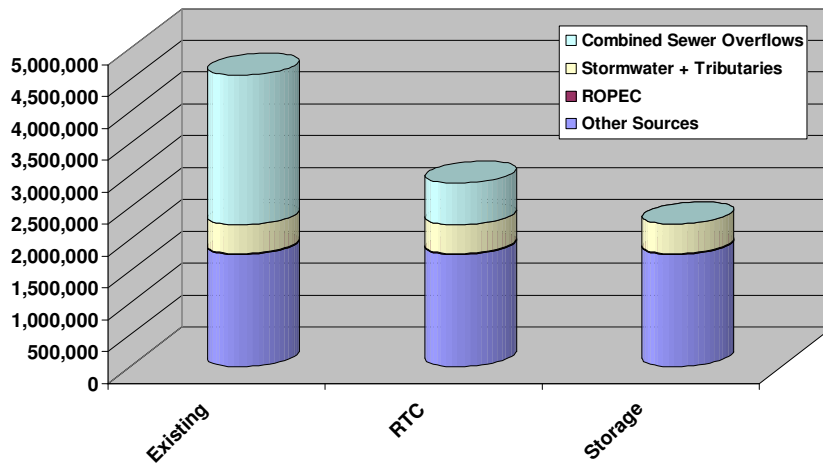


Number of Overflows Per Year

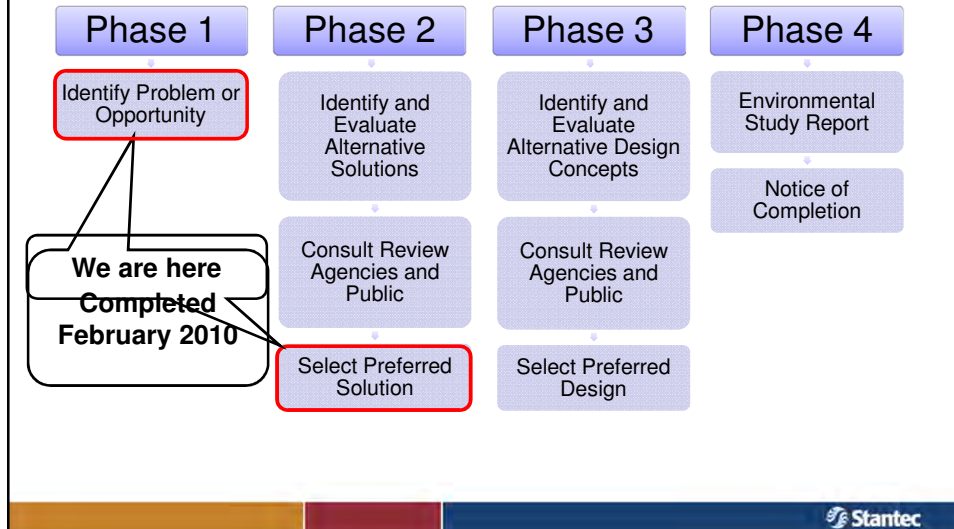


# Impacts at Petrie Island

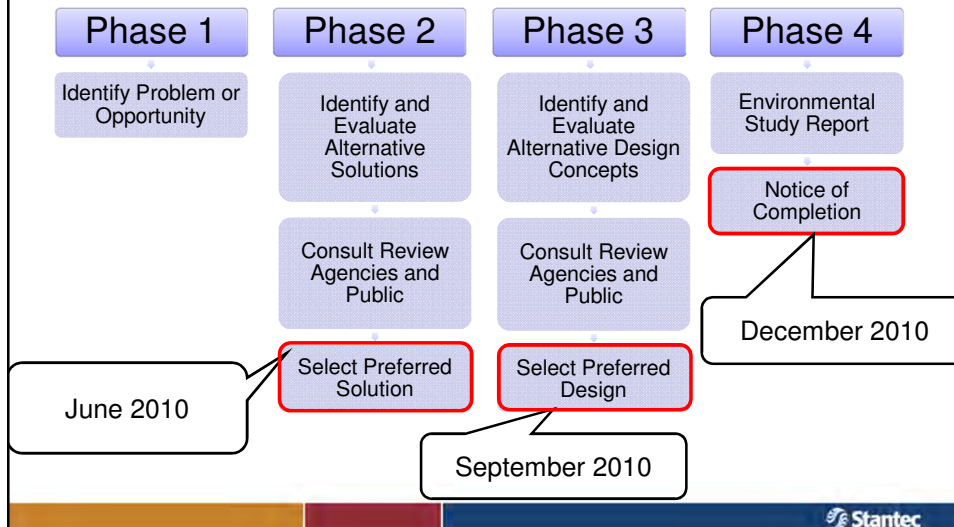
Billions of E coli Colonies



## Municipal Class EA Process



## Municipal Class EA Process: Anticipated Timelines



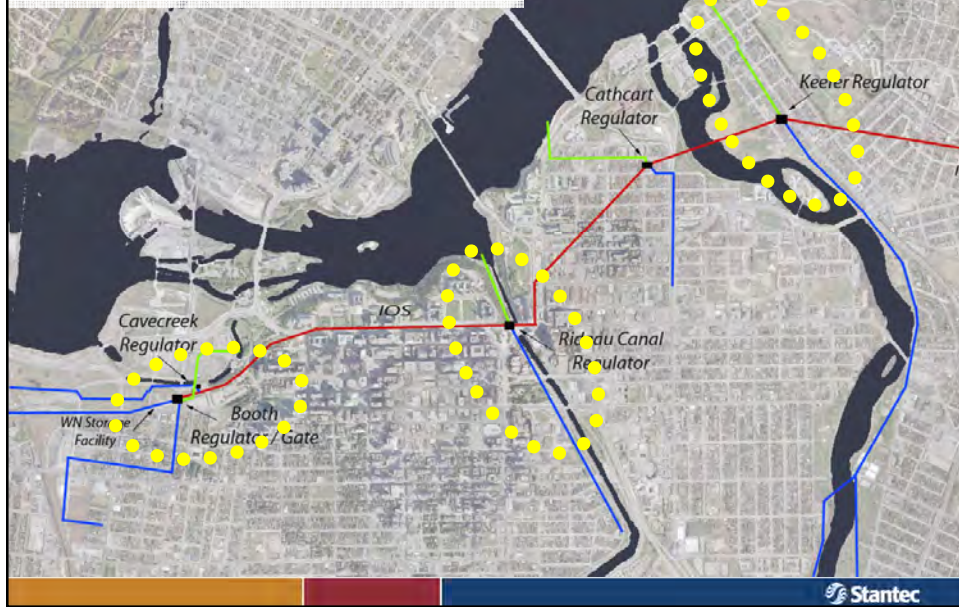
## Evaluation Criteria

Technical	
T1	Construction Risks
T2	Schedule
T3	Flexibility
T4	Reliability/Complexity
Natural Environment	
N1	Impact on Significant Natural Features (Terrestrial/Aquatic)
N2	Impact on Ecological processes
N3	Impact on quality of receiving water
Socio-Cultural	
S1	Effect on urban greenspace/open space
S2	Cultural heritage values or features
S3	Disruption to community
S4	Consistency with planning policies/processes
S5	Impact on level of service
S6	Property Issues
Economy	
E1	Impact on businesses and land owners
E2	Affordability
E3	Sustainability

## Evaluation Methodology

CRITERIA	ALT 1	ALT 2	ALT 3
Natural Environment	L	L	M
Socio-cultural	M	L	H
Technical	L	M	H
Economy	M	M	L

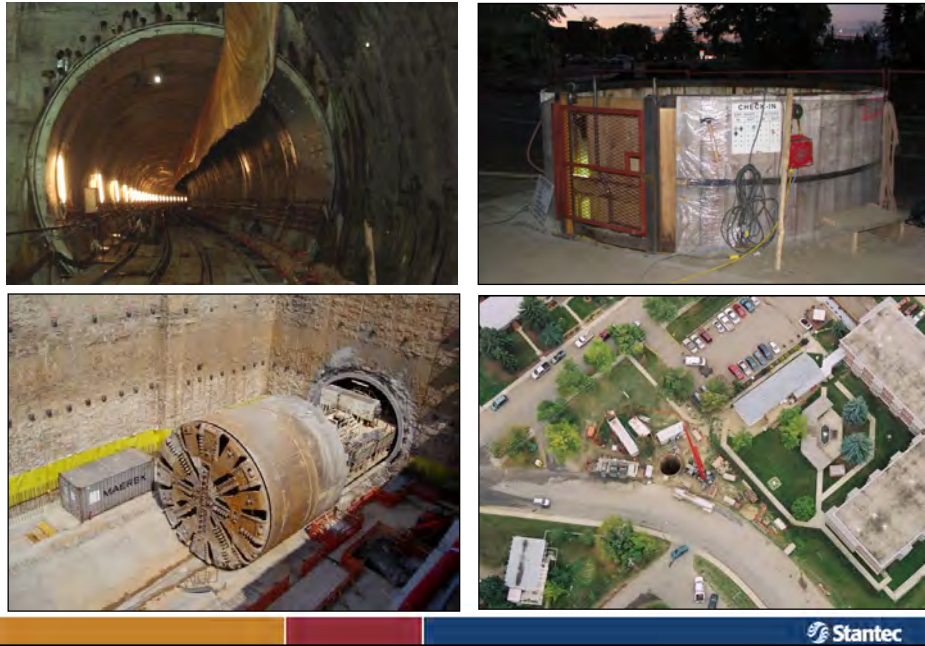
# CSO Control Target Locations Listing of Alternatives



## Combined Sewage Storage: Tanks



## Combined Sewage Storage: Tunnels



## Alt.1: Storage Tanks / Réservoirs de stockage



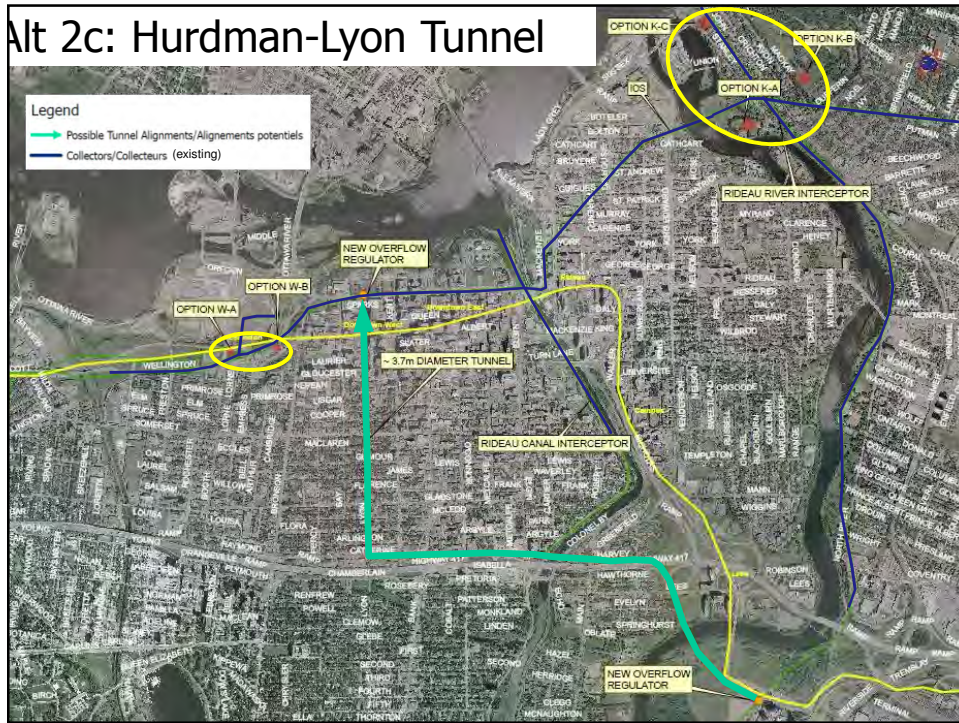
# Alt.2: Short Tunnels / Tunnels courts



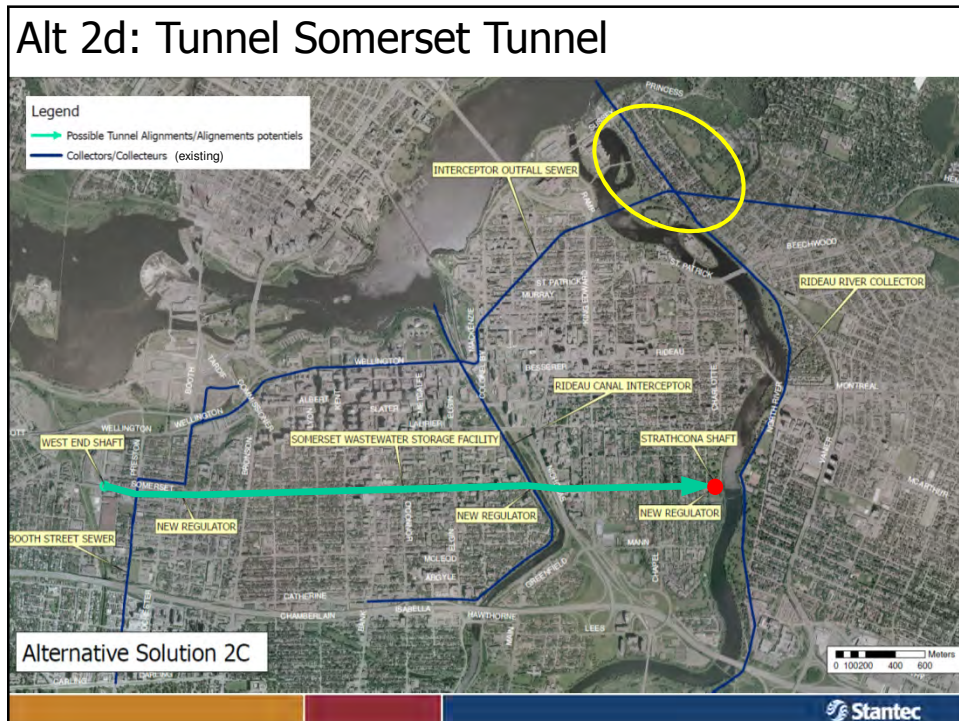
# Alt.2: Short Tunnels / Tunnels courts



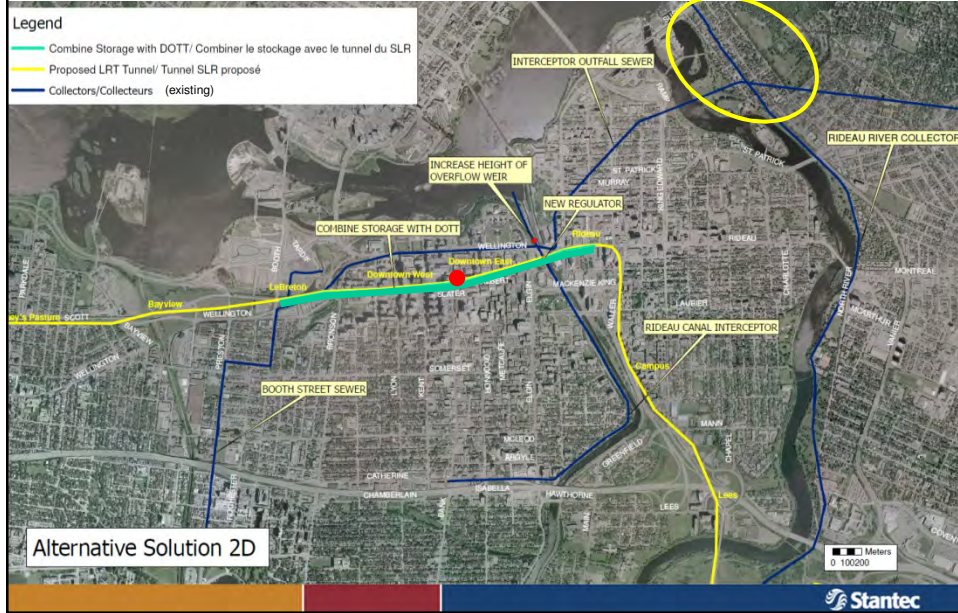
## Alt 2c: Hurdman-Lyon Tunnel



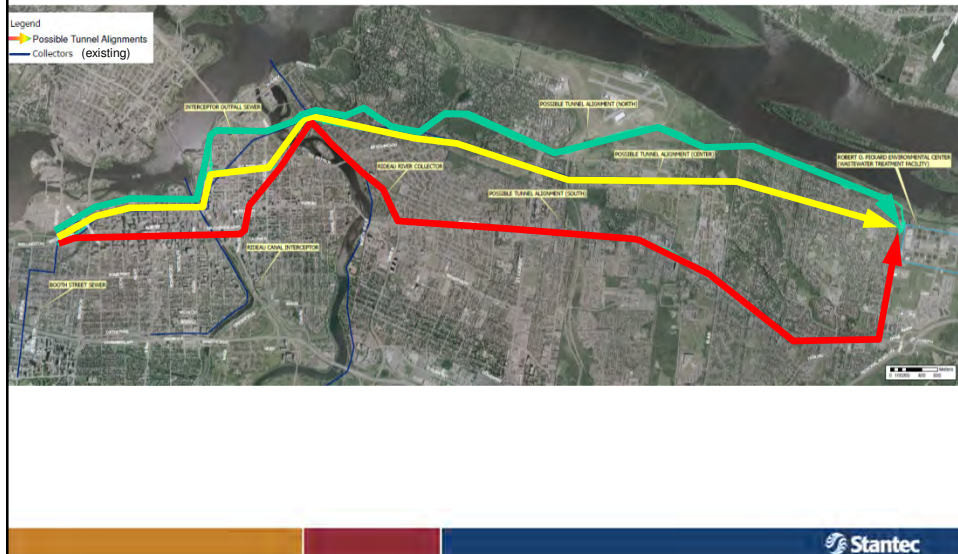
## Alt 2d: Tunnel Somerset Tunnel

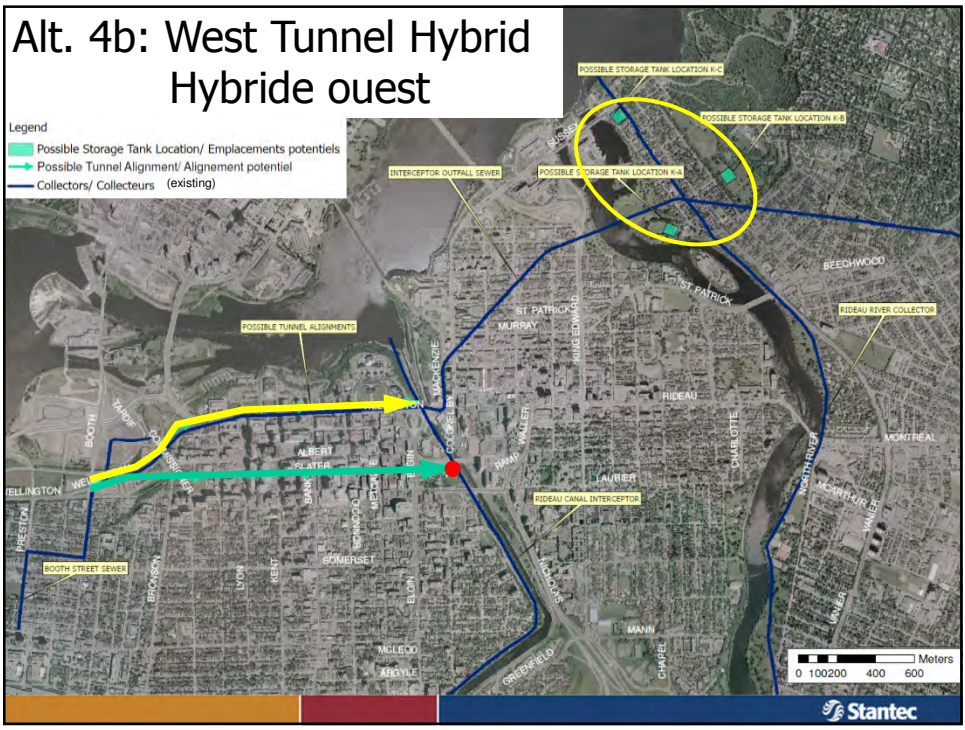
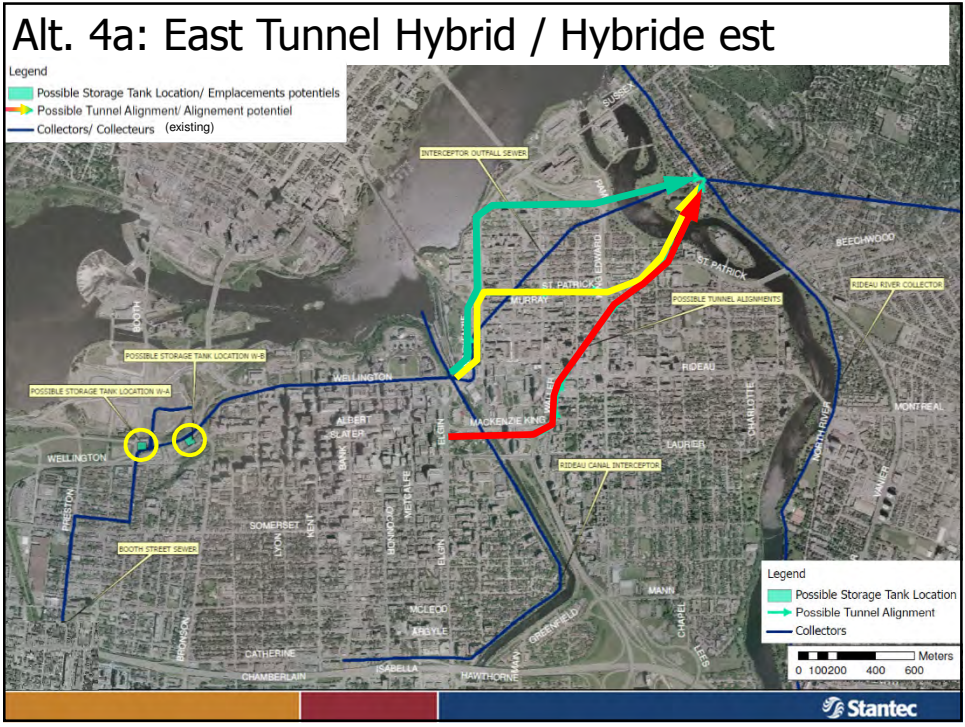


## Alt 2e: Combine with DOTT Combiné avec tunnel de transport en commun

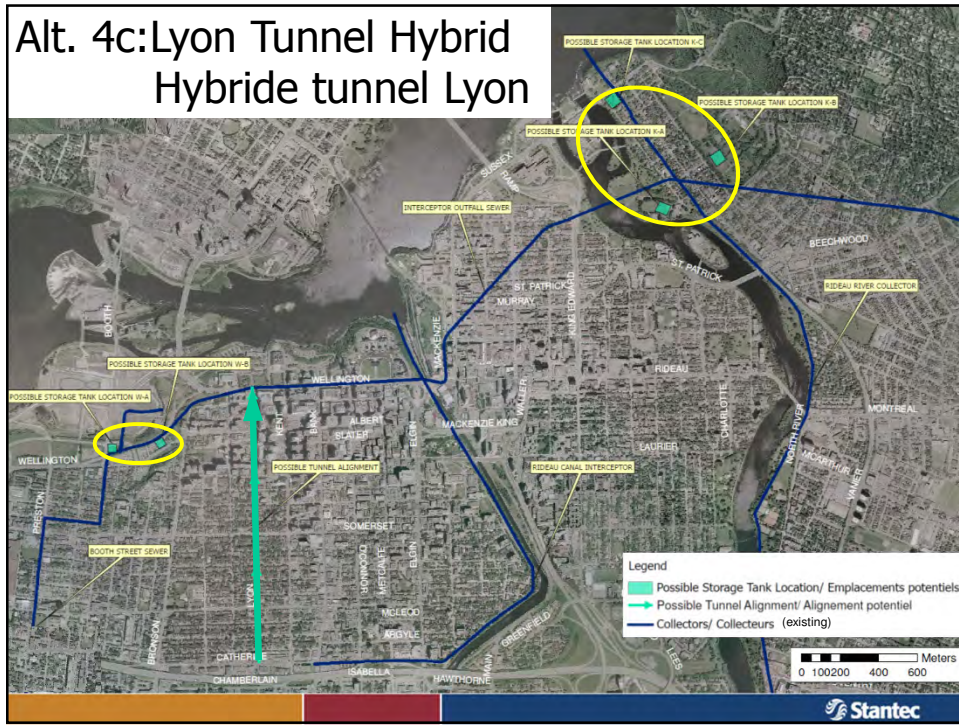


## Alt. 3: Long Tunnel / Tunnel long





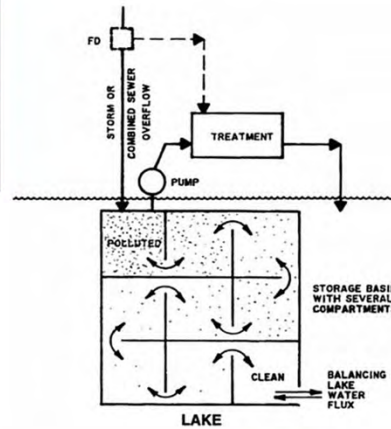
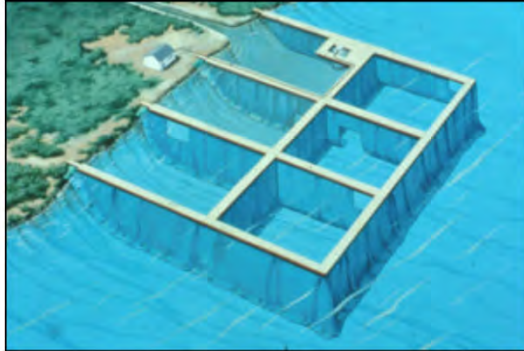
# Alt. 4c: Lyon Tunnel Hybrid Hybride tunnel Lyon



# Alt. 5: In-River Storage / Stockage en rivière



## Alt. 5: In-River Storage / Stockage en rivière



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### Short-Listed Alternatives

- Alt 2a: Core Tunnel South
- Alt 2b: Core Tunnel North
- Alt 3: Long Tunnel

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## Analysis of Short-Listed Alternatives

- Advantages/Disadvantages
- Risks and consequences
- Relative Costs

## Analysis of Short-Listed Alternatives

	Alt. 2a	Alt. 2b	Alt. 3
Technical \ Technique	<ul style="list-style-type: none"> <li>+ Fewer obstacles &amp; conflicts</li> <li>+ Reduced construction risks</li> <li>- Crosses proposed LRT tunnel</li> <li>- More complex operation</li> </ul>	<ul style="list-style-type: none"> <li>+ Simpler operation</li> <li>- Several obstacles &amp; conflicts</li> <li>- Difficult ground conditions</li> </ul>	<p>Refer to 2a or 2b in core</p> <ul style="list-style-type: none"> <li>- Clay east of Blair Rd = higher cost and risks</li> <li>- Complicated rock-clay transition</li> </ul>
	<ul style="list-style-type: none"> <li>+ Moins d'obstacles et conflits</li> <li>+ Construction moins risquée</li> <li>- Doit traverser le tunnel TLR</li> <li>- Opération plus complexe</li> </ul>	<ul style="list-style-type: none"> <li>+ Opération plus simple</li> <li>- Plusieurs obstacles et conflits</li> <li>- Conditions souterraines plus complexes</li> </ul>	<p>Se référer à 2a ou 2b au centre ville</p> <ul style="list-style-type: none"> <li>- Argile à l'est du ch. Blair = cout et risque plus élevés</li> <li>- Transition roche-argile ajoute de la complexité</li> </ul>

- Impacts or Issues    + Benefits  
 - Impacts ou Problèmes    + Bénéfices

## Analysis of Short-Listed Alternatives

	Alt. 2a	Alt. 2b	Alt. 3
Natural Environment \ Environnement naturel	<ul style="list-style-type: none"> <li>- Maintain capacity to WWTP</li> <li>- System redundancy in core</li>   <li>- Capacité d'adduction maintenue</li> <li>- Redondance au centre ville</li> </ul>	<ul style="list-style-type: none"> <li>- Maintain capacity to WWTP</li> <li>- System redundancy in core</li>   <li>- Capacité d'adduction maintenue</li> <li>- Redondance au centre ville</li> </ul>	<ul style="list-style-type: none"> <li>+ Increase conveyance to WWTP</li> <li>+ Full IOS redundancy</li>   <li>+ Plus grande capacité d'adduction</li> <li>+ Pleine redondance pour l'égout intercepteur</li> </ul>
	<ul style="list-style-type: none"> <li>- Impacts or Issues</li> <li>+ Benefits</li> <li>- Impacts ou Problèmes</li> <li>+ Bénéfices</li> </ul>		



## Analysis of Short-Listed Alternatives

	Alt. 2a	Alt. 2b	Alt. 3
Socio-Cultural \ Socio-culturel	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Private/public property easements</li>   <li>+ Temps de construction raccourcit</li> <li>- Droits pour terrains privés et publics</li> </ul>	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Private/public property easements</li>   <li>+ Temps de construction raccourcit</li> <li>- Droits pour terrains privés et publics</li> </ul>	<ul style="list-style-type: none"> <li>- Longest construction schedule</li> <li>- Greatest need for private/public property easements</li>   <li>- Temps de construction allongé</li> <li>- Plus grand besoins de droits pour terrains privés et publics</li> </ul>
	<ul style="list-style-type: none"> <li>- Impacts or Issues</li> <li>+ Benefits</li> <li>- Impacts ou Problèmes</li> <li>+ Bénéfices</li> </ul>		



## Analysis of Short-Listed Alternatives

	Alt. 2a	Alt. 2b	Alt. 3
Economy \ Economie	- No phasing opportunity + Cost effective storage  + \$90 to 115 millions	- No phasing opportunity + Cost effective storage  + \$90 to 115 millions	+ Offers phasing opportunities - Least cost effective storage  - \$180 to 225 millions
	- Phase unique + Stockage efficace	- Phase unique + Stockage efficace	+ Implémentation par tranches - Stockage moins efficace

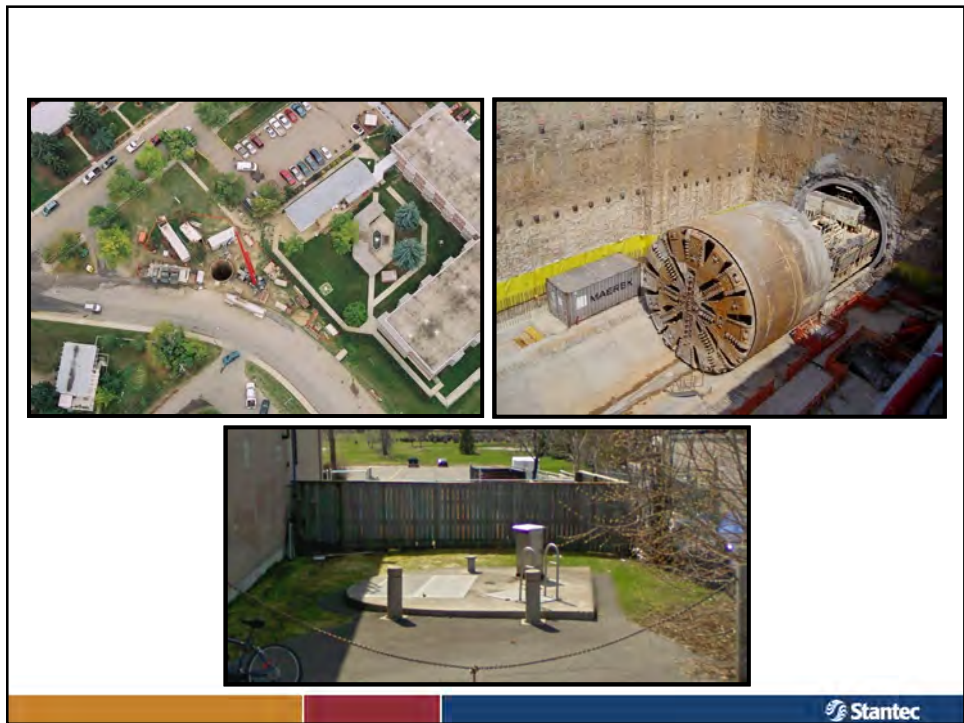
- Impacts or Issues + Benefits  
- Impacts ou Problèmes + Bénéfices

## Long-Term Solution

- Beyond Immediate Project Objectives
  - > CSO Control



- South alignment in core is preferable
- Fully twin IOS - Redundancy
- Lyon Tunnel - Flood Relief



## Storage Need

	Events Series	
	1980	1980 + 15% allowance
CSO Storage	25,000 m <sup>3</sup>	43,000 m <sup>3</sup>
Size (+/- 6km Long)	2.44m (8ft) Ø	3.05m (10ft) Ø
Opinion of Probable Cost	\$116 to 139M	\$131 to 149M

## Next Steps

- Consultation
  - Public
  - Agencies
- Confirmation of Preferred Solution
- Functional Design of Preferred Solution
  - Performance assessment

## So How Can You Help?



[http://www.city.ottawa.on.ca/residents/waterwaste/combined\\_overflows/](http://www.city.ottawa.on.ca/residents/waterwaste/combined_overflows/)



# Combined Sewage Storage Project Class Environmental Assessment Public Open House



June 15 & 16, 2010

## Presentation @ 7:00 PM

Thank you for coming to the City of Ottawa Combined Sewage Storage Project Public Open House.

At this Public Open House you will learn more about the background of this project and where it is going. You will also be introduced to the environmental assessment (EA) process, how it applies to this project and its purpose.

## Background

The City of Ottawa has a working plan to protect water quality in the Ottawa River. The Ottawa River Action Plan (ORAP) identifies seventeen projects that will enable the City improve water quality in the watershed and to ensure compliance with provincial regulations.

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport combined sewage (wastewater and stormwater runoff) in the same pipe. These older systems were designed to overflow into the Ottawa River during medium and large rainfall events. This impacts the water quality of the Ottawa River.

## Problem Statement

Currently, combined sewer overflows (CSOs) to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in an average year, while accepting some overflows during rainy years or heavy rainfall events.

## Opportunity

The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified

combined sewage storage within the Ultimate Combined Sewer Area is the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

## Project Overview

The existing Interceptor-Outfall Sewer (IOS) collects wastewater (sanitary) and some stormwater from west to east across the city to the wastewater treatment plant. The IOS cannot handle all of the stormwater runoff that enters the sewer system during wet weather. Frequent and large volume overflows have been identified at three locations: West End (W), Rideau Canal (R) and Keefer (K).

Storage facilities at these locations will hold excess combined sewage until it can be transferred to the Robert O. Pickard Environmental Centre (ROPEC) for treatment. Storage facilities will lower the amount of combined sewage released to the Ottawa River during larger wet weather events. This will help to reduce the number of beach closures at Petrie Island.

Alternative sewage storage solutions could consist of storage tanks, tunnels or a combination of tanks and tunnels. The alternative solutions have been evaluated using the evaluation methodology and criteria presented at the previous Public Open House. If two or more criteria were determined to be high, than that alternative solution was not included in the short list.

## The EA Process

This project is being planned as a Schedule C project in accordance with the requirements of the *Municipal Class Environmental Assessment*, 2007.

The Municipal Class EA is divided into five Phases. **Phase I** for this project was completed through the ORAP consultation process. This Phase identified



# Combined Sewage Storage Project Class Environmental Assessment Public Open House



June 15 & 16, 2010

and described the problem and opportunity: *To achieve a service level for combined sewer overflows (CSO) of zero overflows during the swimming season in the "average year," while accepting some overflows during rainy years or very large rain events.*

The project is currently in **Phase II** of the EA process. This Phase involves the identification and evaluation of alternative solutions, including consultation, resulting in the selection of a preferred alternative solution using approved criteria.

Following Phase II, completion of the EA will involve evaluation of alternative design concepts of the preferred alternative solutions, additional consultation and filing of an environmental study report.

## Consultation

Public consultation is an important component of the Municipal Class EA process. Throughout Phase II of the EA, there will be opportunity for the public to comment at key milestones of the project. This is the second of three Public Open Houses planned for this Phase of the EA.

This Public Open House presents:

- Short list of alternative solutions
- Evaluation of alternative solutions
- Recommended Preferred Alternative Solution

As you read through the presentation boards and view the presentation, we invite you to share your feedback on the short list of alternatives, their evaluation and the recommended Preferred Alternative Solution.

## Your input is important

The feedback we receive from this Public Open House will influence the outcome of this study, so please take the time to fill out the questionnaire and return it to us.

## Thank you!

Thank you for coming to our Public Open House. If you have any questions about this study, feel free to ask any member of the Study Team. For more information you can also visit the City of Ottawa's website for this project at:

[http://www.city.ottawa.on.ca/residents/waterwaste/combined\\_overflows/index\\_en.html](http://www.city.ottawa.on.ca/residents/waterwaste/combined_overflows/index_en.html)

Following this session, comments may be directed to:

### On the Combined Sewage Storage Project:

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Crescent  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext. 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@Ottawa.ca](mailto:Louis.Julien@Ottawa.ca)

### On the EA Process:

Loretta Hardwick, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-6056  
Fax: 613-738-0721  
Email: [Loretta.Hardwick@stantec.com](mailto:Loretta.Hardwick@stantec.com)



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



*After having reviewed all of the project information provided at this meeting, please complete this questionnaire and return it to the box at the entrance. Should you require assistance or clarification while completing the questionnaire please see any City staff or Stantec during this Open House.*

**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant ( )

Please Specify: \_\_\_\_\_

**2. Do you have any comments regarding the evaluation of the alternative solutions?**

**3. Do you have any comments regarding the recommended preferred alternative solution?**

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**5. Do you have any additional comments you would like to make?**

**Thank you for participating!**

To ensure that your comments are considered during the evaluation of alternatives, please return this completed **Comment Sheet** no later than **July 17, 2010**

Paper copies of the information posters can be mailed upon request. Alternately, they can be found on the City of Ottawa's website for this project at:

*[http://www.city.ottawa.on.ca/residents/waterwaste/combined\\_overflows/index\\_en.html](http://www.city.ottawa.on.ca/residents/waterwaste/combined_overflows/index_en.html)*

The comments you have provided above will be used for the purposes of creating an environmental assessment report which will be a part of the public record and will be made available to individuals or organizations with an interest in this project. Please indicate below (mark an X in the brackets) if you consent to the inclusion of your name, address and telephone number in the report. If you do not mark either selection below, we will assume, for the purposes of documentation that you wish to have your name, address and telephone number be kept confidential.

( ) I consent to my name, address and telephone number being included in the report as part of the public record for this project.

( ) I wish my name, address and telephone number to be kept confidential and not included in the report as part of the public record for this project.

<b>Name:</b>	
<b>Address:</b>	
<b>Phone/Fax No.:</b>	
<b>Email:</b>	

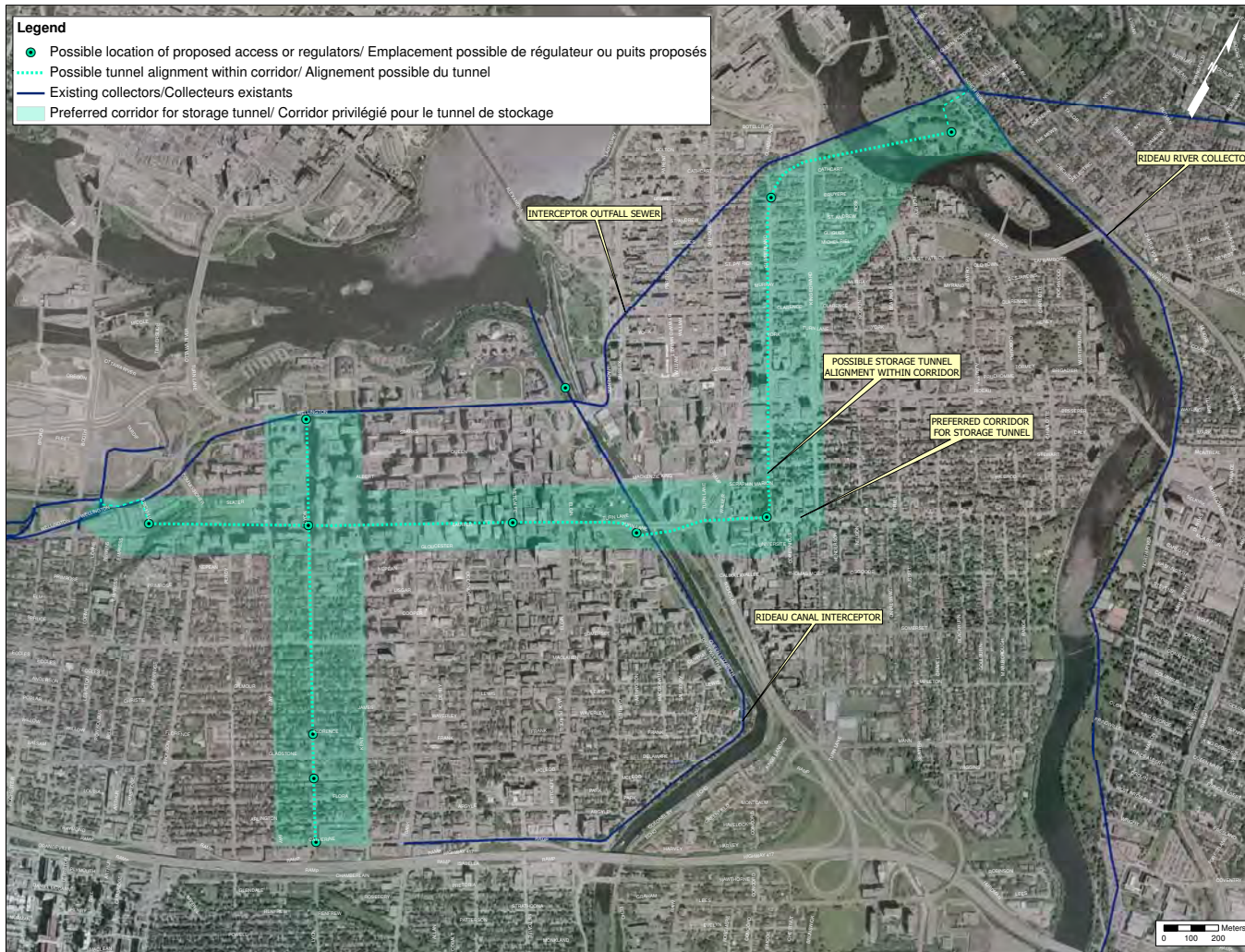
# Analysis of Short-Listed Alternatives/Evaluation des solutions privilégiées

	Alt. 2a: Core Tunnel South Alt. 2a: Tunnel court, alignement sud	Alt. 2b: Core Tunnel North Alt. 2b: Tunnel court, alignement nord	Alt. 3: Long Tunnel Alt. 3: Tunnel long
Technical Technique	<ul style="list-style-type: none"> <li>+ Less congestion near Rideau Canal Interceptor simplifies design and reduces construction risks</li> <li>- Special attention required to cross the proposed downtown transit tunnel near Laurier</li> <li>- Less effective location to intercept Rideau Canal Interceptor flows. Leads to more complex operation and need to retrofit Rideau Canal Regulator to maintain level of service during flood events</li> <li>+ Moins de congestion près de l'intercepteur du canal Rideau - simplifie et réduit les risques durant la construction</li> <li>- Attention particulière requise pour traverser le tunnel de transport en commun proposé</li> <li>- Endroit le moins efficace pour intercepter les débits de l'intercepteur du canal Rideau. Résulte en une opération plus complexe et un besoin d'adapter le régulateur du canal Rideau afin de prévenir les inondations.</li> </ul>	<ul style="list-style-type: none"> <li>+ Most effective location to intercept flows from Rideau Canal Interceptor</li> <li>- Underground canyons near Rideau Canal and convergence of bedrock faults may require significant ground improvements</li> <li>- Alignment adjacent to proposed downtown transit tunnel, Château Laurier and American Embassy requires sharp turns leading to more complex design and increased costs</li> <li>+ Endroit le plus efficace pour intercepter les débits de l'intercepteur du canal Rideau.</li> <li>- Canyons souterrain proche du canal Rideau et convergence des failles du substratum rocheux pourrait nécessiter des améliorations au sol</li> <li>- Alignement adjacent au tunnel de transport en commun proposé, au Château Laurier et à l'ambassade américaine - requiert des virages abruptes, résultant en une conception plus complexe et des coûts plus élevés.</li> </ul>	<p>Refer to comments for Alternatives 2a / 2b for tunnel section through City core</p> <p>Se référer aux commentaires pour les alternatives 2a / 2b pour la section centre ville du tunnel</p> <ul style="list-style-type: none"> <li>- Presence of deep clay overburden east of Blair Rd requires different tunneling equipment and increases risks of overhead settlements</li> <li>- Construction at bedrock and clay overburden interface requires special attention</li> <li>- Présence d'argile profonde à l'est du chemin Blair requiert un équipement de forage particulier et augmente le risque de tassement du sol.</li> <li>- Construction à la l'interface de l'argile et du substratum rocheux requiert une attention particulière</li> </ul>
Natural Environment Environnement naturel	<ul style="list-style-type: none"> <li>- No improvement to conveyance capacity to WWTP</li> <li>- Offers collection system redundancy only in City core</li> <li>- Aucun impact sur la capacité d'adduction vers le centre de traitement des eaux usées (CTEU)</li> <li>- Offre de la redondance au système d'égouts seulement au centre-ville</li> </ul>	<ul style="list-style-type: none"> <li>- No improvement to conveyance capacity to WWTP</li> <li>- Offers collection system redundancy only in City core</li> <li>- Aucun impact sur la capacité d'adduction vers le CTEU</li> <li>- Offre de la redondance au système d'égouts seulement au centre-ville</li> </ul>	<ul style="list-style-type: none"> <li>+ Ability to provide greater flow conveyance to WWTP and potentially a further reduction in combined sewer overflows</li> <li>+ Offers collection system redundancy over entire length of Interceptor Outfall Sewer</li> <li>+ Possibilité de fournir une plus grande capacité d'adduction vers le CTEU et de réduire davantage les débordements d'égouts unitaires</li> <li>+ Offre de la redondance tout au long de l'égout intercepteur</li> </ul>
Socio-Cultural Socio-culturel	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Likely need for private/public property easements may increase implementation schedule</li> <li>+ Temps de construction raccourcit</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics peut augmenter le temps de d'implémentation</li> </ul>	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Need for private/public property easements may increase implementation schedule</li> <li>+ Temps de construction raccourcit</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics peut augmenter le temps d'implémentation</li> </ul>	<ul style="list-style-type: none"> <li>- Longest construction schedule</li> <li>- Greatest need for private/public property easements may increase implementation schedule</li> <li>- Temps de construction allongé</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics augmente le temps d'implémentation</li> </ul>
Economy Economie	<ul style="list-style-type: none"> <li>- No phasing opportunities</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> <li>+ Opinion of Probable cost \$90 to 115M</li> <li>- Aucune opportunité d'implémentation par tranches</li> <li>+ Solution la plus efficace par m<sup>3</sup> de stockage</li> <li>+ Estimé du coût probable 90 à 115M\$</li> </ul>	<ul style="list-style-type: none"> <li>- No phasing opportunities</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> <li>+ Opinion of Probable cost \$90 to 115M</li> <li>- Aucune opportunité d'implémentation par tranches</li> <li>+ Solution la plus efficace par m<sup>3</sup> de stockage</li> <li>+ Estimé du coût probable 90 à 115M\$</li> </ul>	<ul style="list-style-type: none"> <li>+ Offers opportunities for phased implementation</li> <li>- Least cost effective per m<sup>3</sup> of storage</li> <li>- Opinion of Probable cost \$180 to 225M</li> <li>+ Opportunité d'implémentation par tranches</li> <li>- Solution la moins efficace par m<sup>3</sup> de stockage</li> <li>- Estimé du coût probable 180 à 225M\$</li> </ul>

- Impacts or Issues / - Impacts ou Problèmes + Benefits / + Bénéfices



## Recommended Preferred Solution/ Solution privilégiée recommandée



Visible portion of tunnel maintenance access shaft  
Portion visible d'un puits servant de point d'accès pour l'entretien du tunnel.

The recommended solution is a combination of Alternative 2a, Core Tunnel South, combined with a tunnel along Lyon Street to help fulfill the storage requirement and also provide much needed flood protection for the downtown core. The proposed storage tunnels will be located within the east-west and north-south corridors identified on the plan to the left. Maintenance access shafts will be required roughly every 500m along the alignment. The exact locations of the tunnels and access shafts will be determined as part of the functional and preliminary designs. The 6km long tunnel is expected to have an inside diameter between 2.44 and 3.05m in order to store between 25,000 and 43,000m<sup>3</sup> of water.

La solution privilégiée recommandée est une combinaison de la solution alternative 2a, soit un tunnel de stockage court avec l'alignement sud, et un tunnel au long de la rue Lyon. Cette combinaison fournirait le stockage requis et aiderait à protéger le centre-ville des inondations de sous-sols. Les tunnels de stockages recommandés seraient situés dans les corridors est-ouest et nord-sud présentés dans la figure à gauche. Des puits d'accès pour l'entretien seraient nécessaires aux 500 mètres le long du tunnel. L'emplacement exact des puits et des tunnels sera déterminé lors de la conception fonctionnelle préliminaire. Le tunnel de 6km aura un diamètre interne de 2.44m à 3.05m afin de stocker entre 25 000 et 43 000m<sup>3</sup> d'eau.



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



*After having reviewed all of the project information provided at this meeting, please complete this questionnaire and return it to the box at the entrance. Should you require assistance or clarification while completing the questionnaire please see any City staff or Stantec during this Open House.*

**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant (X)

Please Specify: Mathieu Fleury

**2. Do you have any comments regarding the evaluation of the alternative solutions?**

I had the impression that it was done well, by people who know what they're doing.

**3. Do you have any comments regarding the recommended preferred alternative solution?**

After looking through the alternative solutions, I agree that the recommended preferred alternative solution seems best.

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

No, I felt the presentation explained the review and selection process well and thoroughly.



**Combined Sewage Storage Project  
Class Environmental Assessment  
Questionnaire**



**5. Do you have any additional comments you would like to make?**

Thank you for carrying through with the presentation despite the small turnout. It was very informative, and I learned a lot.

**Thank you for participating!**

To ensure that your comments are considered during the evaluation of alternatives, please return this completed **Comment Sheet** no later than **July 17, 2010**

Paper copies of the information posters can be mailed upon request. Alternately, they can be found on the City of Ottawa's website for this project at:

[http://www.city.ottawa.on.ca/residents/waterwaste/combined\\_overflows/index\\_en.html](http://www.city.ottawa.on.ca/residents/waterwaste/combined_overflows/index_en.html)

The comments you have provided above will be used for the purposes of creating an environmental assessment report which will be a part of the public record and will be made available to individuals or organizations with an interest in this project. Please indicate below (mark an X in the brackets) if you consent to the inclusion of your name, address and telephone number in the report. If you do not mark either selection below, we will assume, for the purposes of documentation that you wish to have your name, address and telephone number be kept confidential.

I consent to my name, address and telephone number being included in the report as part of the public record for this project.

I wish my name, address and telephone number to be kept confidential and not included in the report as part of the public record for this project.

<b>Name:</b>	
<b>Address:</b>	
<b>Phone/Fax No.:</b>	
<b>Email:</b>	

**A-9**  
**Public Open House #3 Materials**

# Welcome to the City of Ottawa Combined Sewage Storage and Functional Design Project

Municipal Class Environmental Assessment  
Public Open House

# Bienvenue au projet de stockage et d'étude fonctionnelle visant les SEU de la ville d'Ottawa

Évaluation environnementale municipale de portée  
générale Journée porte ouverte



Please Sign In



Veillez vous inscrire

Take a comment sheet and information package to record your thoughts as you review the display materials and watch the presentation

City Staff and the Study Team are available to answer your questions

Public input will influence this study; please take the time to fill out a questionnaire and return it to the registration table

Prenez une fiche de commentaires et une trousse de renseignements pour prendre notes de vos impressions pendant que vous examinerez le matériel présenté et que vous assisterez à la présentation. Le personnel de la ville ainsi que l'équipe d'étude se feront un plaisir de répondre à vos questions

Cette étude sera influencée par les commentaires du public. Pour cette raison, nous vous prions de prendre un moment pour remplir un formulaire et le ramener à la table d'inscription.



## Introduction

### Background

The City of Ottawa has a working plan to protect water quality in the Ottawa River. The Ottawa River Action Plan (ORAP) identifies seventeen projects that will enable the City to improve water quality in the watershed and ensure compliance with provincial regulations.

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport combined sewage (wastewater and stormwater runoff) in the same pipe. These older systems were designed to overflow into the Ottawa River during medium and large rainfall events. This impacts the water quality of the Ottawa River.

### Problem Statement

Currently, combined sewer overflows (CSOs) to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in an average year, while accepting some overflows during rainy years or heavy rainfall events.

### Opportunity

The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified combined sewage storage within the Ultimate Combined Sewer Area as the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

### Contexte

La ville d'Ottawa dispose d'un plan de travail pour protéger la qualité de l'eau de la rivière des Outaouais. Le Plan d'action de la rivière des Outaouais (PARO) identifie dix-sept projets qui permettront à la ville d'améliorer la qualité de l'eau du bassin-versant et de s'assurer de conformer entièrement aux règlements provinciaux.

Comme la plupart des municipalités, la ville d'Ottawa possède des égouts unitaires, dans les secteurs les plus anciens de la ville, qui transportent aussi bien les eaux de ruissellement que les eaux usées. Ces systèmes plus anciens sont conçus pour déborder dans la rivière des Outaouais lors de précipitations moyennes et extrêmes. Ceci a une influence sur la qualité de l'eau de la rivière des Outaouais.

### Énoncé du problème

Actuellement, les débordements d'égouts unitaires (DEU) dans la rivière des Outaouais ne sont pas entièrement conformes aux objectifs de contrôle des DEU fixés par le ministère de l'Environnement. En février 2010, la ville d'Ottawa a adopté une politique afin de n'avoir aucun événement de DEU pendant la saison de baignade lors d'une année normale, en acceptant un certain nombre de débordements au cours d'années très pluviales ou lors d'événements extrêmes.

### Opportunité

Le plan de prévention et de contrôle de la pollution de la ville pour la zone d'égouts unitaires a permis de déterminer que le stockage des DEU dans la dernière zone d'égouts unitaires constituait la méthode la plus rentable pour réduire les DEU au-delà des exigences minimales des règlements.



## Project Overview

The Interceptor-Outfall Sewer (IOS) collects wastewater (sanitary) and some stormwater from west to east across the city to the wastewater treatment plant. The IOS cannot handle all of the stormwater runoff that enters the sewer system during wet weather. Frequent and large volume overflows have been identified at three locations: West End (W), Rideau Canal (R) and Keefer (K) regulators.

Storage facilities at these locations will hold excess combined sewage until it can be transferred to the Robert O. Pickard Environmental Centre (ROPEC) for treatment. Storage facilities will lower the amount of combined sewage released to the Ottawa River during larger wet weather events. This will help to reduce the number of beach closures at Petrie Island.

### Project Objectives

When implemented, the Combined Sewage Storage Project will:

- Reduce CSOs from the Ultimate Combined Sewer Area
- Improve water quality in the Ottawa River
- Assist City in coming into compliance with Ministry of Environment's Procedure F-5-5

A **combined sewer** collects and transports sanitary wastewater and stormwater runoff in a single pipe.

An **interceptor sewer** captures all of the wastewater flow from the combined sewers and carries it to the wastewater treatment plant for processing during dry weather conditions.

A **combined sewer overflow**, or CSO, occurs when wastewater and stormwater from a combined sewer system are discharged directly into a local waterbody because the flow rate exceeds the capacity of the interceptor sewer lines.



## Aperçu du Projet

L'égout de décharge – intercepteur (ÉDI) recueille les eaux usées (sanitaires) et certaines eaux de ruissellement, d'ouest en est de la ville et les achemine vers l'usine de traitement des eaux usées. L'ÉDI n'est pas en mesure de recevoir toute l'eau de ruissellement qui y entre en période de précipitation. Des débordements fréquents et de volumes importants ont été identifiés à trois emplacements : aux régulateurs du « West End » (W), du canal Rideau (R) et de la rue Keefer (K).

À ces emplacements, les installations de stockage recueilleront les excédents d'eaux usées jusqu'à ce qu'elles puissent être transférées au Centre environnemental R.-O.-Pickard (CEROP) pour y être traitées. Les installations de stockage de eaux usées réduiront la quantité d'eaux d'égouts diluées rejetée dans la rivière des Outaouais pendant les périodes de précipitation. Cela aidera à réduire le nombre de fermetures de la plage de l'île Petrie.

### Objectifs du projet

Une fois qu'il aura été mis en œuvre, le projet de stockage des eaux usées aidera de la manière suivante :

- Il réduira les DEU provenant de la zone ultime d'égouts unitaires
- Il améliorera la qualité de l'eau de la rivière des Outaouais
- Il assistera à la Ville à atteindre la conformité à la procédure F-5-5 du ministère de l'Environnement

Un **égout unitaire** recueille et transporte les eaux usées sanitaires et les eaux de ruissellement dans un seul tuyau.

Lorsque le temps est sec, un **égout intercepteur** capture le débit des eaux usées provenant des égouts unitaires et le transporte vers l'usine de traitement des eaux usées.

Un **débordement d'égouts unitaires**, ou DEU, se produit lorsque les eaux usées et l'eau de ruissellement provenant d'un système d'égouts unitaires sont déchargées directement dans une étendue d'eau parce que le débit d'écoulement dépasse la capacité de l'intercepteur.



## Municipal Class Environmental Assessment Process

The City of Ottawa is conducting an Environmental Assessment (EA) and Functional Design to identify and develop a preferred solution that will provide additional storage facilities in the ultimate combined sewer area and thereby reduce CSOs to the Ottawa River.

### Phase I

Was completed through the ORAP process. This Phase identified and described the problem and opportunity: **To achieve a service level for combined sewer overflows (CSO) of zero overflows during the swimming season in the "design year," while accepting some overflows during rainy years or very large rain events.**

### Phase II

Was completed in 2010. This Phase involved the identification and evaluation of alternative solutions, including consultation, resulting in the selection of a preferred alternative solution.

### Phase III

The project is currently in Phase III of the EA process. This Phase involves evaluation of alternative design concepts of the preferred alternative solution and public and agency consultation.

This project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007, which is an approved process under the Environmental Assessment Act.

Following Phase III, an environmental study report will be published and made available for public comment for 30 days.

## Processus d'évaluation environnementale municipale de portée générale

La Ville d'Ottawa mène actuellement une évaluation environnementale et une étude fonctionnelle en vue de désigner et d'élaborer une solution qui permettra la mise à disposition d'installations supplémentaires de stockage dans la zone ultime d'égouts unitaires et, par conséquent, une réduction des débordements d'égouts unitaires (DEU) dans la rivière des Outaouais.

### Phase I

Elle a été complétée par l'entremise du processus du PARO. Cette phase a permis d'identifier et de décrire le problème et l'opportunité : **Atteindre un niveau de service correspondant à aucun débordement d'égouts unitaires (DEU) pendant la saison de baignade; pour une « année type », en acceptant un certain nombre de débordements au cours d'années très pluvieuses ou lors d'événements extrêmes.**

### Phase II

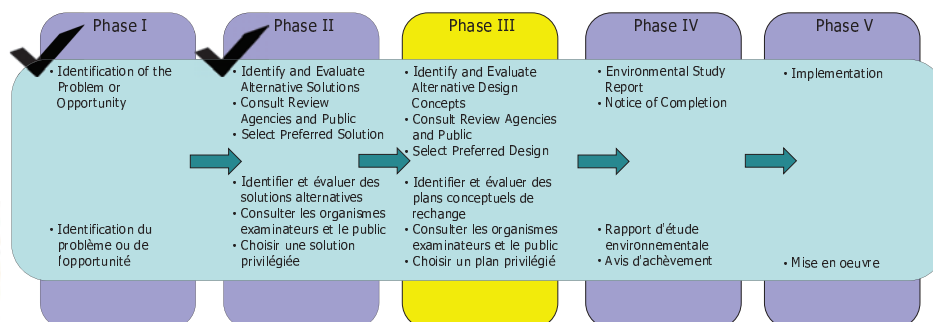
Complétée en 2010, cette phase a impliqué l'identification et l'évaluation de solution de rechange, incluant des périodes de consultation publique résultant en la sélection de la solution privilégiée.

### Phase III

Le projet est dans la troisième phase de l'ÉE où l'on évalue des plans conceptuels de rechange pour la solution privilégiée. Cette phase inclue aussi des consultations avec le public et les organismes examinateurs.

Ce projet est planifié sous la forme d'un projet de l'annexe C conformément aux exigences d'une évaluation environnementale municipale de portée générale, 2007, qui constitue un processus approuvé en vertu de la loi sur les évaluations environnementales.

Un rapport d'étude environnementale sera déposé à la suite de la phase III de l'ÉE et les commentaires du public seront acceptés pour une période de 30 jours.



## Consultation

Consultation is a key component of an environmental assessment (EA).

The purpose of consultation is to raise awareness and to solicit input fulfilled in part through Public Open Houses. Throughout all Phases of the EA process, there are opportunities for the public to comment. This is the last of three Public Open Houses planned for this project.

### This Public Open House presents:

- Evaluation of alternative design concepts for the Preferred Alternative Solution
- Anticipated project schedule & timelines
- Introduction to the Preferred Functional Design
- Potential impacts and proposed mitigation for the project

As you read through the presentation boards and view the presentation, we invite you to share your feedback.

### Your input is important!

...and your comments will influence this project. So please take the time to give us your feedback by filling out a questionnaire and returning it to the registration table.

La consultation est un élément clé d'une évaluation environnementale (ÉE).

Elle vise à sensibiliser le public et à obtenir des commentaires, en partie par des journées portes ouvertes. Tout au long des phases de l'ÉE, le public a l'occasion de se faire entendre. Il s'agit de la dernière journée portes ouvertes planifiées pour ce projet.

### Cette journée portes ouvertes présentera les éléments suivants :

- L'évaluation des plans conceptuels de recharge pour la solution privilégiée
- Calendrier des prochaines étapes avant la mise en service
- Présentation du concept fonctionnel privilégié
- Effets environnementaux potentiels et des mesures d'atténuation

Au fur et à mesure que vous examinerez les tableaux de présentation et lorsque vous regarderez la présentation, nous vous invitons à nous faire part de vos commentaires.

### Votre participation est importante pour nous!

...et vos commentaires auront un impact sur ce projet. Par conséquent, nous vous prions de prendre un moment pour remplir un formulaire et le ramener à la table d'inscription.



## Glossary of Terms / Glossaire

**Design Year:** The Ontario Ministry of the Environment has accepted 1980 as having "average year" wet weather patterns for engineering design purposes.

**Collector sewers:** A collector sewer is a conduit that receives sewage and/or stormwater from local sewers.

**Interceptor Outfall Sewer:** An interceptor sewer captures all of the wastewater flow from the collector and combined sewers and carries it to the wastewater treatment plant for processing during dry weather conditions.

**Regulator:** A regulator directs and controls flows in the sewer system.

**ROPEC:** The Robert O. Pickard Environmental Centre is Ottawa's wastewater treatment plant.

**Shafts:** A shaft provides an access point for construction and/or inspection and maintenance of underground facilities, such as tunnels and storage tanks.

**Tunnel Storage:** An underground tunnel can be used to capture, convey and store combined sewage that would otherwise overflow.

**Underground Storage Tank:** An underground storage tank consists of a large concrete box constructed to temporarily store combined sewage that would otherwise overflow.



Example of tunnel under construction using a tunnel boring machine (right).  
Exemple d'un tunnel en construction utilisant un tunnelier (photo de droite).



Example of an access shaft used for tunnel construction. Once construction is complete, the shaft allows maintenance access to the tunnel.  
Exemple d'un puits servant à la construction d'un tunnel. Une fois la construction terminée, le puits sert de point d'accès pour l'entretien.



Example of underground storage tank under construction. Once construction is complete, the open space over the storage tank can return to its original function. Note control building in the background (at right in bottom photo).  
Exemple d'un réservoir souterrain en construction. Une fois la construction terminée, l'espace au dessus du réservoir peut retourner à son utilisation d'origine. Notez l'édifice de contrôle (dans le coin droit de la photo du bas).



**Année type:** Le Ministère de l'environnement de l'Ontario a accepté l'année 1980 comme étant « l'année type », ayant des caractéristiques de précipitation « moyennes » pour fins de conception en génie.

**Égouts collecteurs:** Un égout collecteur recueille les eaux usées et de ruissellement provenant des égouts locaux.

**Égout de décharge-intercepteur:** Un égout de décharge-intercepteur recueille toutes les eaux usées provenant des égouts collecteurs et des égouts unitaires et les achemine vers l'usine de traitement des eaux usées.

**Régulateur:** Un régulateur dirige et contrôle les débits dans le système d'égouts.

**CEROP:** Le Centre environnemental Robert O. Pickard est l'usine de traitement des eaux usées pour la ville d'Ottawa.

**Puits d'accès:** Un puits d'accès sert de point d'accès pour la construction, l'inspection and l'entretien des installations souterraines, tel que les tunnels et les réservoirs de stockage.

**Tunnel de stockage:** Un tunnel souterrain peut capter, transporter et stocker des eaux usées excédentaires, qui autrement déborderaient du système d'égouts et déverseraient dans une étendue d'eau.

**Réservoir de stockage souterrain:** Un réservoir de stockage consiste en une grosse boîte de béton construite afin de stocker de façon temporaire les eaux usées excédentaires, qui autrement déborderaient du système d'égouts et déverseraient dans une étendue d'eau.



# Evolution of Ottawa's Combined Sewer System

**Originally**  
All flows to the River

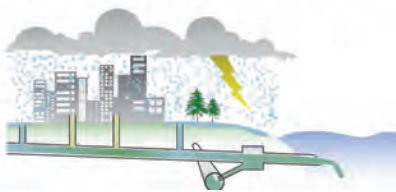


**Past**  
1960s: Interceptor Sewer and Sewage Treatment



The above diagram shows how dry weather flow and some wet weather flow is captured and treated using a regulator and an interceptor sewer.

The diagram below shows how the combined sewer system overflows during heavier rainfall and snowmelt.



**Present**  
Real Time Control – Currently being commissioned (2010)



The above diagram shows how the new control system uses sensors to maximize flow to the sewage treatment facility. With this system, we can capture the flow from a bigger storm that would have caused an overflow in the past.

The diagram below shows how the control system will open the gate in case of extreme rainfall to avoid overload or flooding.



**Future**  
Combined Sewage Storage - Soon to be commissioned (2014)



The above diagram shows that wet weather flow from frequent rain/all events is sent to the sewage treatment facility without the need for storage.

The diagram below shows that during extreme rain/all events, excess wet weather flow is sent to a storage facility. Once the event has passed, the stored water is transferred to the interceptor sewer and treatment facility.



Past:  
Volume\*: 405,000m<sup>3</sup>

65% reduction of CSO Volume

Present:  
Volume\*: 140,000m<sup>3</sup>

100% reduction\* of CSO Volume

Future  
Volume\*: 0

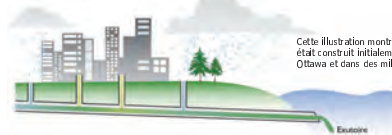


\* During average annual control period of April 15 to November 15

# Évolution du réseau d'égouts unitaires d'Ottawa

**Initialement**

À l'origine, tous les débits du réseau se déversaient dans la rivière des Outaouais



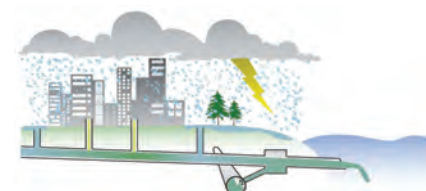
**Dans la passé**

Années 1960: égout intercepteur et installation de traitement des eaux usées



Le schéma ci-dessus démontre comment les débits sanitaires et une partie des débits des eaux pluviales sont recabés et traités par le biais d'un régulateur et d'un égout intercepteur.

Le schéma ci-dessous illustre comment le système d'égouts déborde suite à la fonte des neiges.



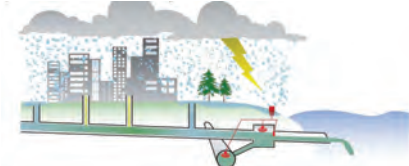
**Présentement**

Système de régulation en temps réel – Mise en œuvre actuelle (2010)



L'illustration ci-dessus montre comment le système de contrôle a recours à des détecteurs de niveau afin de maximiser le débit acheminé à l'usine de traitement des eaux usées. Avec ce système en place, il est possible de reculer le débit d'une période de forte précipitation qui aurait autrement résulté en un débordement.

L'illustration ci-dessous montre que lors des périodes de forte précipitation, le système de contrôle ouvre la barrière afin de prévenir des inondations ou la surcharge du système.



**Dans le futur**

Stockage des eaux usées - Mise en œuvre prochainement (2014)



L'illustration ci-dessus montre comment le débit en période de précipitation est acheminé à l'usine de traitement des eaux usées sans avoir besoin d'être stocké.

L'illustration ci-dessous montre que lors des périodes de forte précipitation, le débit excédentaire est détourné vers un unité de stockage. Une fois la précipitation terminée, les eaux usées sont réintroduites dans le système d'égouts et acheminées vers l'usine de traitement des eaux usées.



Dans le passé:  
Volume\*: 405 000m<sup>3</sup>

Volume des débordements réduit de 65%

Présentement:  
Volume\*: 140 000m<sup>3</sup>

Volume des débordements réduit de 100%\*

Dans le futur:  
Volume\*: 0m<sup>3</sup>



\* Durant la période de contrôle (15 avril au 15 novembre) de l'année type

# Evaluation of alternative solutions / Évaluation des solutions proposées

Alternative Solutions / Solutions de rechange	Short-List / Privilégiées	Criteria categories / Catégories de critères					(-) Benefits / Impacts / Issues	(-) Benefits / Impacts / Problèmes
		Technical / Technique	Natural Environment / Environnement naturel	Socio-Cultural / Socio-culturel	Economy / Économie	Other / Autres		
1. <b>1000m Tunnels / 1000m de tunnels</b>	✗	N/A	N/A	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>
(a) <b>1000m Tunnels / 1000m de tunnels</b>	✓	N/A	N/A	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>
(b) <b>1000m Tunnels / 1000m de tunnels</b>	✓	N/A	N/A	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>
2. <b>1000m+100m Tunnels / 1000m+100m de tunnels</b>	✗	N/A	N/A	N/A	N/A	N/A	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>	<ul style="list-style-type: none"> <li>High cost per m<sup>3</sup> of storage</li> <li>Deep excavations with extensive shoring needs. Some may require high groundwater dewatering</li> <li>Control buildings may impact valuable open space</li> <li>Some may result in loss of development opportunities</li> </ul>
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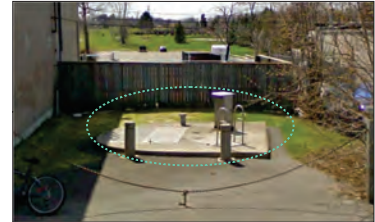
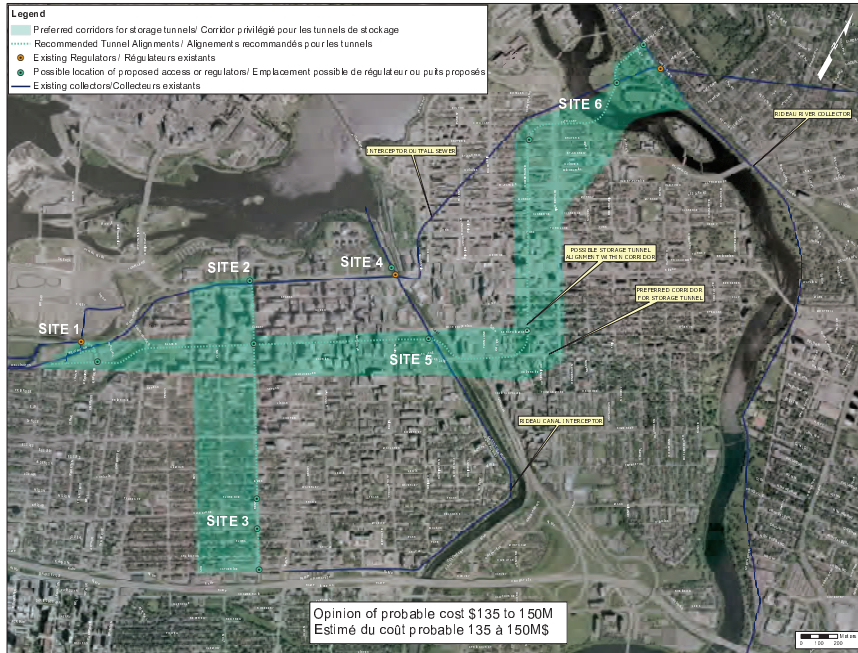
## Analysis of Short-Listed Alternatives / Évaluation des solutions privilégiées

	Alt. 2a: Core Tunnel South Alt. 2a: Tunnel court, alignement sud	Alt. 2b: Core Tunnel North Alt. 2b: Tunnel court, alignement nord	Alt. 3: Long Tunnel Alt. 3: Tunnel long
<b>Technical / Technique</b>	<ul style="list-style-type: none"> <li>+ Less congestion near Rideau Canal Interceptor simplifies design and reduces construction risks</li> <li>- Special attention required to cross the proposed downtown transit tunnel near Laurier</li> <li>- Less effective location to intercept Rideau Canal Interceptor flows. Leads to more complex operation and need to retrofit Rideau Canal Regulator to maintain level of service during flow events</li> </ul>	<ul style="list-style-type: none"> <li>+ Most effective location to intercept flows from Rideau Canal Interceptor</li> <li>- Underground canyons near Rideau Canal and convergence of bedrock faults may require significant ground improvements</li> <li>- Alignment adjacent to proposed downtown transit tunnel, Château Laurier and American Embassy requires sharp turns leading to more complex design and increased costs</li> </ul>	<p>Refer to comments for Alternatives 2a / 2b for tunnel section through City core</p> <p>Se référer aux commentaires pour les alternatives 2a / 2b pour la section centre ville du tunnel</p> <ul style="list-style-type: none"> <li>- Presence of deep clay overburden east of Blair Rd requires different tunneling equipment and increases risks of overhead settlements</li> <li>- Construction at bedrock and clay overburden interface requires special attention</li> <li>- Présence d'argile profonde à l'est du chemin Blair requiert un équipement de forage particulier et augmente le risque de tassement du sol</li> <li>- Construction à la l'interface de l'argile et du substratum rocheux requiert une attention particulière</li> </ul>
<b>Natural Environment / Environnement naturel</b>	<ul style="list-style-type: none"> <li>- No improvement to conveyance capacity to WWTP</li> <li>- Offers collection system redundancy only in City core</li> <li>- Aucun impact sur la capacité d'adduction vers le centre de traitement des eaux usées (CTEU)</li> <li>- Offre de la redondance au système d'égouts seulement au centre-ville</li> </ul>	<ul style="list-style-type: none"> <li>- No improvement to conveyance capacity to WWTP</li> <li>- Offers collection system redundancy only in City core</li> <li>- Aucun impact sur la capacité d'adduction vers le CTEU</li> <li>- Offre de la redondance au système d'égouts seulement au centre-ville</li> </ul>	<ul style="list-style-type: none"> <li>+ Ability to provide greater flow conveyance to WWTP and potentially a further reduction in combined sewer overflows</li> <li>+ Offers collection system redundancy over entire length of Interceptor Outfall Sewer</li> <li>+ Possibilité de fournir une plus grande capacité d'adduction vers le CTEU et de réduire davantage les débordements d'égouts unitaires</li> <li>+ Offre de la redondance tout au long de l'égout intercepteur</li> </ul>
<b>Socio-Cultural / Socio-culturel</b>	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Likely need for private/public property easements may increase implementation schedule</li> <li>+ Temps de construction raccourci</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics peut augmenter le temps de d'implémentation</li> </ul>	<ul style="list-style-type: none"> <li>+ Shorter construction schedule</li> <li>- Need for private/public property easements may increase implementation schedule</li> <li>+ Temps de construction raccourci</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics peut augmenter le temps d'implémentation</li> </ul>	<ul style="list-style-type: none"> <li>- Longest construction schedule</li> <li>- Greatest need for private/public property easements may increase implementation schedule</li> <li>- Temps de construction allongé</li> <li>- L'obtention des droits d'usage souterrain pour terrains privés et publics augmente le temps d'implémentation</li> </ul>
<b>Economy / Économie</b>	<ul style="list-style-type: none"> <li>- No phasing opportunities</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> <li>+ Opinion of Probable cost \$90 to 115M (short tunnel only)</li> <li>- Aucune opportunité d'implémentation par tranches</li> <li>+ Solution la plus efficace par m<sup>3</sup> de stockage</li> <li>+ Estimé du coût probable 90 à 115M\$ (tunnel court seul.)</li> </ul>	<ul style="list-style-type: none"> <li>- No phasing opportunities</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> <li>+ Opinion of Probable cost \$90 to 115M (short tunnel only)</li> <li>- Aucune opportunité d'implémentation par tranches</li> <li>+ Solution la plus efficace par m<sup>3</sup> de stockage</li> <li>+ Estimé du coût probable 90 à 115M\$ (tunnel court seul.)</li> </ul>	<ul style="list-style-type: none"> <li>+ Offers opportunities for phased implementation</li> <li>- Least cost effective per m<sup>3</sup> of storage</li> <li>- Opinion of Probable cost \$180 to 225M</li> <li>+ Opportunité d'implémentation par tranches</li> <li>- Solution la moins efficace par m<sup>3</sup> de stockage</li> <li>- Estimé du coût probable 180 à 225M\$</li> </ul>

- Impacts or Issues / - Impacts ou Problèmes + Benefits / + Bénéfices



## Recommended Preferred Solution/ Solution privilégiée recommandée



Visible portion of tunnel maintenance access shaft  
Portion visible d'un puits servant de point d'accès pour l'entretien du tunnel.

The recommended solution is a combination of Alternative 2a, Core Tunnel South, combined with a tunnel along Kent Street to help fulfill the storage requirement and also provide much needed flood protection for the downtown core. The proposed storage tunnels will be located within the east-west and north-south corridors identified on the plan to the left. Maintenance access shafts will be required roughly every 1,000m along the alignment. The exact locations of the tunnels and access shafts will be determined as part of the preliminary and final designs. The tunnels, totaling 6km in length, are expected to have an inside diameter of 3.05m in order to store 43,000m<sup>3</sup> of water.

La solution privilégiée recommandée est une combinaison de la solution alternative 2a, soit un tunnel de stockage court avec l'alignement sud, et un tunnel au long de la rue Kent. Cette combinaison fournirait le stockage requis et aiderait à protéger le centre-ville des inondations de sous-sols. Les tunnels de stockages recommandés seraient situés dans les corridors est-ouest et nord-sud présentés dans la figure à gauche. Des puits d'accès pour l'entretien seraient nécessaires aux 1 000 mètres le long du tunnel. L'emplacement exact des puits et des tunnels sera déterminé lors de la conception préliminaire et finale. Les tunnels, d'une longueur totale de 6km, auront un diamètre interne de 3.05m afin de stocker entre 43 000m<sup>3</sup> d'eau.

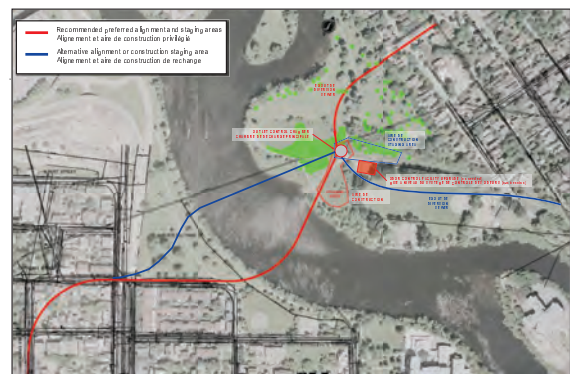


## ALTERNATIVE DESIGN CONCEPTS / PLANS CONCEPTUELS DE RECHANGE

Site 1: Lebreton Flats / Plaines Lebreton



Site 6: River Lane at/à Keefer



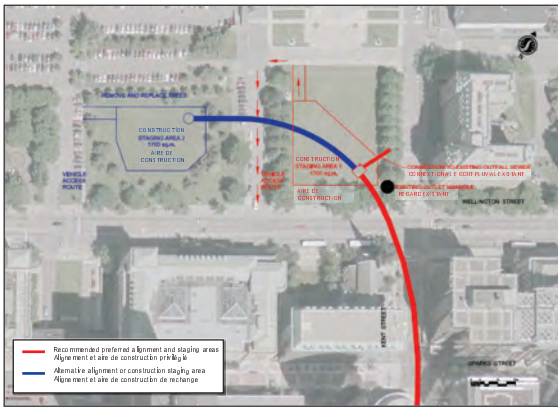
A number of alternative design concepts were evaluated including alternative tunnel and diversion sewer alignments along with alternative locations for diversion chambers and construction staging areas. The plans above illustrate some of the alternative design concepts considered along with the recommended preferred design concepts.

Plusieurs plans conceptuels de rechange furent évalués incluant des alignements alternatifs pour les tunnels et les égouts de diversions ainsi que des emplacements alternatifs pour les chambres de diversion et aires de construction. Les plans ci-haut illustrent ces plans de rechange ainsi que les plans privilégiés.



## ALTERNATIVE DESIGN CONCEPTS / PLANS CONCEPTUELS DE RECHANGE

Site 2: Wellington at/à Kent



A number of alternative design concepts were evaluated including alternative tunnel and diversion sewer alignments along with alternative locations for diversion chambers and construction staging areas. The plans above illustrate some of the alternative design concepts considered along with the recommended preferred design concepts.

Site 3: Kent at/à Catherine



Plusieurs plans conceptuels de rechange furent évalués incluant des alignements alternatifs pour les tunnels et les égouts de diversions ainsi que des emplacements alternatifs pour les chambres de diversion et aires de construction. Les plans ci-haut illustrent ces plans de rechange ainsi que les plans privilégiés.



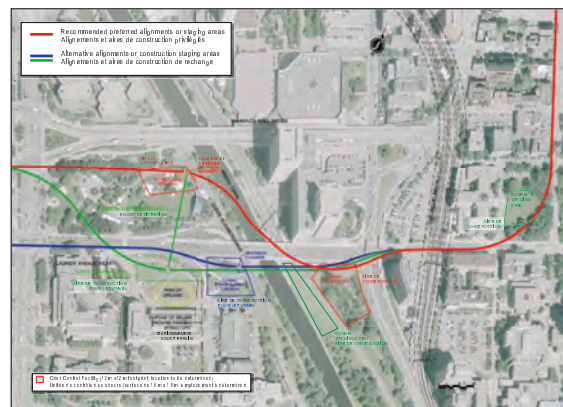
## ALTERNATIVE DESIGN CONCEPTS / PLANS CONCEPTUELS DE RECHANGE

Site 4: Rideau Canal Rideau at/à Wellington



A number of alternative design concepts were evaluated including alternative tunnel and diversion sewer alignments along with alternative locations for diversion chambers and construction staging areas. The plans above illustrate some of the alternative design concepts considered along with the recommended preferred design concepts.

Site 5: Rideau Canal Rideau at/à Laurier



Plusieurs plans conceptuels de rechange furent évalués incluant des alignements alternatifs pour les tunnels et les égouts de diversions ainsi que des emplacements alternatifs pour les chambres de diversion et aires de construction. Les plans ci-haut illustrent ces plans de rechange ainsi que les plans privilégiés.



# Potential Project Environmental Effects and Proposed Mitigation Measures

VALUED ENVIRONMENTAL COMPONENT (VEC)	PROJECT COMPONENT OR PHASE	POTENTIAL ENVIRONMENTAL EFFECTS	PROPOSED MITIGATION MEASURES
<b>Physical Environment</b>			
<b>Air Quality/ Odour/ Dust</b>	Site preparation Construction Operation	Vehicle emissions Increased odours Dust generation	<ul style="list-style-type: none"> <li>Mitigation through design, odour treatment systems will be provided for the treatment of air expelled from the proposed tunnels and locally with existing collector sewers during and immediately following an rainfall event. Potential odours will also be mitigated through proper maintenance (draining and flushing of the tunnels following an event).</li> <li>Stockpiles of excavated material and/or infill material will be properly shaped and covered or stabilized to avoid dust generation.</li> <li>A dust suppressant (e.g., water) will be applied to areas of exposed soil as necessary. Activities with potential to generate dust will be restricted during windy conditions.</li> <li>Unnecessary idling of vehicles will be avoided. Heavy equipment used during the Project will be in good operating condition.</li> </ul>
<b>Ambient Noise</b>	Site preparation Construction Operation	Increased noise levels	<ul style="list-style-type: none"> <li>All equipment used during the Project will meet applicable standards and regulations regarding noise emissions (e.g., Occupational Health and Safety Act, Local By-laws).</li> <li>In order to limit the effects of noise during construction, work will be restricted to hours that adhere to applicable City of Ottawa by-laws (No. 2004-253).</li> <li>Rock blasting activities are anticipated for construction access shafts. Blasting programs will be designed and monitored by qualified experts to ensure vibrations and procedures are maintained within legislated and recommended limits so that no damage to private property occurs. Pre and post-blasting surveys of individual properties will be conducted. Construction staging areas will be placed away from sensitive receptors to the extent possible.</li> <li>Hoardings and shrouding of engines and tunnel vents will be used to limit noise spread during operation.</li> </ul>
<b>Surface Water</b>	Site preparation Construction Operation	Runoff of sediment-laden water Release of deleterious substances	<ul style="list-style-type: none"> <li>Sediment/erosion control measures will be implemented to prevent runoff of sediment-laden stormwater.</li> <li>All equipment or associated materials will be covered, stored and maintained (e.g., re-fuel, lubricate) in a manner that prevents the entry of any deleterious substance into nearby waterways.</li> <li>On a system-wide basis, the total number of CSO occurrences and overflow volume to the Ottawa River will decrease significantly through operation. On rare occasions, the river will experience an increase in CSO volume near the Kent St. outfall since it will also provide flood relief for the City core.</li> <li>During operation, the surface water quality will improve due to the reduced number of CSOs, an overall positive impact.</li> </ul>
<b>Groundwater Quality</b>	Site preparation Construction Operation	Reduced quality of groundwater	<ul style="list-style-type: none"> <li>Mitigation through design and staging, the proposed tunnels and chambers will be lined with concrete and are not expected to impact groundwater levels along the alignment.</li> <li>Geotechnical analyses to determine alignments that provide the greatest geotechnical integrity.</li> <li>Groundwater level adjacent to construction access shafts may be temporarily lowered during construction. These temporary conditions will not adversely affect adjacent structures provided that groundwater levels are allowed to return to pre-construction levels once complete.</li> <li>Construction and post-construction monitoring.</li> <li>Investigate measures to minimize impacts and/or response to spills; all measures and procedures are to adhere to Provincial and federal regulations.</li> </ul>
<b>Soil Quality</b>	Site preparation Construction	Spread of contaminated soils	<ul style="list-style-type: none"> <li>Environmental Site Assessments Phase I and II will be completed to identify contaminated soils prior to work.</li> <li>Any identified contaminated soils will be handled and sent to a licensed disposal facility in accordance with Federal and provincial regulations.</li> </ul>
<b>Terrestrial Environment</b>			
<b>Vegetation</b>	Site preparation Construction	Introduction of invasive species Loss of vegetation Transfer of pests/disease	<ul style="list-style-type: none"> <li>As much vegetation as possible will be retained. Trees will be inspected prior to removal for pests or disease and disposed of accordingly.</li> <li>Trees that will be preserved will be demarcated to protect them from construction. Trees removed will be replaced in greater numbers.</li> <li>Native non-invasive species will be used for replacement plantings. Vegetation will be restored as soon as possible.</li> </ul>
<b>Terrestrial Animals</b>	Site preparation Construction	Disturbance	<ul style="list-style-type: none"> <li>Sedentary wildlife occurring at construction areas will be humanely trapped and relocated.</li> <li>Targeted surveys to identify potential for Species at Risk or their habitat prior to work and development of appropriate mitigation measures following surveys.</li> </ul>
<b>Avifauna</b>	Site preparation Construction	Disturbance	<ul style="list-style-type: none"> <li>Clearing of trees and shrubs will be scheduled to occur outside of the nesting season (April – July). If trees or shrubs must be cleared during the breeding season, a nesting survey will be conducted by a qualified biologist prior to disturbance. If migratory birds or species at risk are identified actively nesting in the Project area, additional mitigation will need to be applied in consultation with the Ministry of Natural Resources.</li> </ul>
<b>Aquatic Environment</b>			
<b>Fish and Fish Habitat</b>	Operation	Alteration of fish habitat	<ul style="list-style-type: none"> <li>There are no anticipated impacts to fish and fish habitat during site preparation or construction.</li> <li>Potential impacts as they relate to fish and fish habitat will improve during operation of the project as the reduced number of CSOs to the Ottawa River will reduce pollution.</li> </ul>
<b>Socio-Economic Environment</b>			
<b>Heritage/ Historical</b>	Site preparation Construction	Damage due to nearby vibrations Effect on heritage character/viewscapes	<ul style="list-style-type: none"> <li>Mitigation through design, surface disturbance will be low because tunneling will occur at depth.</li> <li>Consultation with Parks Canada to ensure design and implementation of project components do not have a negative impact on the Rideau Canal World Heritage Site's Outstanding Universal Value.</li> <li>Consultation with Federal Heritage Building Review Office.</li> <li>Blasting programs will be designed and monitored by qualified experts to ensure vibrations and procedures are maintained to limit potential effects to private property. Pre and post-blasting surveys specific to heritage buildings will be conducted as necessary.</li> </ul>
<b>Archaeology</b>	Site preparation Construction	Disturbance or destruction of previously undiscovered archaeological resources	<ul style="list-style-type: none"> <li>Archaeological assessment will be conducted prior to any ground disturbance to identify and mitigate against loss of undiscovered resources.</li> </ul>
<b>Recreation/ Aesthetics</b>	Site preparation Construction Operation	Disruption to recreational use	<ul style="list-style-type: none"> <li>Schedule construction and maintenance activities to minimize conflict with recreational use.</li> <li>Construction and notification with potentially affected organizations and those that utilize identified recreational spaces.</li> <li>Surface and underground storage facilities will be integrated into existing spaces in a manner that keeps the current functionality while also providing opportunity to enhance where possible.</li> </ul>
<b>Economy</b>	Site preparation Construction Operation	Disruption to commercial activities	<ul style="list-style-type: none"> <li>Schedule the project activities and future maintenance to minimize conflict with commercial use of nearby area.</li> <li>A traffic control plan including public notifications and proper signage will be implemented.</li> <li>Restrictions to construction zone access and control structures along roadways will be scheduled, to the extent possible, during off-peak seasons and/or hours.</li> </ul>

# Effets environnementaux éventuels du projet et mesures d'atténuation proposées

Composante valorisée de l'écosystème (CVE)	Composante du projet ou phase	Effets environnementaux éventuels	Mesures d'atténuation proposées
<b>Environnement physique</b>			
<b>Qualité de l'air, odeurs ou poussières</b>	Préparation du site Construction Exploitation	Émissions des véhicules Augmentation des odeurs Formation de poussières	<ul style="list-style-type: none"> <li>L'atténuation par le biais du design, les systèmes de traitement des odeurs seront assurés pour le traitement de l'air extrait des tunnels proposés et localement à l'intérieur de réseaux collecteurs existants au cours de et immédiatement après une chute de pluie. Les odeurs éventuelles seront également atténuées par le biais d'un entretien adéquat (drainage et nettoyage des tunnels après une pluie).</li> <li>Les piles de stocks de matériaux excavés ou de remblais seront correctement stabilisées et couvertes ou stabilisées pour éviter la formation de poussières.</li> <li>Au besoin, on appliquera un dépolluant (p. ex., de Feux) sur le sol exposé. Les activités peuvent contribuer à la formation de poussières, les mesures seront prises pour les minimiser.</li> <li>On évite le marche au ralenti inutile des véhicules. L'équipement lourd utilisé au cours du projet sera en bon état de fonctionnement.</li> </ul>
<b>Bruit et niveaux sonores ambiants</b>	Préparation du site Construction Exploitation	Augmentation des niveaux sonores	<ul style="list-style-type: none"> <li>Tout l'équipement à bruit utilisé au cours du projet sera conforme aux normes et règlements applicables concernant les émissions de bruits (p. ex., le Loi sur le son et le silence au travail, le règlement local).</li> <li>Pour limiter les effets du bruit au cours de la construction, les travaux seront restreints aux heures qui respectent les règlements applicables de la Ville d'Ottawa (No. 2004-253).</li> <li>On prévoit des activités d'atténuation des bruits pour la construction des puits d'accès. Des programmes de démarrage seront conçus et surveillés par des experts qualifiés pour assurer que les vibrations et les procédures sont maintenues à l'intérieur des limites recommandées de façon à éviter les dommages à la propriété privée. On procédera au même pré- et post-démarrage des propriétés individuelles. Autant que possible, on installera les sites de rassemblement de construction loin des récepteurs sensibles.</li> <li>On aura recours à des hoardings de chantier et des enveloppes de mesure et d'arrêt de tunnel pour limiter la propagation du bruit au cours de leur fonctionnement.</li> </ul>
<b>Eau de surface</b>	Préparation du site Construction Exploitation	Ruissellement d'eau contenant des sédiments Rejet de substances nocives	<ul style="list-style-type: none"> <li>Des mesures de contrôle de l'érosion ou de sédiments seront mises en œuvre pour prévenir le ruissellement d'eau de pluie contenant des sédiments.</li> <li>Tout l'équipement et le matériel concerné sera soigneusement entretenu (p. ex., vidage, lubrification) de façon à prévenir l'introduction de toute substance nocive dans le cours d'eau environnant.</li> <li>Pour l'ensemble du système, le nombre total de déversements vers le rivière de Ottawa est d'importance au cours de la planification. En de rares occasions, la rivière subira une augmentation du volume de déversement près de l'avalanche de la rue Kent étant donné qu'il assurera également l'évaluation des crues pour le centre-ville.</li> <li>Au cours de l'exploitation, le rejet de l'eau de surface s'améliorera en raison de la réduction du nombre de déversements; un impact positif global sur le système.</li> </ul>
<b>Qualité des eaux souterraines</b>	Préparation du site Construction Exploitation	Diminution de la qualité des eaux souterraines	<ul style="list-style-type: none"> <li>Une atténuation par le biais de la conception et de la réalisation, les tunnels et chambres proposés seront revêtus d'une paroi de béton et ne devraient pas avoir d'incidence sur les niveaux des eaux souterraines à long terme.</li> <li>Des analyses géotechniques détermineront les tracés qui assurent la plus grande intégrité géotechnique.</li> <li>Les niveaux des eaux souterraines aux environs des puits d'accès de construction pourront diminuer au cours des travaux de construction. Cet état temporaire ne aura aucune incidence défavorable sur les constructions adjacentes à condition que les eaux souterraines puissent retrouver leurs niveaux pré-construction une fois les travaux complétés.</li> <li>Surveillance au cours de la construction et post-construction.</li> <li>Prévoir des mesures pour réduire les impacts ou intervenir en cas de déversements; toutes les mesures et procédures doivent être conformes aux lois provinciales et fédérales.</li> </ul>
<b>Qualité du sol</b>	Préparation du site Construction	Dispersion des sols contaminés	<ul style="list-style-type: none"> <li>Les phases I et II de l'évaluation environnementale du site seront complétées pour identifier les sols contaminés avant le début des travaux.</li> <li>Tous les sols désignés comme sensibles et exposés vers une installation d'immersion autorisée conformément aux lois provinciales et fédérales.</li> </ul>
<b>Environnement terrestre</b>			
<b>Végétation</b>	Préparation du site Construction	Introduction d'espèces envahissantes Dépérissement de la végétation Transfert d'organismes nuisibles ou de maladies	<ul style="list-style-type: none"> <li>On conservera le plus de végétation possible. Les arbres devront être inspectés avant leur enlèvement raison de maladies et déposés en conséquence.</li> <li>Les arbres qui seront conservés seront démarqués pour les protéger contre les travaux de construction. Les arbres et arbustes seront remplacés par un plus grand nombre d'arbres.</li> <li>Pour le remplacement des plantes, on utilisera des espèces indigènes non envahissantes. La végétation sera restaurée le plus tôt possible.</li> </ul>
<b>Faune terrestre</b>	Préparation du site Construction	Perturbation	<ul style="list-style-type: none"> <li>Les espèces sauvages sédentaires sur les lieux de travaux de construction seront protégées sans nuire ni violence et dérangées.</li> <li>Des relevés ciblés pour évaluer la possibilité d'impacts en période de leur habitat avant le début des travaux et l'élaboration de mesures d'atténuation appropriées à la suite de ces relevés.</li> </ul>
<b>Faune avienne</b>	Préparation du site Construction	Perturbation	<ul style="list-style-type: none"> <li>Le défrichage des arbres et des arbustes sera effectué en dehors de la saison de nidification (d'avril à juillet). Lorsque des arbres ou arbustes doivent être éliminés au cours de la saison de nidification, un relevé des nids d'oiseaux sera effectué par un biologiste qualifié avant la perturbation du site. Lorsque des oiseaux migrateurs ou des espèces en péril sont répertoriés en train de nicher dans l'aire du projet, des mesures supplémentaires d'atténuation doivent être appliquées de concert avec le ministère des Ressources naturelles.</li> </ul>
<b>Environnement aquatique</b>			
<b>Poisson et habitat du poisson</b>	Exploitation	Détérioration de l'habitat du poisson	<ul style="list-style-type: none"> <li>Aucune incidence sur les poissons et sur les habitats de poissons n'est anticipée au cours de la préparation du site ou de la construction.</li> <li>Les incidences éventuelles en ce qui concerne les poissons et les habitats de poissons font en somme équilibre au cours de l'exploitation du projet étant donné que la réduction du nombre de déversements acheminés vers le rivière des Ottawa réduit la pollution.</li> </ul>
<b>Environnement socio-économique</b>			
<b>Histoire et patrimoine</b>	Préparation du site Construction	Domages causés par les vibrations à proximité immédiate Incidences sur le caractère patrimonial et sur les vues panoramiques	<ul style="list-style-type: none"> <li>Atténuation par le biais du design, la perturbation de surface sera faible étant donné le creusement de tunnel qui se produira en profondeur.</li> <li>Consultations auprès de Parks Canada pour assurer que le design et la mise en œuvre des composantes du projet n'auront pas d'incidences négatives sur le valeur historique exceptionnelle du site du patrimoine national du canal Rideau.</li> <li>Consultations auprès du Bureau d'histoire de la Ville d'Ottawa et de l'Agence de patrimoine.</li> <li>Les programmes de démarrage seront conçus et surveillés par des experts qualifiés pour assurer que les vibrations et les procédures sont maintenues pour éviter les incidences éventuelles sur la propriété privée.</li> <li>Des relevés pré- et post-démarrage des édifices à valeur patrimoniale seront effectués selon les besoins.</li> </ul>
<b>Archéologie</b>	Préparation du site Construction	Perturbation ou destruction de ressources archéologiques encore inconnues	<ul style="list-style-type: none"> <li>Une évaluation archéologique sera effectuée avant toute perturbation du sol pour localiser et prendre des mesures d'atténuation à l'encontre de la perte de ressources archéologiques encore inconnues.</li> </ul>
<b>Récréation et esthétique</b>	Préparation du site Construction Exploitation	Perturbation des activités récréatives	<ul style="list-style-type: none"> <li>Planifier les activités de construction et d'entretien pour réduire les conflits avec les activités récréatives.</li> <li>La consultation et la notification des organisations communément touchées et de celles qui utilisent les activités récréatives en question.</li> <li>Les installations d'emplacement en surface et souterraines seront conçues et surveillées pour conserver la fonctionnalité à laquelle elles ont été conçues tout en offrant aussi l'occasion de familiariser lorsque possible.</li> </ul>
<b>Économie</b>	Préparation du site Construction Exploitation	Perturbation des activités commerciales	<ul style="list-style-type: none"> <li>Planifier les activités de construction et d'entretien futur du projet de façon à réduire les conflits avec les activités commerciales des environs.</li> <li>Un plan de contrôle de la circulation comprenant des avis à l'intention du public et une signalisation adéquate sera mis en œuvre.</li> <li>Des restrictions à l'accès des zones de construction et des structures de contrôle de la circulation publiques seront planifiées, dans la mesure du possible, aux heures et aux saisons où la demande est moins forte.</li> </ul>

## Next Steps in the Project / Prochaines étapes du projet

- Review and document input received from this Public Open House  
Examiner et documenter les commentaires reçus lors de la journée portes ouvertes  
July 2012  
Juillet 2012
- Confirm the functional design for the preferred alternative solution  
Confirmer la conception fonctionnelle de la solution alternative privilégiée  
August 2012  
Août 2012
- Complete the Environmental Study Report and post notice of completion (30 day review)  
Compléter le rapport d'étude environnementale et publier l'avis d'achèvement (révision de 30 jours)  
September 2012  
Septembre 2012
  
- Final design of the preferred solution  
Conception finale de la solution alternative privilégiée  
January 2013 to June 2014  
Janvier 2013 à juin 2014
- Construction of the preferred solution  
Mise en œuvre de la solution alternative privilégiée  
January 2015 to December 2017  
Janvier 2015 à décembre 2017
  
- Commissioning of the storage tunnels  
Mise en service des tunnels de stockage  
January 2018  
Janvier 2018





# Combined Sewage Storage Project

EA & Functional Design  
Public Open House No. 3

June 26, 2012

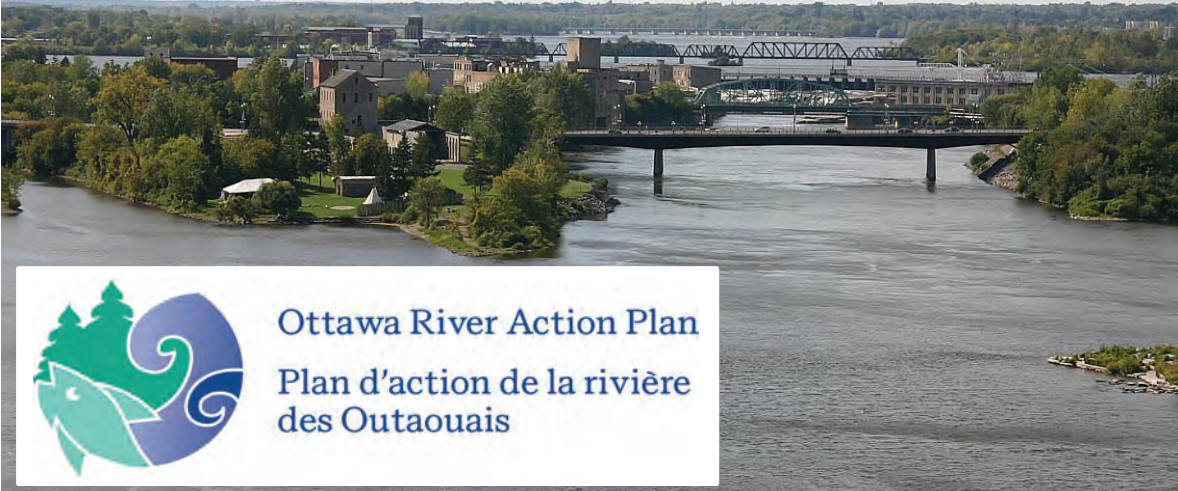

One Team. Infinite Solutions.



## Agenda

- Project Background & Objectives
- EA Process
- Review of Alternatives
- Evaluation Criteria
- Recommended Solution
- Review of Alternative Design Concepts
- Environmental Effects & Mitigation Measures
- Next Steps

- Real Time Control
- CSO & Storm Outfall Monitoring
- Storage for CSO Control
- Sewer Separation
- Wet Weather Management †
- Floatable Traps
- Public Consultation and Education
- Pinecrest Creek / Westboro Pilot
- Expand and Implement Retrofits †
- ROPEC Dechlorination
- Water Environment Strategy
- Monitoring & Source Control
- Environmental Management System
- Water Quality Model

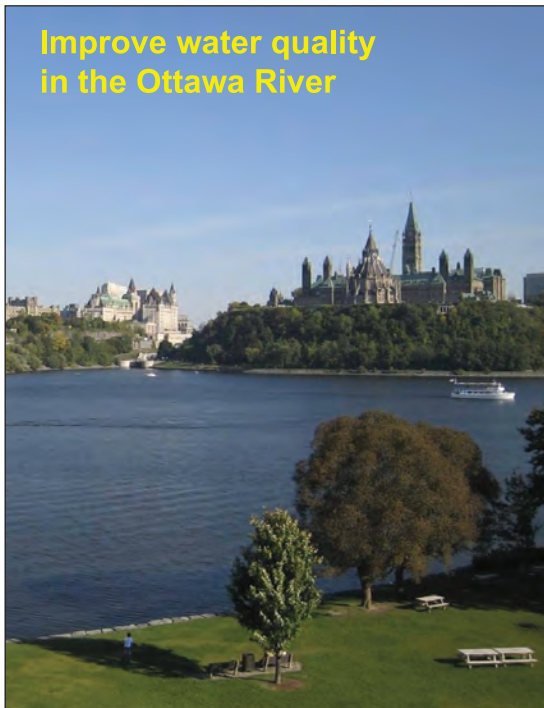
Ottawa River Action Plan  
Plan d'action de la rivière  
des Outaouais



## PROJECT OBJECTIVES

### ENHANCED CSO CONTROL – BEYOND REGULATIONS

Improve water quality  
in the Ottawa River



Reduce CSOs from the  
Combined Sewer Area



Full Compliance  
with MOE Guidelines



## MOE Procedure F-5-5: Minimum requirements for CSO Control

- No Sanitary Sewer Overflows ✓ Complete
- Capture and treat 90% of wet weather flows ✓ RTC
- Beach Protection (as a result of CSOs) ! Storage
  - Not to exceed provincial objectives for E.coli bacteria
  - Control to 2 overflow events per swimming season

## Combined Sewers in Ottawa



## Originally: All flows to river



## 1960's: Interceptor Sewer and Treatment Plant



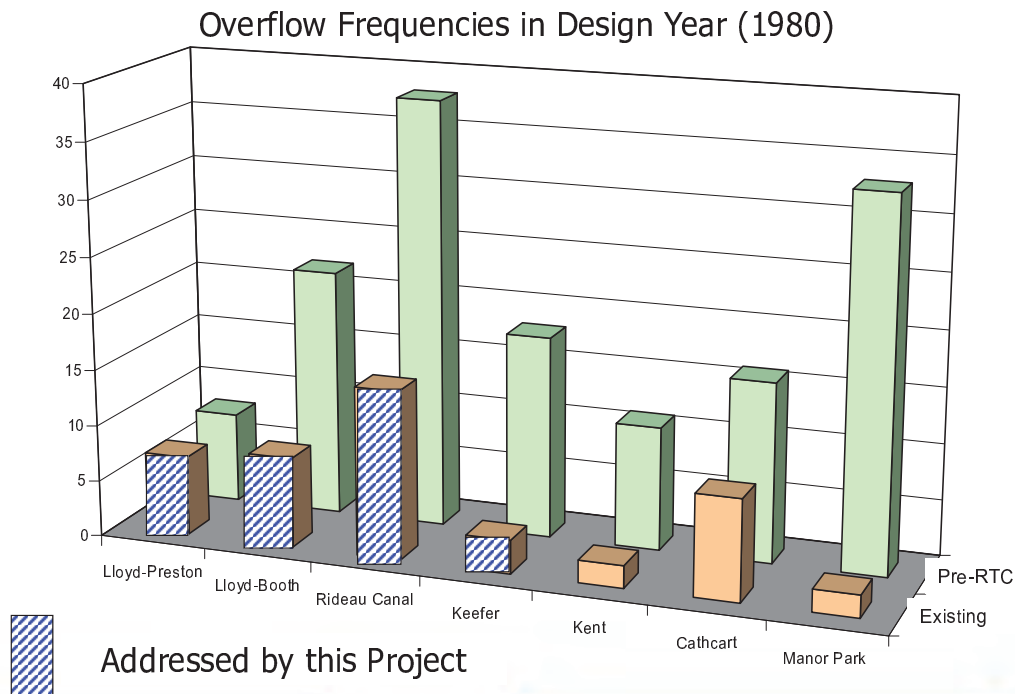
**Capture/treat all  
dry weather  
flow + some  
storm water**



**Overflow during  
larger rainfalls**



# How Much Overflows and How Often?



## Problem Definition/Opportunity

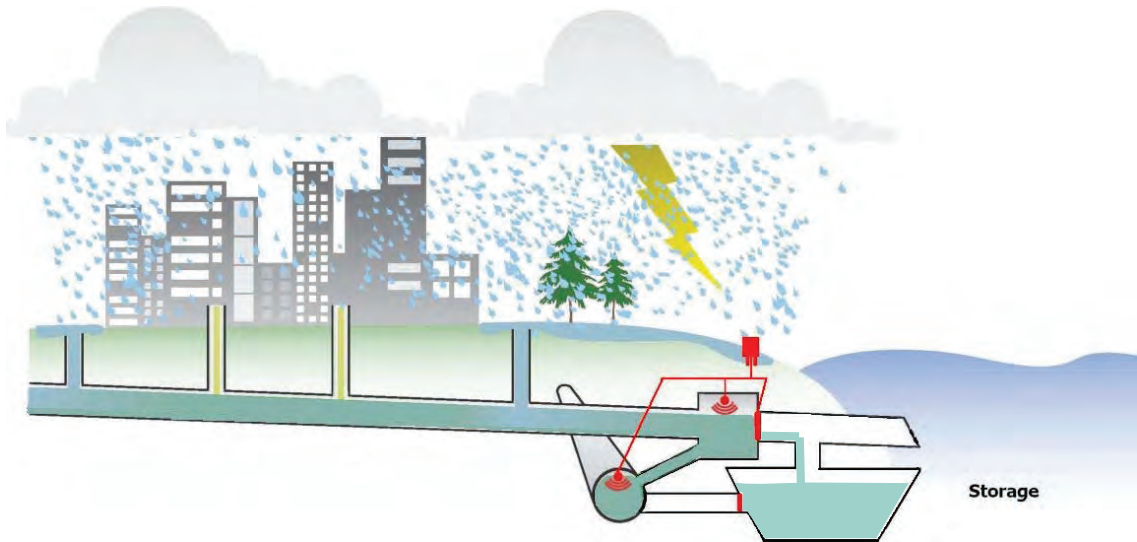
### Problem Statement

- CSOs to the Ottawa River meet most but not all provincial CSO control targets.
- The City of Ottawa adopted a policy of having zero CSO events during the swimming season in the design year (with the understanding that overflows will occur during large events).

### Opportunity

- Combined sewage storage has been identified as the most cost effective way of further reducing CSO beyond the minimum control targets.

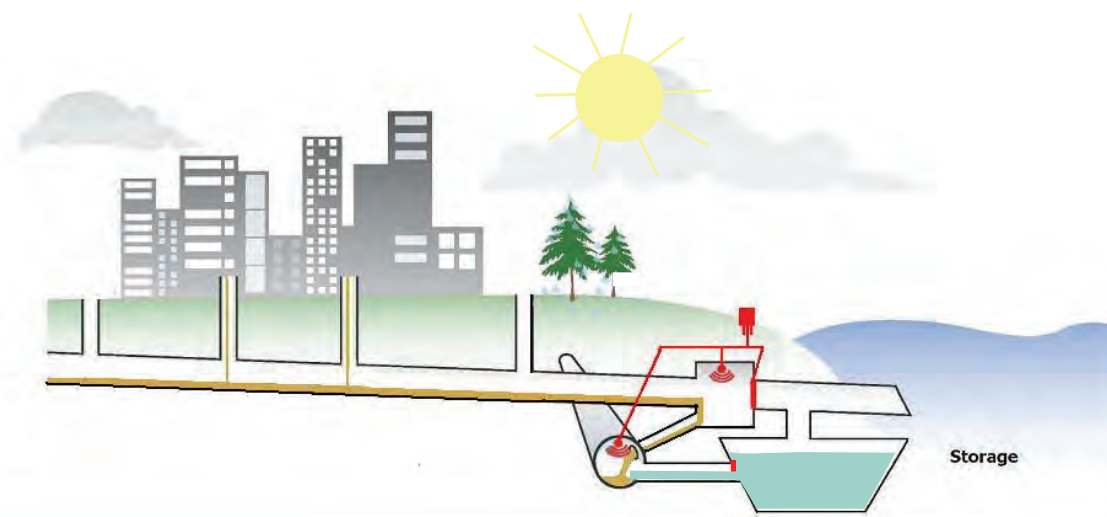
## Next: Storage to Achieve Objectives



Capture and store excess  
during larger rainfalls



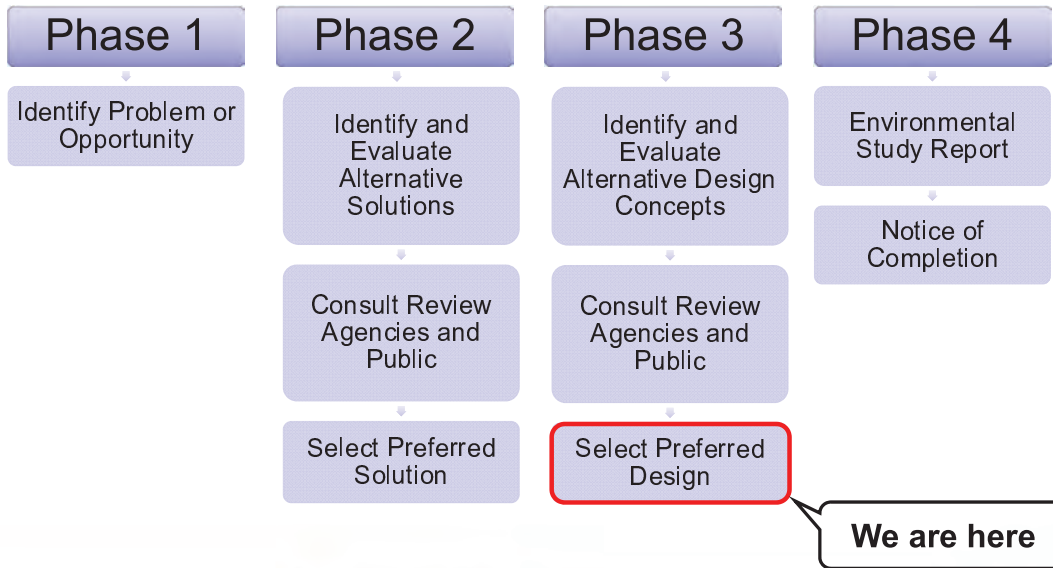
## Next: Storage to Achieve Objectives



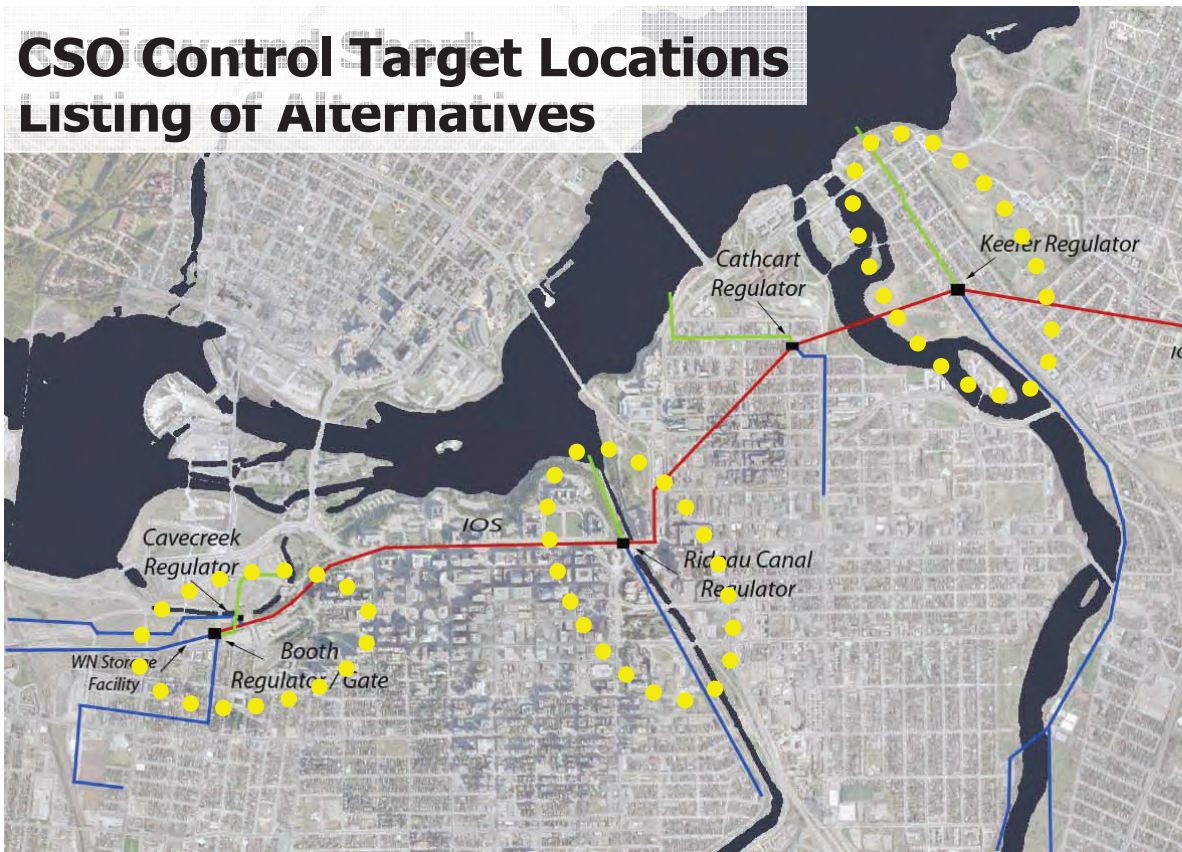
Returned to system  
when flows subside



# Municipal Class EA Process



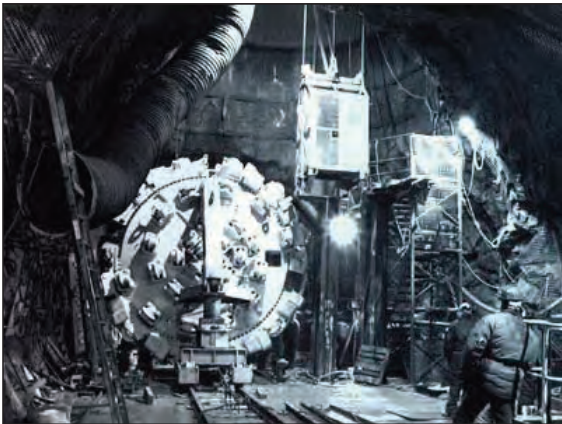
## CSO Control Target Locations Listing of Alternatives



# Combined Sewage Storage: Tanks



# Combined Sewage Storage: Tunnels



# Alt.1: Storage Tanks



# Alt.2: Short Tunnels



Alternative Solution 2A & 2B

# Alt. 3: Long Tunnel



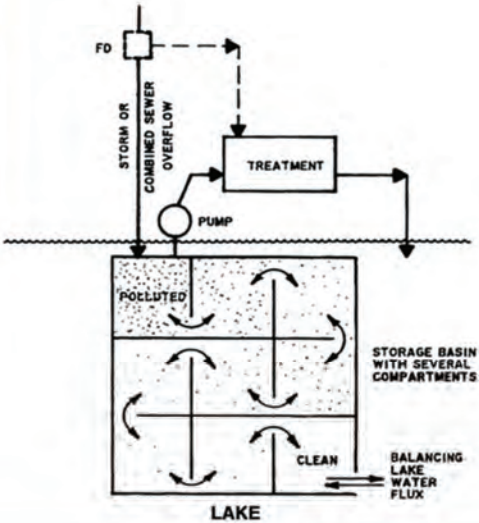
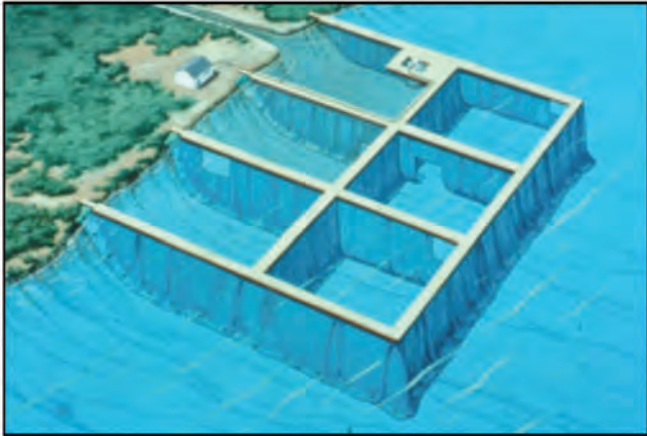
# Alt. 4a: East Tunnel Hybrid



# Alt. 5: In-River Storage



# Alt. 5: In-River Storage / Stockage en rivière



# Evaluation Criteria

Technical	
T1	Construction Risks
T2	Schedule
T3	Flexibility
T4	Reliability/Complexity
Natural Environment	
N1	Impact on Significant Natural Features (Terrestrial/Aquatic)
N2	Impact on Ecological processes
N3	Impact on quality of receiving water
Socio-Cultural	
S1	Effect on urban greenspace/open space
S2	Cultural heritage values or features
S3	Disruption to community
S4	Consistency with planning policies/processes
S5	Impact on level of service
S6	Property Issues
Economy	
E1	Impact on businesses and land owners
E2	Affordability
E3	Sustainability



# Short-Listed Alternatives

	Alternatives	Short-List	Criteria Categories			
			Technical	Natural	Socio-Cultural	Economy
1	Storage Tanks	☒	High	Low	High	High
2	(2a) Core Tunnel South	✓	Medium	Low	Low	Medium
	(2b) Core Tunnel North	✓	Medium	Low	Low	Medium
	(2c) Hurdman-Lyon Tunnel	☒	High	Low	Low	Medium
	(2d) Somerset Tunnel	☒	High	Low	Medium	High
	(2e) Opportunities with DOT	☒	High	Low	Low	High
3	Long Tunnel to ROPEC	✓	Medium	Low	Medium	Medium
4	(4a) East Tunnel Hybrid	☒	Medium	Low	Medium	High
	(4b) West Tunnel Hybrid	☒	Medium	Low	Medium	High
	(4c) Lyon Tunnel Hybrid	☒	High	Low	Medium	High
5	Dunker Systems	☒	Medium	High	High	Medium



# Analysis of Short-Listed Alternatives

<b>Alternative 2a Core Tunnel South</b> (4,200m @ 2.8-3.7m Ø)	<b>Alternative 2b Core Tunnel North</b> (4,200m @ 2.8-3.7m Ø)	<b>Alternative 3 Long Tunnel</b> (11,900m @ 2.4m Ø)
<ul style="list-style-type: none"> <li>+ Least congestion near Rideau Canal Interceptor</li> <li>+ Least amount of private/public property impacts</li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Geotechnical concerns</b></li> <li>- <b>Need private/public property easements (Parliamentary Precinct)</b></li> <li>+ Most cost effective per m<sup>3</sup> of storage</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Clay for last ~1.5km</b></li> <li>- <b>Greatest amount of private/public property impacts</b></li> <li>+ Increased conveyance and full redundancy to WWTP</li> <li>- <b>Least cost effective per m<sup>3</sup> of storage</b></li> </ul>



## Long-Term Solution

- **Beyond Immediate Project Objectives**
  - **CSO Control**

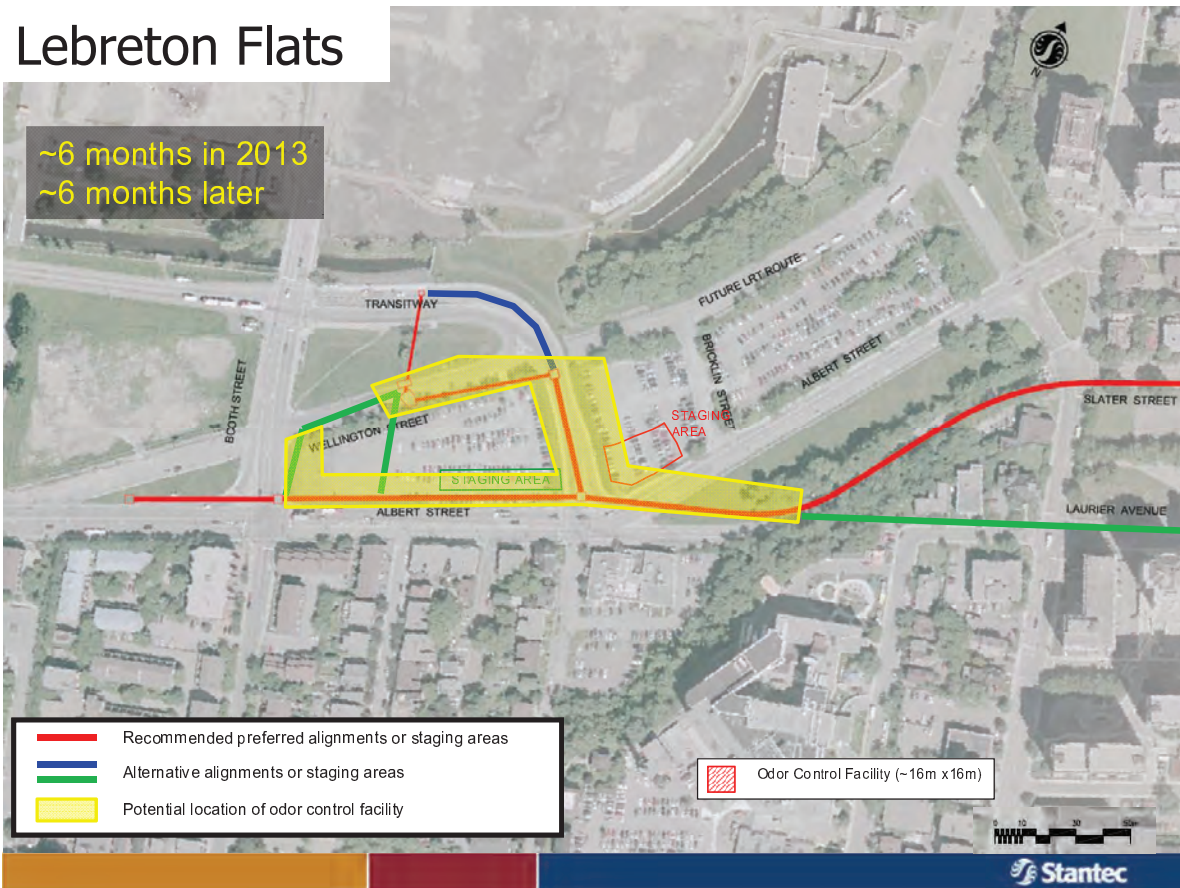


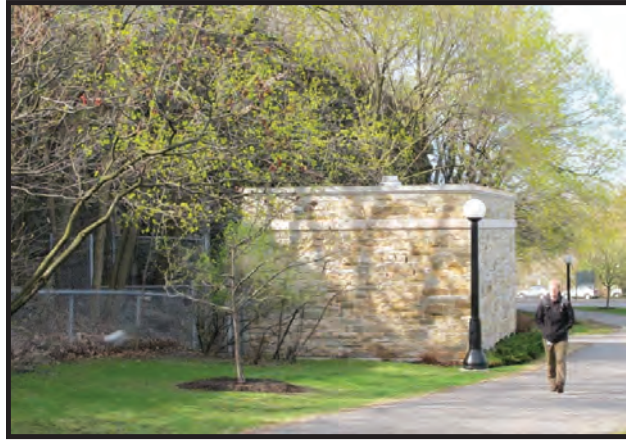
- **South alignment in core is preferable**
- **Fully twin IOS - Redundancy**
- **North-South Tunnel - Flood Relief**





## Lebreton Flats

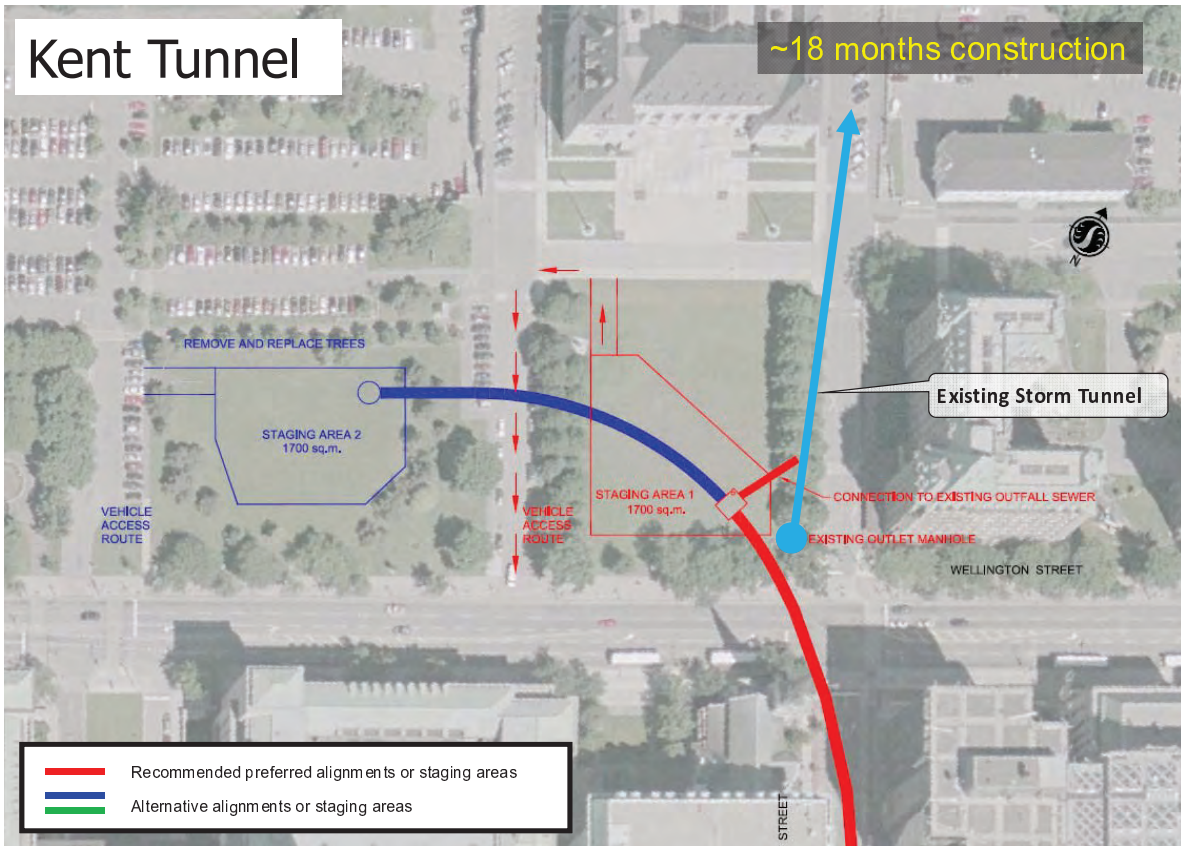




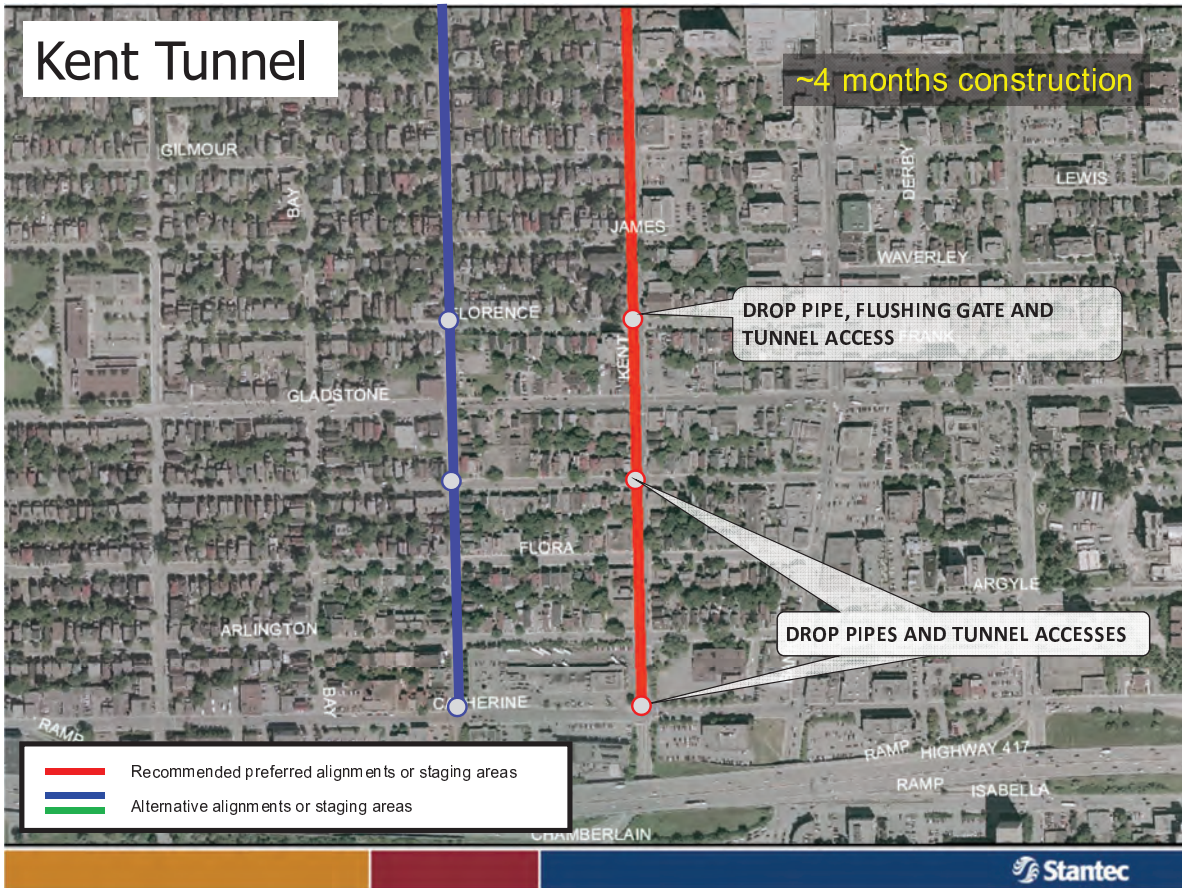
Odor control facilities



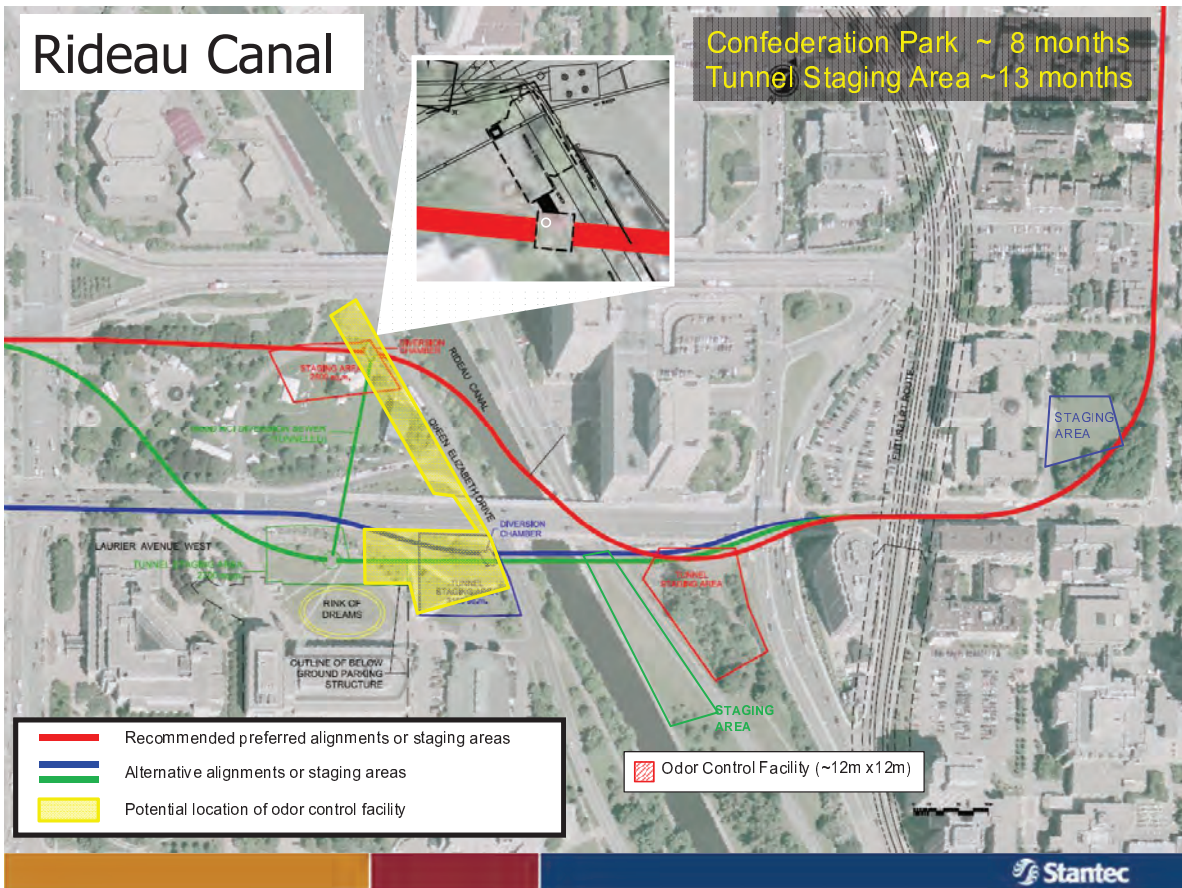
# Kent Tunnel



# Kent Tunnel

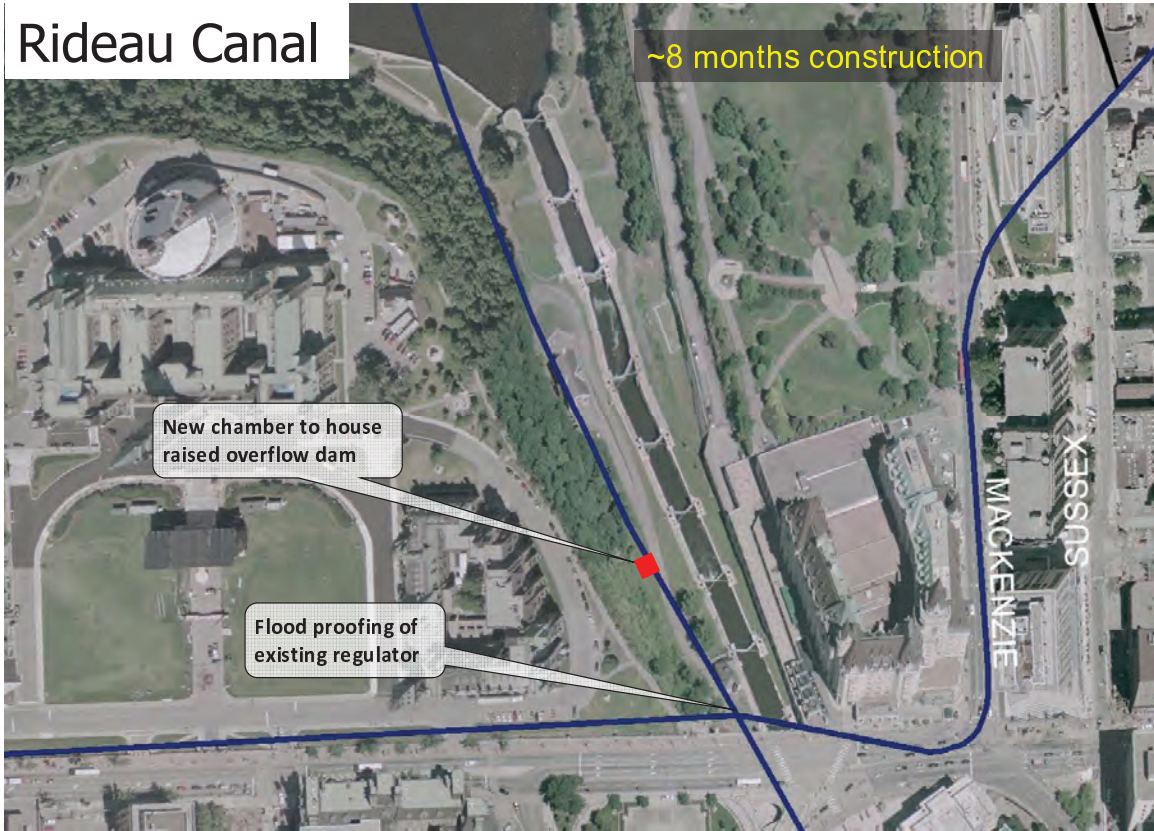


# Rideau Canal



# Rideau Canal

~8 months construction



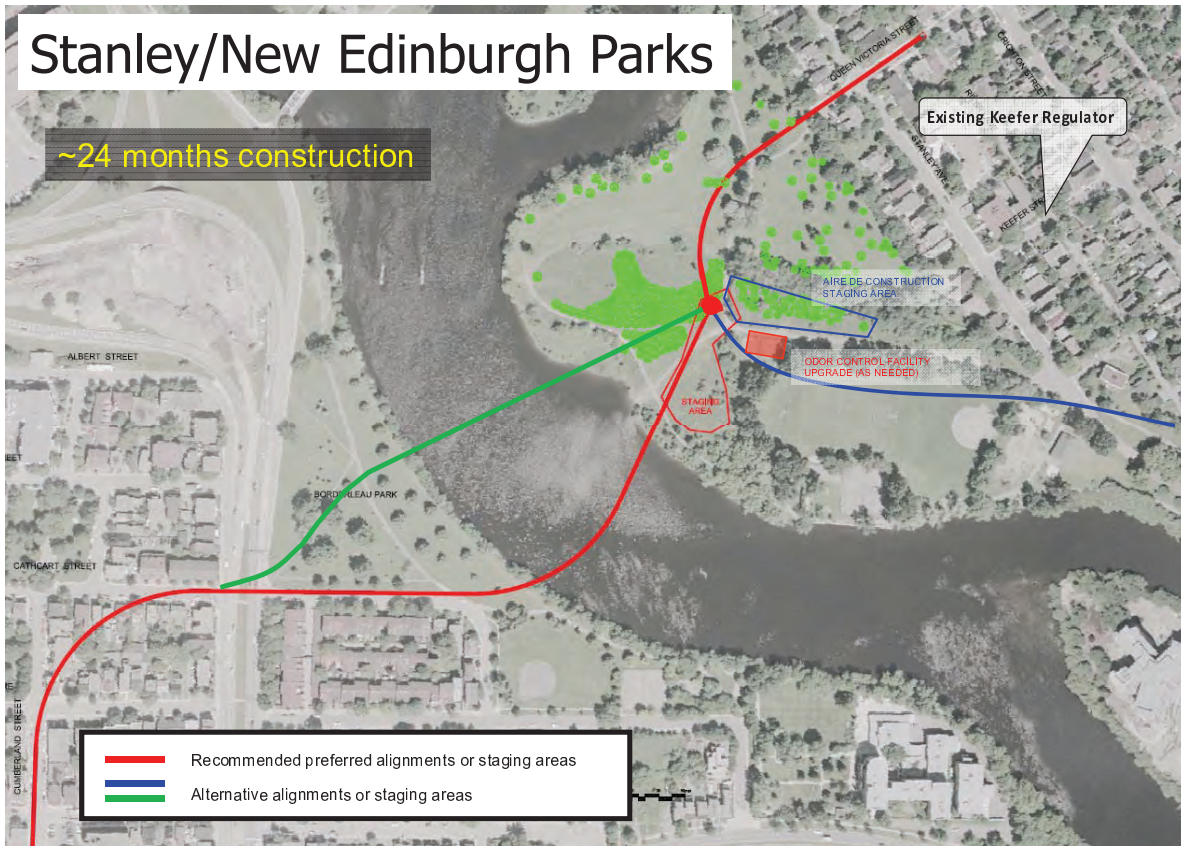
New chamber to house raised overflow dam

Flood proofing of existing regulator



# Stanley/New Edinburgh Parks

~24 months construction



Existing Keefer Regulator

AIRE DE CONSTRUCTION STAGING AREA

ODOR CONTROL FACILITY UPGRADE (AS NEEDED)

STAGING AREA

- Recommended preferred alignments or staging areas
- Alternative alignments or staging areas



# Potential Environmental Effects and Proposed Mitigation Measures



## Potential Environmental Effects and Proposed Mitigation Measures Physical Environment

ENVIRONMENTAL COMPONENT	POTENTIAL ENVIRONMENTAL EFFECTS	PROPOSED MITIGATION MEASURES
<b>Air Quality / Odour / Dust</b>	Vehicle emissions Dust generation Increased odours	<ul style="list-style-type: none"> <li>• Best construction practices</li> <li>• Mitigation through design, odour control &amp; treatment systems</li> </ul>
<b>Ambient Noise</b>	Increased noise levels	<ul style="list-style-type: none"> <li>• Equipment and work hours to meet noise standards and regulations</li> <li>• Controlled blasting</li> <li>• Hoardings and shrouding of engines and tunnel vents</li> </ul>
<b>Surface Water</b>	Runoff of sediment-laden water Release of deleterious substance	<ul style="list-style-type: none"> <li>• Sediment/erosion control measures</li> <li>• River water quality will improve due to the reduced number of CSOs</li> </ul>
<b>Groundwater Quality</b>	Reduced quality of groundwater	<ul style="list-style-type: none"> <li>• Tunnels / chambers lined with concrete</li> <li>• Engineering analyses to determine best alignment</li> <li>• Construction and post-construction monitoring</li> <li>• Instigate measures to minimize impacts and/or response to spills</li> </ul>
<b>Soil Quality</b>	Spread of contaminated soils	<ul style="list-style-type: none"> <li>• Identify contaminated soils prior to work</li> <li>• Handle contaminated soils in accordance with applicable regulations</li> </ul>

# Potential Environmental Effects and Proposed Mitigation Measures Terrestrial & Aquatic Environment

ENVIRONMENTAL COMPONENT	POTENTIAL ENVIRONMENTAL EFFECTS	PROPOSED MITIGATION MEASURES
<b>Vegetation</b>	Introduction of invasive species Loss of vegetation Transfer of pests/disease	<ul style="list-style-type: none"> <li>Retain vegetation as much as possible</li> <li>Trees removed will be replaced as soon as possible and in greater numbers</li> <li>Proper disposal of diseased trees</li> </ul>
<b>Terrestrial Animals</b>	Disturbance	<ul style="list-style-type: none"> <li>Sedentary wildlife humanely trapped and relocated</li> <li>Surveys for Species at Risk or their habitat prior to work and development of appropriate mitigation measure</li> </ul>
<b>Avifauna</b>	Disturbance	<ul style="list-style-type: none"> <li>Clearing of trees and shrubs to occur outside of the nesting season</li> <li>Additional mitigation will be applied if species at risk are identified actively nesting in the project area,</li> </ul>
<b>Fish and Fish Habitat</b>	Alteration of fish habitat	<ul style="list-style-type: none"> <li>No anticipated impacts to fish and fish habitat during construction</li> <li>Improvement during operation as the reduced number of CSOs to the Ottawa River will reduce pollution.</li> </ul>



# Potential Environmental Effects and Proposed Mitigation Measures Socio-Economic Environment

ENVIRONMENTAL COMPONENT	POTENTIAL ENVIRONMENTAL EFFECTS	PROPOSED MITIGATION MEASURES
<b>Heritage/ Historical</b>	Damage due to nearby vibrations Effect on heritage character/viewscales	<ul style="list-style-type: none"> <li>Limited surface disturbance because of tunneling</li> <li>Consultation with Parks Canada - Rideau Canal</li> <li>Consultation with Federal Heritage Buildings Review Office</li> <li>Blasting programs including pre and post-blasting surveys will be conducted</li> </ul>
<b>Archaeology</b>	Disturbance or destruction of archaeological resources	<ul style="list-style-type: none"> <li>Archaeological assessment will be conducted prior to any ground disturbance</li> </ul>
<b>Recreation/ Aesthetics</b>	Disruption to recreational use	<ul style="list-style-type: none"> <li>Schedule construction and maintenance to minimize conflict with recreational use</li> <li>Consultation and notification with potentially affected organizations and those that utilize identified recreational spaces.</li> <li>Surface and underground facilities will be integrated into existing spaces to keep current functionality and provide enhancements where possible</li> </ul>
<b>Economy</b>	Disruption to commercial activities	<ul style="list-style-type: none"> <li>Schedule construction and maintenance to minimize conflict with commercial use</li> <li>Traffic control plan will be implemented</li> <li>Construction and maintenance access to control structures along roadways will be scheduled, to the extent possible, during off-peak seasons and/or hours</li> </ul>



## Next Steps

- Review and document public input
- Confirm preferred design concepts
- Complete Environmental Study Report (ESR) & publish Notice of Completion (30 day review) September 2012

=====

- Preliminary & Detailed Design Jan. 2013 to June 2014
- Construction Jan. 2015 to Dec. 2017
- Commissioning January 2018





# Combined Sewage Storage Project Class Environmental Assessment Public Open House



June 26, 2012

## Presentation @ 7:00 PM

Thank you for coming to the City of Ottawa Combined Sewage Storage Project Public Open House.

At this Public Open House you will learn more about the background of this project and where it is going. You will also be introduced to the environmental assessment (EA) process, how it applies to this project and its purpose.

## Background

The City of Ottawa has a working plan to protect water quality in the Ottawa River. The Ottawa River Action Plan (ORAP) identifies seventeen projects that will enable the City to improve water quality in the watershed and to ensure compliance with provincial regulations.

Like most municipalities, the City of Ottawa has combined sewers in older areas of the City, which transport combined sewage (wastewater and stormwater runoff) in the same pipe. These older systems were designed to overflow into the Ottawa River during medium and large rainfall events. This impacts the water quality of the Ottawa River.

## Problem Statement

Currently, combined sewer overflows (CSOs) to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in the design year, while accepting some overflows during rainy years or heavy rainfall events.

## Opportunity

The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified

combined sewage storage within the Ultimate Combined Sewer Area as the most cost effective way of further reducing CSO beyond the minimum regulatory requirements.

## Project Overview

The existing Interceptor-Outfall Sewer (IOS) collects wastewater (sanitary) and some stormwater from west to east across the city to the wastewater treatment plant. The IOS cannot handle all of the stormwater runoff that enters the sewer system during wet weather. Frequent and large volume overflows have been identified at three locations: West End (W), Rideau Canal (R) and Keefer (K).

Storage facilities at these locations will hold excess combined sewage until it can be transferred to the Robert O. Pickard Environmental Centre (ROPEC) for treatment. Storage facilities will lower the amount of combined sewage released to the Ottawa River during larger wet weather events. This will improve the water quality of the Ottawa River and will help to reduce the number of beach closures at Petrie Island.

## The EA Process

This project is being planned as a Schedule C project in accordance with the requirements of the *Municipal Class Environmental Assessment, 2007*.

The Municipal Class EA is divided into five Phases. **Phase I** for this project was completed through the ORAP consultation process. This Phase identified and described the problem and opportunity: *To achieve a service level for combined sewer overflows (CSO) of zero overflows during the swimming season in the "design year," while accepting some overflows during rainy years or very large rain events.*



# Combined Sewage Storage Project Class Environmental Assessment Public Open House



June 26, 2012

**Phase II** was completed in 2010. This Phase involved the identification and evaluation of alternative solutions, including consultation, resulting in the selection of a preferred alternative solution.

The project is currently in **Phase III** of the EA process. This Phase involves evaluation of alternative design concepts of the preferred alternative solution and public and agency consultation.

Following Phase III, an environmental study report will be published and made available for public comment for 30 days.

## Consultation

Public consultation is an important component of the Municipal Class EA process. Throughout all Phases of the EA process, there are opportunities for the public to comment. This is the last of three Public Open Houses planned for this project.

This Public Open House presents:

- Evaluation of alternative design concepts for the Preferred Alternative Solution
- Anticipated project cost, schedule & timelines
- Introduction to the Preferred Functional Design
- **Potential impacts and proposed mitigation for the project**

As you read through the presentation boards and view the presentation, we invite you to share your feedback.

## Your input is important

The feedback we receive from this Public Open House will influence the outcome of this study, so

please take the time to fill out the questionnaire and return it to us.

## Thank you!

Thank you for coming to our Public Open House. If you have any questions about this study, feel free to ask any member of the Study Team. For more **information you can also visit the City of Ottawa's website** for this project at:

[http://ottawa.ca/en/env\\_water/water\\_sewer/sewer\\_septic/collection/sewer\\_overflows/](http://ottawa.ca/en/env_water/water_sewer/sewer_septic/collection/sewer_overflows/)

Following this session, comments may be directed to:

### On the Combined Sewage Storage Project:

Louis Julien, Project Manager  
Infrastructure Services Dept.  
100 Constellation Crescent  
Ottawa, ON K2G 6J8  
Phone: 613-580-2424 ext. 21504  
Fax: 613-560-6068  
Email: [Louis.Julien@Ottawa.ca](mailto:Louis.Julien@Ottawa.ca)

### On the EA Process:

Sarah Rogers, Project Consultant  
Stantec Consulting Ltd.  
2781 Lancaster Road, Suite 200  
Ottawa, ON K1B 1A7  
Phone: 613-738-0708 \*7383235  
Fax: 613-738-0721  
Email: [Sarah.Rogers@Stantec.com](mailto:Sarah.Rogers@Stantec.com)



# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



*After having reviewed all of the project information provided at this meeting, please complete this questionnaire and return it to the box at the entrance. Should you require assistance or clarification while completing the questionnaire please see any City staff or Stantec during this Open House.*

**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ( )    Consultant ( )

Please Specify: \_\_\_\_\_

**2. Do you have any comments regarding the evaluation of the alternative design concepts?**

**3. Do you have any comments regarding the alternative design concepts?**

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**



## Combined Sewage Storage Project Class Environmental Assessment Questionnaire



**5. Do you have any additional comments you would like to make?**

**Thank you for participating!**

To ensure that your comments are considered during the evaluation of alternative design concepts, please return this completed **Comment Sheet** no later than **July 27, 2012**

Paper copies of the information posters can be mailed upon request. Alternately, they can be found on the **City of Ottawa’s website for this project at:**

[http://ottawa.ca/en/city\\_hall/planningprojectsreports/public\\_consult/combined\\_overflows/](http://ottawa.ca/en/city_hall/planningprojectsreports/public_consult/combined_overflows/)

The comments you have provided above will be used for the purposes of creating an environmental assessment report which will be a part of the public record and will be made available to individuals or organizations with an interest in this project. Please indicate below (mark an X in the brackets) if you consent to the inclusion of your name, address and telephone number in the report. If you do not mark either selection below, we will assume, for the purposes of documentation that you wish to have your name, address and telephone number be kept confidential.

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<b>Name:</b>	
<b>Address:</b>	
<b>Phone/Fax No.:</b>	
<b>Email:</b>	



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**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group ()    Consultant ( )

Please Specify: \_\_\_\_\_

**2. Do you have any comments regarding the evaluation of the alternative design concepts?**

I think we should  
do highly polluted  
areas 1st.

**3. Do you have any comments regarding the alternative design concepts?**

no

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

no



**Combined Sewage Storage Project  
Class Environmental Assessment  
Questionnaire**



*I would like to see continued monitoring after the project is completed.*

5. Do you have any additional comments you would like to make? *ensure we have met our goals*

*1) I think the sooner the project can be undertaken, the better. I hope the areas where there is the highest E. coli concentration will be addressed 1st. (i.e. Kettle Island etc). This is an important environmental project.*

**Thank you for participating!** *Combining this with building a subway would really put Ottawa into the 21st century.*

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I wish my name, address and telephone number to be kept confidential and not included in the report as part of the public record for this project.

<b>Name:</b>	[Redacted]
<b>Address:</b>	[Redacted]
<b>Phone/Fax No.:</b>	[Redacted]
<b>Email:</b>	[Redacted]

*I strongly support this as a private individual and a board member of NRC.*

*Work well done. Keep it up!*



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**1. Please describe your interest in this project (please check one):**

Landowner  Agency ( ) Municipal ( ) Interest Group ( ) Consultant ( )

Please Specify: \_\_\_\_\_

**2. Do you have any comments regarding the evaluation of the alternative design concepts?**

No.

**3. Do you have any comments regarding the alternative design concepts?**

No.

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

No.

## 5. Do you have any additional comments you would like to make?

• Don't use concrete that only lasts 30 years like the city used under Woodroff Ave.

### Thank you for participating!

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**1. Please describe your interest in this project (please check one):**

Landowner ( )    Agency ( )    Municipal ( )    Interest Group     Consultant ( )

Please Specify: Environmental Health Association - Ontario EHA O

**2. Do you have any comments regarding the evaluation of the alternative design concepts?**

I would like to see the interceptor tunnels to be finished as soon as possible. Let's not wait to start this project.

**3. Do you have any comments regarding the alternative design concepts?**

I find the more economical storage possibilities on the water could maybe be implemented in combination to the north fork tunnel. To further decrease overflow in major rainfalls.

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



### 5. Do you have any additional comments you would like to make?

*Hoping that LRT construction and sewer  
interceptor solutions be coordinated.  
Groundwater quality*

### Thank you for participating!

To ensure that your comments are considered during the evaluation of alternative design concepts, please return this completed **Comment Sheet** no later than **July 27, 2012**

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<b>Phone/Fax No.:</b>	[Redacted]
<b>Email:</b>	[Redacted]



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**1. Please describe your interest in this project (please check one):**

Landowner  Agency ( ) Municipal ( ) Interest Group ( ) Consultant ( )

Please Specify: Homeholder

**2. Do you have any comments regarding the evaluation of the alternative design concepts?**

Excellent description of The 3 final alternatives

**3. Do you have any comments regarding the alternative design concepts?**

Impressive presentation overall  
logical arguments <sup>we</sup> have to accept some overflow  
financing to be determined?

**4. Do you require additional information about the Municipal Class EA review and approval process (please explain)?**

N/A.

# Combined Sewage Storage Project Class Environmental Assessment Questionnaire



### 5. Do you have any additional comments you would like to make?

*Glad I came.*

### Thank you for participating!

To ensure that your comments are considered during the evaluation of alternative design concepts, please return this completed **Comment Sheet** no later than **July 27, 2012**

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I wish my name, address and telephone number to be kept confidential and not included in the report as part of the public record for this project.

<b>Name:</b>	[Redacted]
<b>Address:</b>	[Redacted]
<b>Phone/Fax No.:</b>	[Redacted]
<b>Email:</b>	[Redacted]

**Appendix B**  
**Screening of Long List of Alternatives**

Criteria	Rationale for Inclusion / Indicator	Alternative 1	Alternative 2- Short Tunnels					Alternative 3	Alternative 4- Tank-Tunnel Hybrids			Alternative 5	
		Storage Tanks	(2a) Short Tunnel South	(2b) Short Tunnel North	(2c) Hurdman/North-South Tunnel	(2d) SWSF	(2e) Opportunities with DOTT	Long Tunnel to ROPEC	(4a) East Tunnel/ Tank Hybrid	(4b) West Tunnel/ Tank Hybrid	(4c) North-South Tunnel/Tank Hybrid	In-River Storage	
Technical													
T1	Construction Risks	Potential for construction difficulties due to soil/bedrock/groundwater Proximity to existing foundations etc. Conflicts with existing infrastructure/other utilities Potential for contaminated soil/groundwater	High	Medium	Medium	High	Medium	High	High	Medium	High	High	Medium
	Comments	Risks are site dependant Common construction methods K-A and K-C may be prone to high groundwater infiltration K-A is in Rideau R. floodplain W-A, W-B, R-E and K-A possible soil contamination in overburden R-A to R-C and R-E likely to be deep excavations (some in clay) with significant shoring needs R-E risks are high due to rubble fill & distance from regulator	Inherent risks in tunnelling Possible conflict with DOTT	Inherent risks in tunnelling Possible conflict with Chateau Laurier foundations	Inherent risks in tunnelling Soft ground tunnelling increases overhead settlement risks and is prone to challenges K-A may be prone to high groundwater infiltration K-A is in Rideau R. floodplain W-A, W-B and K-A possible soil contamination in overburden	Deeper tunnel to construct	Inherent risks in tunnelling Risks in accommodating dual purpose tunnel	Inherent risks in tunnelling Possible conflicts with IOS Smaller tunnel size may be problematic for mucking and more shafts Soft ground tunnelling increases overhead settlement risks and is prone to challenges	Inherent risks in tunnelling Possible conflict with Chateau Laurier foundations or DOTT depending on tunnel alignment selected W-A/B possible soil contamination in overburden	Inherent risks in tunnelling K-A may be prone to high groundwater infiltration K-A is in Rideau R. floodplain K-A possible soil contamination in overburden	Inherent risks in tunnelling K-A may be prone to high groundwater infiltration K-A is in Rideau R. floodplain K-A & W/A/B possible soil contamination in overburden	River currents may be a factor in construction Extension of tailrace sewer to river expected to be problematic	
T2	Schedule	Anticipated start time and duration of construction Approval needs	Medium	Medium	Medium	Medium	Medium	High	Medium	High	Medium	High	Low
	Comments	Common construction methods with +/- 18mo period Approvals likely to include CEAA / MOE, this could lead to major delays for such large structures W-A/B timing could conflict with DOTT construction	Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE Shafts considered easier to approve than tanks	Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE Shafts considered easier to approve than tanks	Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE Shafts considered easier to approve than tanks	Longer implementation time for tunnelling Approvals likely to include CEAA / MOE Shafts considered easier to approve than tanks Advanced design state may accelerate planning-design phase	Many uncertainties associated with DOTT & storage project likely to lead to delays Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE	Longer implementation time expected for longer tunnel (may be accelerated by using 2 TBMs) Subsurface easements may increase schedule Approvals likely to include CEAA / MOE, this could lead to major delays for large tanks W-A/B timing could conflict with DOTT construction	Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE Avoids potential conflicts with W-A/B	Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE, this could lead to major delays for large tanks W-A/B timing could conflict with DOTT construction	Longer implementation time for tunnelling Subsurface easements may increase schedule Approvals likely to include CEAA / MOE, this could lead to major delays in implementation		
T3	Flexibility	Potential for addressing other system issues and/or future regulatory changes such as stormwater treatment Works provide additional system benefits such as flood control or system redundancy	High	Low	Low	High	High	High	Low	Medium	Medium	High	Medium
	Comments	Some potential tank sites offer limited expansion opportunities Tanks do not provide system redundancy or flood control Tanks do not provide ability to share storage volume	Tunnel may be extended in the future to offer more storage Tunnel may offer diversion capability for IOS maintenance or ability to share storage volume with IOS	Tunnel may be extended in the future to offer more storage Tunnel may offer diversion capability for IOS maintenance or ability to share storage volume with IOS	Alignment is such that it is not easily expanded (i.e. best to oversize now) Provides some much needed flood relief for the O'Connor area Does not provide redundancy to IOS	Alignment and elevation is such that it is not easily expanded (i.e. best to oversize now) May provide some much needed flood relief for the O'Connor area Would need to be expanded to Rideau River Collector to provide comparable functionality	Provides no flexibility or system redundancy	Tunnel may offer full diversion capability for IOS maintenance or ability to share storage volume with IOS Best to accommodate extra volume by oversizing now Ability to provide extra storage at ROPEC or with North-South tunnel spines	Tunnel may be extended in the future to offer more storage Tunnel may offer some diversion capability for IOS maintenance or ability to share storage volume with IOS Some potential tank sites offer limited expansion opportunities Tanks do not provide system redundancy or flood control	Tunnel may be extended in the future to offer more storage Tunnel may offer some diversion capability for IOS maintenance or ability to share storage volume with IOS Some potential tank sites offer limited expansion opportunities Tanks do not provide system redundancy or flood control	Alignment is such that it is not easily expanded (i.e. best to oversize now) Provides some much needed flood relief for the O'Connor area Some potential tank sites offer limited expansion opportunities Tanks do not provide system redundancy or flood control	Future expansion in the river may not be desirable Provides ability to treat stormwater flows tributary to outfall sewers (Tailrace & John St.) Does not provide IOS redundancy	
T4	Reliability/Complexity	Complexity/simplicity of the operation and maintenance of the infrastructure Ability to consistently meet Council directive for CSO control	High	Medium	Low	Medium	High	Medium	Low	Medium	Medium	Medium	High
	Comments	Tank dewatering pump stations and flushing systems increases complexity and reduces reliability O&M on deep tanks is complex and ultimately impacts reliability	Gravity drainage reduces complexity Location where flows are intercepted will decrease reliability in achieving control targets (less reliable further away from regulators)	Gravity drainage reduces complexity Location where flows are intercepted will decrease reliability in achieving control targets (less reliable further away from regulators) Dewatering pump station (east) and flushing systems increases complexity and reduces reliability	Gravity drainage reduces complexity Location where flows are intercepted will decrease reliability in achieving control targets (less reliable further away from regulators) Dewatering pump station (east) and flushing systems increases complexity and reduces reliability	Deep pump station at downstream end increases complexity and reduces reliability Location where flows are intercepted will decrease reliability in achieving control targets (less reliable further away from regulators)	Dewatering pump stations and flushing systems increases complexity and reduces reliability	Gravity drainage reduces complexity	Tank dewatering pump stations and flushing systems increases complexity and reduces reliability	Tank/tunnel dewatering pump stations and flushing systems increases complexity and reduces reliability	Tank dewatering pump stations and flushing systems increases complexity and reduces reliability	Dewatering pump stations increases complexity Occasional dredging increases complexity Reliability of curtains unknown Seasonal deployment and retrieval of curtains increase complexity and O&M	
	Category Short list		☒	✓	✓	☒	☒	☒	✓	✓	✓	☒	✓

Criteria	Rationale for Inclusion / Indicator	Alternative 1	Alternative 2- Short Tunnels					Alternative 3	Alternative 4- Tank-Tunnel Hybrids			Alternative 5	
		Storage Tanks	(2a) Short Tunnel South	(2b) Short Tunnel North	(2c) Hurdman/North-South Tunnel	(2d) SWSF	(2e) Opportunities with DOTT	Long Tunnel to ROPEC	(4a) East Tunnel/ Tank Hybrid	(4b) West Tunnel/ Tank Hybrid	(4c) North-South Tunnel/Tank Hybrid	In-River Storage	
Natural Environment													
N1	Impact on Significant Natural Features	Natural woodlands Provincially significant wetlands Area of Natural & Scientific Interest (ANSI) River crossings or riparian area disruptions	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Medium
	Comments		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible riparian area disruption for pump stations
N2	Impact on Ecological processes	Disruption to wildlife linkages Potential effects on known fish habitat	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	High
	Comments		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible impacts to fish and benthic habitat (river bottom) in enclosure
N3	Impact on quality of receiving water	Number and volume of wastewater overflows	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Medium
	Comments		no ability to share volume	ability to share volume. While reliability in achieving control targets is decreased, impact on receiving water quality is expected to be insignificant	ability to share volume	ability to share volume. While reliability in achieving control targets is decreased, impact on receiving water quality is expected to be insignificant	ability to share volume. While reliability in achieving control targets is decreased, impact on receiving water quality is expected to be insignificant	ability to share volume	ability to share volume	ability to share volume	ability to share volume	ability to share volume	Seasonal use only - overflows will continue during winter no ability to share volume
	Category Short list		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	☒

Criteria	Rationale for Inclusion / Indicator	Alternative 1	Alternative 2- Short Tunnels					Alternative 3	Alternative 4- Tank-Tunnel Hybrids			Alternative 5	
		Storage Tanks	(2a) Short Tunnel South	(2b) Short Tunnel North	(2c) Hurdman/North-South Tunnel	(2d) SWSF	(2e) Opportunities with DOTT	Long Tunnel to ROPEC	(4a) East Tunnel/ Tank Hybrid	(4b) West Tunnel/ Tank Hybrid	(4c) North-South Tunnel/Tank Hybrid	In-River Storage	
Socio-Cultural													
S1	Effect on urban green space/open space	Quality and quantity of open space Urban Tree Removal Loss of use during construction	High	Low	Low	Low	Medium	Low	Low	Medium	Medium	Medium	Medium
	Comments	Control buildings may impact available open space Loss of use during construction Some tree clearing likely for K-series tanks	Possibility of access hatches	Possibility of access hatches	Possibility of access hatches	Control buildings may impact available open space in New Edinburgh and Strathcona Park Loss of use during construction	Possibility of access hatches	Possibility of access hatches	Control buildings may impact available open space Loss of use during construction	Control buildings may impact available open space Loss of use during construction Some tree clearing likely for K-series tanks	Control buildings may impact available open space Loss of use during construction Some tree clearing likely for K-series tanks	Control buildings may impact available open space Loss of use during construction Some tree clearing likely for K-series tanks	Control buildings/pump stations may impact available open space
S2	Cultural heritage values or features	Symbolic cultural value - cultural landscapes Potential for heritage significance - built heritage Requirement for special architectural treatments Potential for archaeological significance	Medium	Low	Low	Low	Low	Low	Low	Low	Medium	Medium	High
	Comments	Amount of previous archaeological assessment unknown for most sites; likelihood of archaeological material low to high depending on site Heritage values vary by site low potential for W-A/B & K-A medium pot. for R-B/C high pot. for R-A/D & K-B/C medium to high heritage value for R-A/D & K-B/C	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances	Limited disturbance to surficial soils, some flexibility w/r to surface disturbances Area already disturbed - low potential; archaeological assessment beyond Stage 1 likely	Low rating for tunnel component Amount of previous archaeological assessment unknown for most sites; likelihood of archaeological material low to high depending on site High heritage value for sites K-B/C low potential for K-A high pot. for K-B/C	Low rating for tunnel component Amount of previous archaeological assessment unknown for most sites; likelihood of archaeological material low to high depending on site High heritage value for sites K-B/C low potential for K-A high pot. for K-B/C	High heritage - adjacent to Rideau Canal and locks which are a UNESCO world heritage site
S3	Disruption to community	Duration of construction Permanent structures that would impact views or aesthetics Impacts to recreational activities (events, pathways, boating) Impacts due to odors and/or O&M activities	High	Low	Low	Low	High	Medium	Medium	Medium	Medium	Medium	High
	Comments	Disruption are site specific Localized disruptions during construction Permanent control buildings necessary Tonnes of material to haul and bring back over deep tanks	Localized disruptions during construction Permanent access hatches while more numerous are more inconspicuous than control buildings associated with tanks	Localized disruptions during construction Permanent access hatches while more numerous are more inconspicuous than control buildings associated with tanks	Localized disruptions during construction Permanent access hatches while more numerous are more inconspicuous than control buildings associated with tanks	Localized disruptions during construction Large shaft and permanent control building necessary in Strathcona Park	Little incremental disturbance Construction duration is expected to be longest to accommodate both projects Control building will be in City core	Localized disruptions during construction Longer construction duration than shorter tunnels Permanent access hatches while more numerous are more inconspicuous than control buildings associated with tanks	Localized disruptions during construction Permanent control building necessary	Localized disruptions during construction Permanent control building necessary	Localized disruptions during construction Permanent control building necessary	Localized disruptions during construction Permanent control building necessary	Floating boom for enclosure is highly visible and expected to impact views Enclosures would disrupt kayak course at Tailrace or boaters on Ottawa River at mouth of canal
S4	Consistency with planning policies/processes	Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies. Effect on potential site development	Medium	Low	Low	Low	Low	Low	Low	Medium	Low	Medium	High
	Comments	May need to alter zoning to accommodate tank in Lebreton Flats Tank will limit overhead development potential	Most compatible	Most compatible	Most compatible	Most compatible	Most compatible	Most compatible	Most compatible	May need to alter zoning to accommodate tank in Lebreton Flats Tank will limit overhead development potential	Most compatible	May need to alter zoning to accommodate tank in Lebreton Flats Tank will limit overhead development potential	May be construed as in-river treatment by MOE/DFO MOE F-5.5 (6g): storage & treatment capacity should be maintained outside control period
S5	Impact on level of service	Potential for flooding and ponding during the full range of wet weather events.	Medium	Medium	Medium	Low	Medium	Medium	Medium	Medium	Medium	Low	Medium
	Comments	No change to LOS	No change to LOS	No change to LOS	Possible increased LOS for O'Connor area	Possible increased LOS if tunnel is oversized (not accounted for here)	No change to LOS	No change to LOS	No change to LOS	No change to LOS	No change to LOS	Possible increased LOS for O'Connor area	No change to LOS
S6	Property Issues	Ownership - City owned versus publicly owned versus private Possible access restrictions - site security requirements Right of way or land acquisition needed	High	Medium	High	High	Low	Medium	Medium	Medium	Medium	High	Medium
	Comments	City and publicly owned lands NCC have opposed sites W-A, R-A, K-B and K-C	City and publicly owned lands (Lebreton Flats) Subsurface easements likely required	City and publicly owned lands (Lebreton Flats) Subsurface easements likely required Site security requirements - parliamentary precinct	City owned ROW for the most part with crossing of MTO lands (tunnel) City and publicly owned lands (tanks) NCC have opposed sites W-A, R-A, K-B and K-C	City owned ROW	City owned ROW (coordinated with DOTT)	City and publicly owned lands (Lebreton Flats) Subsurface easements likely required	City and publicly owned lands (Lebreton Flats) NCC have opposed sites W-A	City and publicly owned lands Site security requirements at K-B NCC have opposed sites K-B and K-C	City and publicly owned lands Site security requirements at K-B NCC have opposed sites W-A, K-B and K-C	Provincially/federally owned lands	
	Category Short list		☒	✓	✓	✓	✓	✓	✓	✓	✓	✓	☒

Criteria	Rationale for Inclusion / Indicator	Alternative 1	Alternative 2- Short Tunnels					Alternative 3	Alternative 4- Tank-Tunnel Hybrids			Alternative 5	
		Storage Tanks	(2a) Short Tunnel South	(2b) Short Tunnel North	(2c) Hurdman/North-South Tunnel	(2d) SWSF	(2e) Opportunities with DOTT	Long Tunnel to ROPEC	(4a) East Tunnel/ Tank Hybrid	(4b) West Tunnel/ Tank Hybrid	(4c) North-South Tunnel/Tank Hybrid	In-River Storage	
<b>Economy</b>													
E1	Impact on businesses land owners	Number/extent of businesses affected (during and/or after construction) Duration of construction/impact Loss of opportunity costs	High	Medium	Medium	Medium	Medium	High	Medium	High	Medium	High	Medium
	Comments	No businesses located near R series and K series tanks Some sites such as W-A/B will result in loss of development opportunities	Some potential disruptions dependent on shaft locations	Some potential disruptions dependent on shaft locations	Some potential disruptions dependent on shaft locations	Some potential disruptions dependent on shaft locations	Disruptions are expected to be longer with a combined DOTT-Storage Tunnel construction	Some potential disruptions dependent on shaft locations	Some potential disruptions dependent on shaft locations Some sites such as W-A/B will result in loss of development opportunities	Some potential disruptions dependent on shaft locations	Some potential disruptions dependent on shaft locations No businesses located near tanks Some sites such as W-A/B will result in loss of development opportunities	Impact to tourist operations (boat tour operators)	
E2	Affordability	Capital cost Cost of property / easement	Medium	High	High	High	High	Medium	High	High	High	High	Low
	Comments	Deep tanks with shoring and probable groundwater issues	Among the most expensive capital costs	Among the most expensive capital costs	Among the most expensive capital costs	Among the most expensive capital costs	Cost sharing efficiency	Among the most expensive capital costs	Among the most expensive capital costs	Among the most expensive capital costs	Among the most expensive capital costs	Among the most expensive capital costs	Expected to be the lowest capital cost
E3	Sustainability	Operation & maintenance costs	High	Low	Low	Low	High	High	Low	High	High	High	High
	Comments	High O&M needs associated with tank pumping stations and flushing systems especially when tanks are deep	Assuming no mechanical flushing system Access is always an issue	Assuming no mechanical flushing system Access is always an issue	Assuming no mechanical flushing system Access is always an issue	Significant O&M needs associated with deep pumping station and tunnel flushing systems	Significant O&M needs associated with deep pumping station and tunnel flushing systems	Assuming no mechanical flushing system Access is always an issue	Significant O&M needs associated with pumping stations and flushing systems (tank)	Significant O&M needs associated with pumping stations and flushing systems (tank & south tunnel alignment)	Significant O&M needs associated with pumping stations and flushing systems (tanks)	High costs associated with deployment and retrieval of curtain (fixing & replacing) Costs associated with pump stations and occasional dredging	
	Category Short list		☒	✓	✓	✓	☒	☒	✓	☒	☒	☒	✓
	OVERALL SHORT LIST		☒	✓	✓	☒	☒	☒	✓	☒	☒	☒	☒

High	Highest Impact - least Desirable
Medium	Medium Impact - Neutral
Low	Lowest Impact - Most Desirable

**Appendix C**  
**Phase I Environmental Site Assessment**  
**Information Sources**

The modified assessment comprised a search of the available historical aerial photographs, federal, provincial and private databases, and other pertinent historical information. A list of references is provided below.

Source	Information/Contact
Aerial Photographs	1928, 1932, 1945, 1950, 1966, 1973, 1982, 1993, 1994, 2002, 2005, 2008
Fire Insurance Plans	1901/22, 1956/63
<b>Federal Government Source Database</b>	
Environmental Effects Monitoring	1992-2007
Environmental Issues Inventory System	1992 – 2001
Federal Convictions	1988 – June 2007
Contaminated Site on Federal Land	June 2000 – May 2010
Fisheries and Oceans Fuel Tanks	1964 – Sept 2003
Indian and Northern Affairs Fuel Tanks	1950 – Aug 2003
National Analysis of Trends in Emergencies System	1974 – 1994
National Defence & Canadian Forces Fuel Tanks	Up to May 2001
National Defence & Canadian Forces Spills	March 1999 – Jul 2009
National Defence & Canadian Forces Waste Disposal Sites	2001 – April 2007
National Environmental Emergencies Systems	1974 – 2003
National PCB Inventory	1988 – 2008
National Pollutant Release Inventory	1993 – 2008
Parks Canada Fuel Storage Tanks	1920 – Jan 2005
Transport Canada Fuel Storage Tanks	1970 – Mar 2007
<b>Provincial Government Source Databases</b>	
Abandoned Aggregate Inventory	Up to Sept 2002
Aggregate Inventory	Up to Jan 2010
Abandoned Mines Information System	1800 – 2005
Certificates of Approval	1985 – Sept 2002
Commercial Fuel Oil Tanks	1948 – Jan 2010

Source	Information/Contact
Coal Gasification Plants	1987, 1988
Compliance and Convictions	1989 – June 2010
Drill Holes	1886 – 2005
Environmental Registry	1994 – June 2010
Fuel Storage Tanks	Current to June 2010
Ontario Regulation 347 Waste Generators Summary	1986 – Jan 2010
Mineral Occurrences	1846 – Oct 2009
Non-Compliance Reports	1992 (water only), 1994 – 2008
Ontario Oil and Gas Wells	1800 – Feb 2010
Ontario Inventory of PCB Storage Sites	1987 – Oct 2004
Ontario Spills	1988 – Jan 2010
Pesticide Register	1988 – Jan 2010
Private Fuel Storage Tanks	1989 – 1996
Ontario Regulation 347 Waste Receivers Summary	1986 - 2008
Record of Site Condition	1997 – Sept 2001, Oct 2004 – Jun 2010
Wastewater Discharge Registration Database	1990 – 2008
Waste Disposal Sites – MOE CA Inventory	1970 – Sept 2002
Waste Disposal Sites – MOE 1991 Historical Approval Inventory	Up to Oct 1990
Water Well Information System	1955 – Jan 2010
<b>Private Source Databases</b>	
Anderson's Waste Disposal Sites	1860s - Present
Automobile Wrecking & Supplies	2001 – Feb 2009
Chemical Register	1992, 1999 – Feb 2009
ERIS Historical Searches	1999 – Apr 2010
Canadian Mine Locations	1998 – 2009
Oil and Gas Wells	Oct 2001 – June 2010
Canadian Pulp and Paper	1999, 2002, 2004, 2005, 2009

Source	Information/Contact
Retail Fuel Storage Tanks	2000 – Feb 2009
Scott's Manufacturing Directory	1992 – Sept 2009
Anderson's Storage Tanks	1915 – 1953
<b>Other Sources</b>	
Miscellaneous	<p>Google Earth, Europa Technologies, 2008.</p> <p>Ministry of the Environment's Brownfields Environmental Site Registry website  <a href="http://www.ene.gov.on.ca/environet/BESR/index.htm">http://www.ene.gov.on.ca/environet/BESR/index.htm</a></p> <p>Intera Technologies Ltd., <i>Mapping and Assessment of Former Industries Sites, City of Ottawa</i>. Report prepared for City of Ottawa, July 1988.</p> <p>Wells, Jody, <i>Waste Site Inventory for the Regional Municipality of Ottawa-Carleton, Vol.2</i>.</p>

During the assessment, two locations were categorized as a significant environmental concern, one location was categorized as a moderate environmental concern, and two locations were categorized as minor environmental concerns. A description of the environmental concern at each location and the rationale for the rank assigned to each is presented in Table 1.

**Table 1: Sites of Environmental Concern**

Alternative	Project Element of Interest	Location	Environmental Concerns	Approximate Period of Operation	References	Level of Concern <sup>1</sup>
Alternative 3: Long Tunnel to ROPEC	East End of Core Tunnel South	Southwest of Stanley Avenue and northeast of the Rideau River	<p>Listed as Stanley Park, a contaminated site on federal land. Contaminants of concern are petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and metals, metalloids and organometallics in soil. Recent contaminant risk management measures have been implemented in the area by others on behalf of the National Capital Commission.</p> <p>The approach to risk management was to cap surface and near surface contaminated soil with clean fill, which does not address the occurrence of contaminant impacts at depth that may be observed during CSO construction activities.</p> <p>New Edinburgh Park listed in WDSH as a former waste disposal site, closed in 1938. Classified with the potential for human impact due to urban municipal and domestic waste.</p> <p>ANDR reported that the property is known as New Edinburgh Park and Stanley Park waste disposal sites.</p> <p>The property at 174 Stanley Avenue, the City of Ottawa Archives, is listed as a generator of hazardous materials including aliphatic solvents and photoprocessing wastes.</p>	<p>Active in 1930s, 1950s to 1970s.</p> <p>1992 to 1998</p> <p>Closed in 1938.</p>	FCS, ANDR, GEN, WDSH	Significant due to historical waste disposal site for approximately 40 years, and the proximity of a hazardous waste generator.

**Notes:**

1 – The level of concern assigned to a location may change if the area of construction activity is altered from that proposed to date.

GEN – Ontario Regulation 347 Waste Generators Summary Database

SPL – Ontario Spills Database

FCS – Contaminated Sites on Federal Land

ANDR – Anderson's Waste Disposal Sites

NDSP – National Defence & Canadian Forces Spills

WDSH – Waste Disposal Sites – MOE 1991 Historical Approval Inventory

Table 1: Sites of Environmental Concern

Alternative	Project Element of Interest	Location	Environmental Concerns	Approximate Period of Operation	References	Level of Concern <sup>1</sup>
Alternative 2b: Core Tunnel North	Rideau Canal and Wellington Street	1 Rideau Street	Fairmont Chateau Laurier is listed as a generator of hazardous materials including acid solutions containing heavy metals, alkaline solutions containing heavy metals, wastes from the use of pigments, slurries and paints, aliphatic solvents and residues, petroleum distillates, halogenated pesticides and herbicides, waste petroleum based oils and sludges, waste crankcase oil and lubricants and waste compressed gases including cylinders. Listed as part of LeBreton Flats as a contaminated site on federal land with contaminants concern including petroleum hydrocarbons, polycyclic aromatic hydrocarbons and metals, metalloids and organometallics in both soil and groundwater.	1991 to 2010	GEN	Moderate Due to a generator of hazardous materials for approximately 10 years.
	West End of Core Tunnel North	LeBreton Flats	Phase III ESA and PQRA study under review by Health Canada and Environment Canada. Listed as Stanley Park, a contaminated site on federal land. Contaminants of concern are petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and metals, metalloids and organometallics in soil. Recent contaminant risk management measures have been implemented in the area by others on behalf of the National Capital Commission.	1900s to 1940s	FCS	Minor based on the remediation work completed by others.
	East End of Core Tunnel South	Southwest of Stanley Avenue and northeast of the Rideau River  174 Stanley Avenue, at Keefer Street	The approach to risk management was to cap surface and near surface contaminated soil with clean fill, which does not address the occurrence of contaminant impacts at depth that may be observed during CSO construction activities.  ANDR reported that the property is known as New Edinburgh Park waste disposal site.  The property at 174 Stanley Avenue, the City of Ottawa Archives, is listed as a generator of hazardous materials including aliphatic solvents and photoprocessing wastes.	Active in 1930s, 1950s to 1970s.  1992 to 1998	FCS, ANDR, GEN	Significant due to historical waste disposal site for approximately 40 years, and the proximity of a hazardous waste generator.

**Table 1: Sites of Environmental Concern**

Alternative	Project Element of Interest	Location	Environmental Concerns	Approximate Period of Operation	References	Level of Concern <sup>1</sup>
	Storage Tunnel	Laurier Avenue West and Cambridge Street	Former City Iron and Bottles Co.	1902 to 1950	1902 Fire insurance plans	Minor based on the former activity and the time period since the activity.
	Rideau Canal and Laurier Avenue	4 Queen Elizabeth Drive (Military Stores Building) Laurier Avenue and Current Colonel By Drive	A 151-litre spill of hydraulic oil from a leak in underground piping for an elevator, located in the Military Stores Building, was reported in May of 2005. No remedial action was taken. Soil contamination is suspected. Formerly a boat builders and painter and military stores.	May 2005	1902 Fire insurance plans, NDSP	Moderate based on a spill of hydraulic oil with no remedial action completed.
Alternative 2a: Core Tunnel South	East End of Core Tunnel South	Southwest of Stanley Avenue and northeast of the Rideau River  174 Stanley Avenue, at Keefer Street	Listed as Stanley Park, a contaminated site on federal land. Contaminants of concern are petroleum hydrocarbons, polycyclic aromatic hydrocarbons, and metals, metalloids and organometallics in soil. Recent contaminant risk management measures have been implemented in the area by others on behalf of the National Capital Commission.  The approach to risk management was to cap surface and near surface contaminated soil with clean fill, which does not address the occurrence of contaminant impacts at depth that may be observed during CSO construction activities.  ANDR reported that the property is known as New Edinburgh Park waste disposal site.  The property at 174 Stanley Avenue, the City of Ottawa Archives, is listed as a generator of hazardous materials including aliphatic solvents and photoprocessing wastes.	Active in 1930s, 1950s to 1970s.  1992 to 1998	FCS, ANDR, GEN	Significant due to historical waste disposal site for approximately 40 years, and the proximity of a hazardous waste generator.

**Appendix D**  
**Geotechnical Technical Memorandums**

**DATE** February 2, 2010**PROJECT No.** 09-1121-1062**TO** Mr. Stephane D'Aoust, P.Eng.  
Stantec**CC** Adrien Comeau, Stantec**FROM** Erin O'Neill / Mike Cunningham, P.Eng.**EMAIL** eoneill@golder.com**OVERVIEW OF SUBSURFACE CONDITIONS – CSO STORAGE PROJECT, OTTAWA, ONTARIO**

This memo provides a brief overview of ground conditions within the study area for the Combined Sewer Overflow (CSO) Storage Environmental Assessment and Functional Design Project.

**BACKGROUND**

The purpose of the CSO Storage Environmental Assessment and Functional Design Project is to identify and then develop the preferred alternative for providing additional storage in order to further reduce CSO's within the combined sewer area and attain the targets identified as part of the City's Ottawa River Action Plan. The purpose of the geotechnical review is to identify important issues or challenges related to the soil and bedrock conditions using available geotechnical and hydrogeologic information.

The main study area is located within the downtown Ottawa core and is generally north of Laurier Avenue West and Rideau Street, and extends from about Preston Street easterly to Rideau Hall. The storage options include both tunnels or below-grade tanks. The possible storage tunnel alignments run generally parallel to (both north and south of) the existing Interceptor Overflow Sewer (IOS), with an additional branch being considered along Lyon Street North (see Figure 1). Storage tank locations being considered are in the Lebreton Flats area in the downtown Rideau Canal area and east of the Rideau River in the New Edinburgh neighbourhood.

As a first step, this memo provides a broad summary of the soil and bedrock conditions across the full study area, based on available geologic mapping and Golder Associates' extensive experience with the ground conditions in the Ottawa area. Future memos will focus on selected routes or sites and will provide general guidelines on geotechnical and hydrogeologic conditions associated with excavation and tunnel construction for the anticipated ground conditions.

**SUBSURFACE CONDITIONS**

Based on geologic mapping and existing borehole information, it is anticipated that most of the project area is underlain by bedrock of the Ottawa Formation (Verulam and Lindsay Formation limestones). The Verulam Formation is a fossiliferous limestone with inter-beds of calcareous shale. The Lindsay formation is inter-bedded black, organic-rich limestone and highly calcareous shale. Although not indicated from bedrock surface mapping it is possible that, as a result of upthrusting on the various faults interpreted to exist in the area of the Bank



Street Valley, the tunnels or tank excavations near the Parliamentary Precinct may encounter Billings shale and/or the Carlsbad Formation. The Billings Formation consists of a non-calcareous shale with thin interbeds of dark grey limestone. The Billings Formation grades into the Carlsbad Formation which consists of interbedded shale, fossiliferous calcareous siltstone, and silty limestone.

As shown on Figure 2, bedrock within the study area is generally at or very near surface along the Ottawa River and dips down to the southeast away from the river with a large localized low where the Rideau Canal passes underneath Highway 417. Along the possible storage tunnel alignments, bedrock is typically within 3 m of ground surface, increasing to up to 10 m along Lyon Street south of Laurier Avenue West and along the southern alignments in Lower Town. Near the intersection of Rideau and Sussex Streets, a localized bedrock valley/trough, filled with overburden, is present and over 33 m deep (Figure 6). At tank sites in the LeBreton Flats area (between the Transitway and Albert/Wellington Street), boreholes indicate that bedrock is up to 12 m below ground surface, which is slightly deeper than shown by the mapping (Figure 3). At tank sites near the Parliamentary Precinct (Figure 4) and east of the Rideau River (Figure 5), bedrock is estimated to be 3 m of ground surface. At more southerly sites adjacent to the Rideau Canal, such as at City Hall (Figure 4) bedrock is up to 15 to 25 m deep and is in an area known to be underlain by Carlsbad Formation shales, siltstone and silty limestone.

## **GEOTECHNICAL ISSUES**

The comments provided below are intended only to assist with evaluating the general feasibility of tunnel and/or tank construction, and to assist in evaluating the advantages, disadvantages, risks and relative costs associated with different alignments or tank locations. Comments are based on available geologic mapping and our general knowledge of the study area. Additional study and investigation will be required to confirm the overall feasibility of the selected option.

## **STORAGE TUNNEL CONSTRUCTION**

In general, the existing IOS has been constructed at an elevation of between 46 and 42 m. At Booth Street, this corresponds to a depth of approximately 14 m below ground surface. Along the downtown portion of Wellington Street, this corresponds to a depth of between 17 m at Bronson Avenue and 36 m just west of the Rideau Canal, as ground surface increases from west to east. If similar tunnel elevations are planned for the new storage tunnel, it can be expected that the tunnel will be entirely within rock (which is the preferred condition). The following geotechnical issues should be considered with respect to the storage tunnels:

- In the Verulam and Lindsay limestones expected along most of the tunnel alignment, discontinuity controlled wedges and blocks and the intrinsic hardness of the formation will constitute the main geotechnical concerns, as the rock is expected to be competent and hard.
- Known faults within the Ottawa area can sometimes be associated with deep overburden zones and potentially areas of poor quality rock.
- A deep erosional valley east of the Canal near the intersection of Rideau and Sussex Streets is known to exist with bedrock surface mapped at over 33 m. A similar but shallower valley exists along/beneath the Rideau Canal. The existing IOS was designed to skirt these features and similar consideration should be given when planning future tunnel alignments. The alignment and profile should ideally be picked to keep the tunnel fully in bedrock.

- It is possible that the tunnel could encounter Billings shale as a result of upthrusting on the various faults interpreted to exist in the area. In the Billings Formation, which consists entirely of black shale (some of which is known to exhibit unique geotechnical properties), the main issues will be time-dependent deformation behaviour, swelling, and slaking that could have an impact on the design and construction of the tunnel lining.
- The presence of existing tunnels within the downtown core (e.g., Kent-Wellington tunnel, Parliament Hill tunnel at NW corner of Wellington and the Rideau Canal) may limit the location of new tunnels. A minimum separation of at least 2 tunnel diameters should be maintained from existing tunnels, including the IOS.
- If tunnel construction under private property is proposed, there may be potential conflicts with existing or proposed basements/foundations.
- The expected tunnel profiles will likely be too deep to directly encounter soil or groundwater contamination (other than at shaft locations), but because the tunnel alignments are located in areas of past industrial activity, it is possible that any groundwater level lowering could mobilize contaminated groundwater from sites above and adjacent to the tunnel alignment and draw it towards/into the tunnel.
- Tunnel shafts will need to be constructed and will have similar geotechnical issues to those outlined below.

## **STORAGE TANK CONSTRUCTION**

We understand that storage tanks would be constructed at or slightly above the elevation of the existing IOS to allow for surplus sewage and stormwater to be temporarily stored and subsequently released into the IOS. As outlined above, the depth of bedrock is such that tanks in most of the study area would likely be founded directly on bedrock. Throughout most of the study area, excavations would mostly be in bedrock, however in areas such as LeBreton Flats or City Hall, significant thicknesses of overburden would have to be shored to reach the tank elevation. The following geotechnical issues should be considered in relation to the storage tanks:

- Tank excavations in most of the study area will require significant bedrock excavation. Excavation of limestone bedrock would likely be carried out using blasting techniques. Costs of deep rock excavation should be considered.
- Blasting or other ground vibrations associated with rock excavation can likely be controlled, but impacts to surrounding utilities and structures should be considered.
- In areas of significant overburden, excavation to the desired tank founding levels may require costly shoring and groundwater control (especially if tanks are located near the Rideau River).
- Groundwater level lowering and shoring may impact surrounding structures and utilities because of induced lateral ground movements or consolidation settlement of overburden soils.
- Potential exists for the presence of impacted/contaminated soil and/or groundwater, particularly in areas such as LeBreton Flats. Disposal of contaminated soil or groundwater excavated or pumped would be costly and should be considered when siting tank locations.
- If tanks are located in areas where the overburden thickness exceeds the founding level of the tank, foundation support may be required and seismic design issues will need to be considered.

We trust that the summary of ground conditions and geotechnical issues related to tunnelling and tank construction meet with your current needs. We look forward to providing more site-specific information and recommendations as the project continues. Should you require further information at this time, please do not hesitate to contact us.

Yours truly,

**GOLDER ASSOCIATES LTD.**



Erin O'Neill, P. Eng.  
Geotechnical Engineer

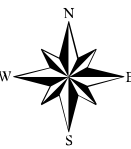


Michael I. Cunningham, P. Eng.  
Associate

ESO/MIC/kdc/cg

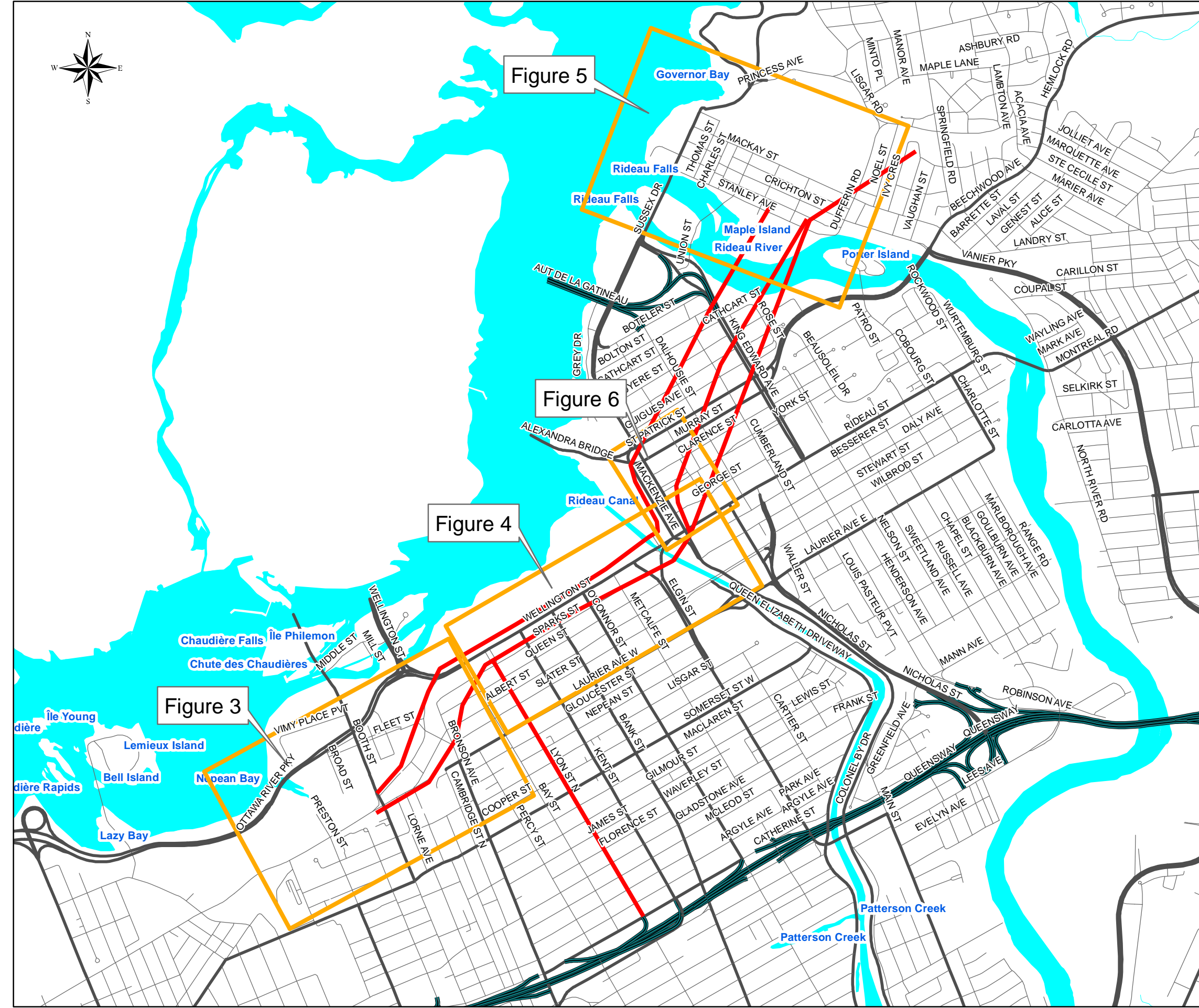
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Attachments: Figure 1 – Study Area  
Figure 2 – Depth to Bedrock – Study Area  
Figure 3 – Depth to Bedrock – LeBreton Flats Area  
Figure 4 – Depth to Bedrock – Rideau Canal Area  
Figure 5 – Depth to Bedrock – Rideau River Area  
Figure 6 – Drift Thickness Contours – Filled Valley at Rideau and Sussex



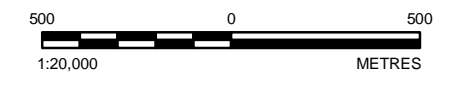
**LEGEND**

- Possible Storage Tunnel Alignment
- Highway
- Major Road
- Local road
- Possible Tank Areas
- Water



**NOTE:**  
 This figure is to be read in conjunction with the accompanying Golder Associates Ltd. report No. 09-1121-1062

**REFERENCE**  
 BÉLANGER, J. R., URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE D3256, 2001  
 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 18

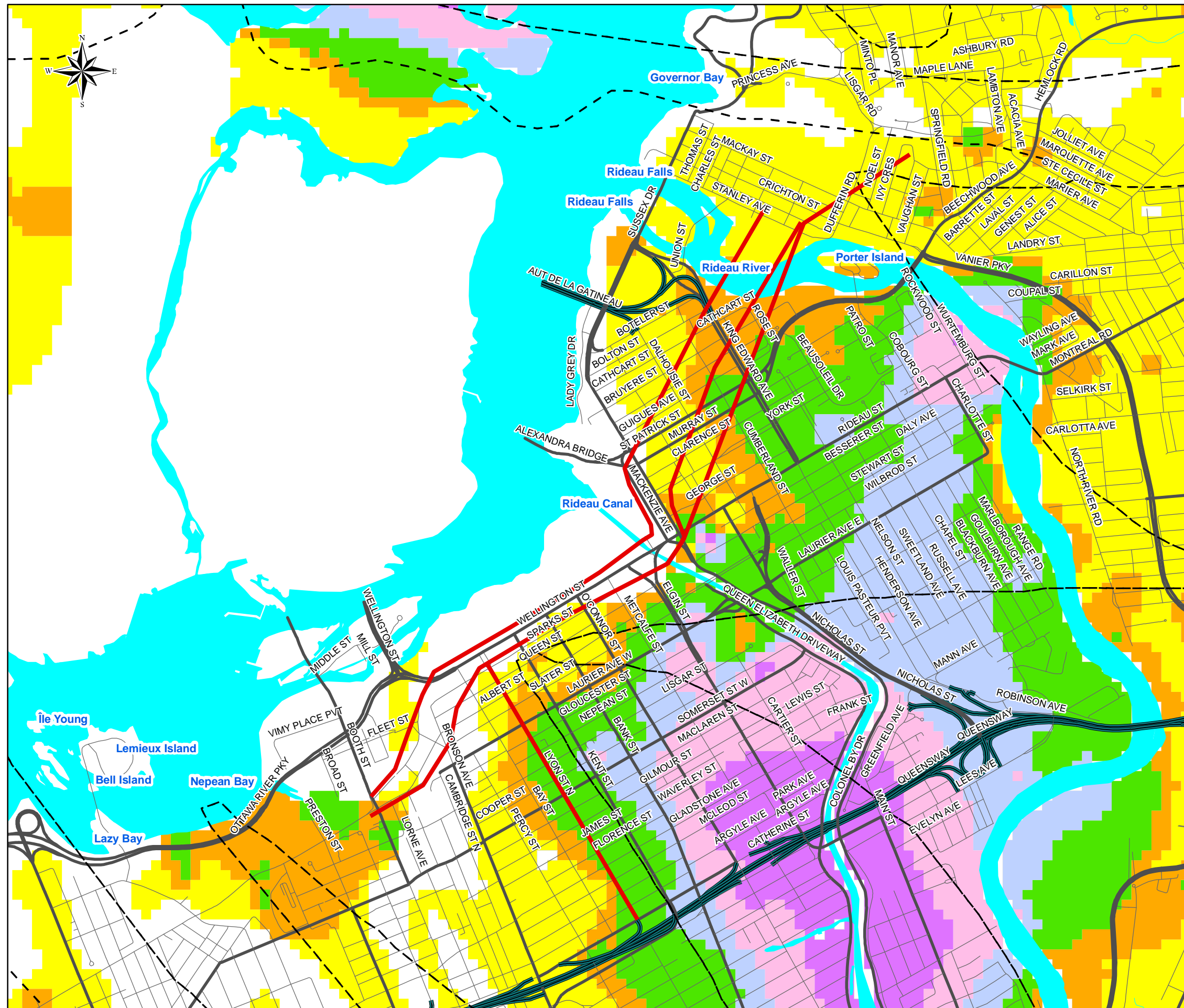


PROJECT	STANTEC CORE CSO STORAGE OTTAWA, ONTARIO
TITLE	STUDY AREA

<p><b>Golder Associates</b> Ottawa, Ontario</p>	PROJECT No. 09-1121-1062	SCALE AS SHOWN	REV. 0
	DESIGN ESO 14 Jan 2010		
	GIS ABD 14 Jan 2010		
	CHECK ESO 02 Feb. 2010		
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FIGURE: 1			

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**LEGEND**

- Possible Storage Tunnel Alignment
- Highway
- Major Road
- Local road
- Faults
- Water

**TREND IN DEPTH TO BEDROCK**

**METRES**

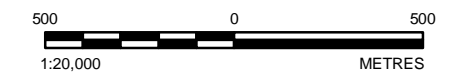
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- 2 to 3
- 3 to 5
- 5 to 10
- 10 to 15
- 15 to 25
- 25 to 50
- 50 to 150

**NOTE:**

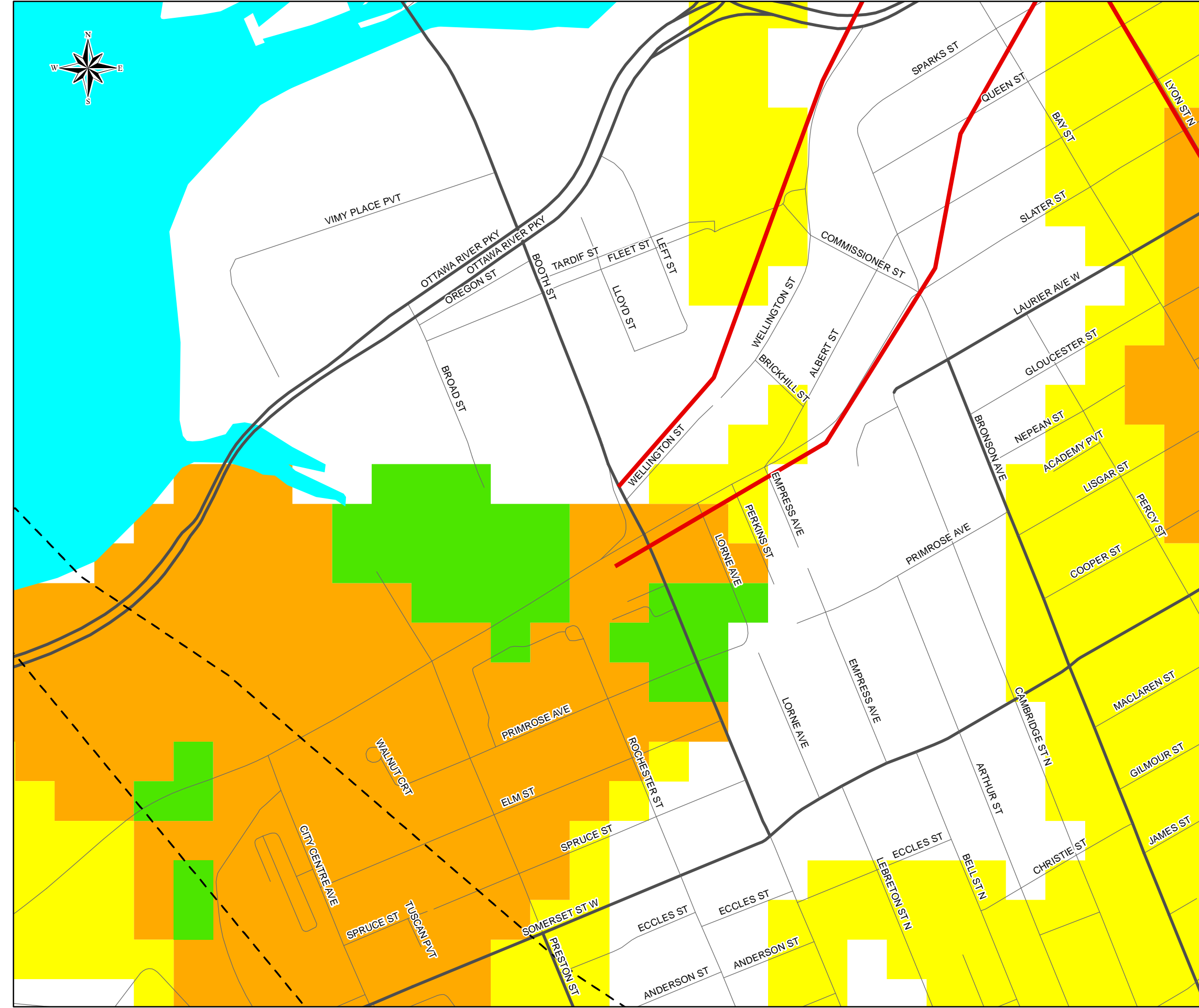
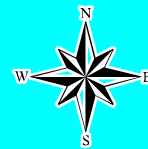
This figure is to be read in conjunction with the accompanying Golder Associates Ltd. report No. 09-1121-1062

**REFERENCE**

BÉLANGER, J. R., URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE D3256, 2001  
 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 18



PROJECT	STANTEC CORE CSO STORAGE OTTAWA, ONTARIO		
TITLE	DEPTH TO BEDROCK STUDY AREA		
	PROJECT No. 09-1121-1062	SCALE AS SHOWN	REV. 0
	DESIGN ESO 14 Jan 2010		
	GIS ABD 14 Jan 2010		
	CHECK ESO 02 Feb. 2010		
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	FIGURE: 2		



**LEGEND**

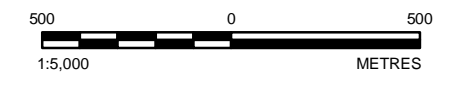
- Possible Storage Tunnel Alignment
- Major Road
- Local road
- Faults
- Water

**TREND IN DEPTH TO BEDROCK METRES**

- 0 to 2
- 2 to 3
- 3 to 5
- 5 to 10
- 10 to 15
- 15 to 25
- 25 to 50
- 50 to 150

**NOTE:**  
 This figure is to be read in conjunction with the accompanying Golder Associates Ltd. report No. 09-1121-1062

**REFERENCE**  
 BÉLANGER, J. R., URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE D3256, 2001  
 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 18



PROJECT	STANTEC CORE CSO STORAGE OTTAWA, ONTARIO		
TITLE	DEPTH TO BEDROCK LEBRETON FLATS AREA		
 <b>Golder Associates</b> Ottawa, Ontario	PROJECT No.	09-1121-1062	SCALE AS SHOWN
	DESIGN	ESO 14 Jan 2010	REV. 0
	GIS	ABD 14 Jan 2010	
	CHECK	ESO 02 Feb. 2010	
	REVIEW	MIC 02 Feb. 2010	

**FIGURE: 3**

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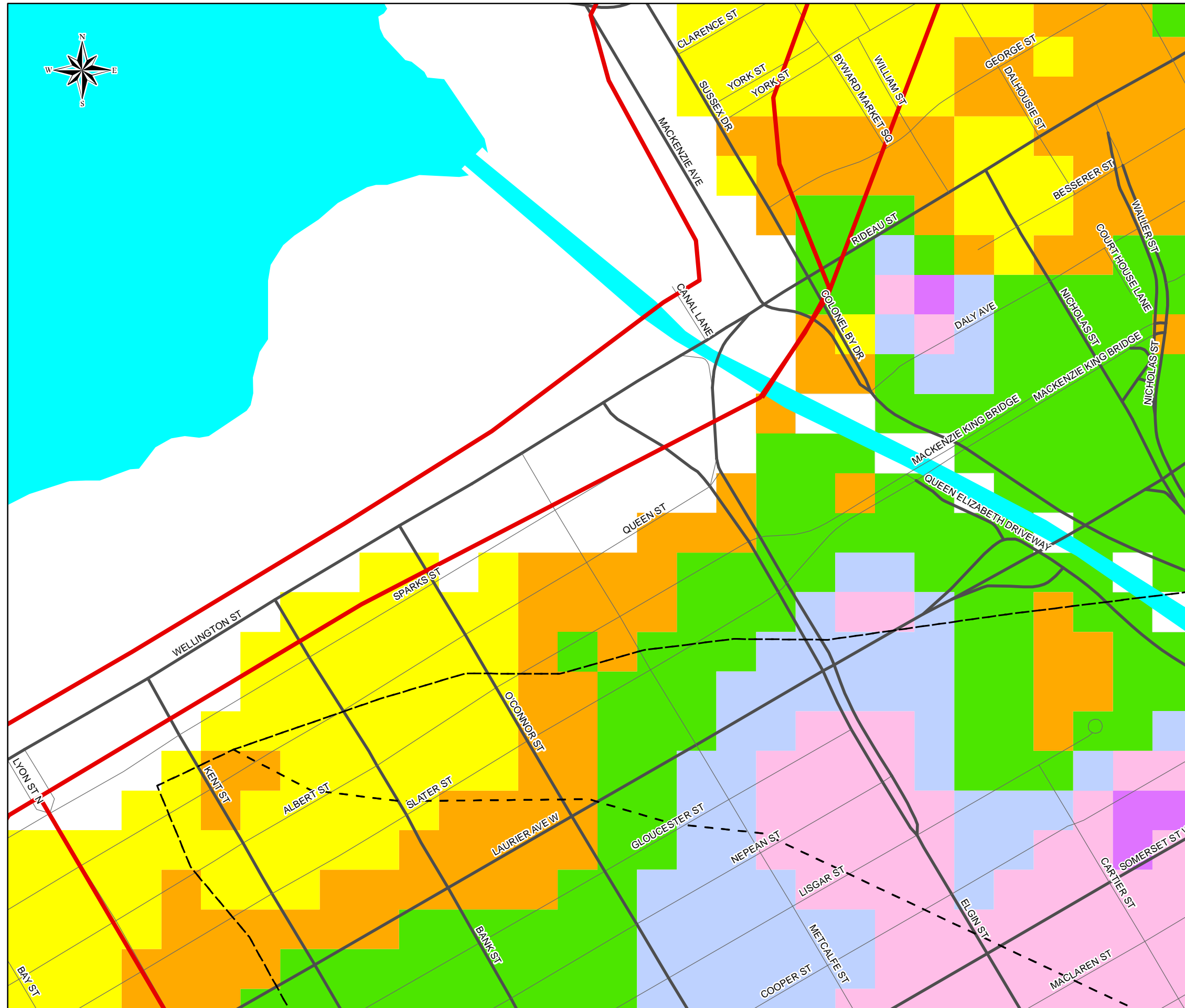
**LEGEND**

- Possible Storage Tunnel Alignment
- Major Road
- Local road
- Faults
- Water

**TREND IN DEPTH TO BEDROCK**

**METRES**

- 0 to 2
- 2 to 3
- 3 to 5
- 5 to 10
- 10 to 15
- 15 to 25
- 25 to 50
- 50 to 150

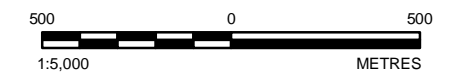


**NOTE:**

This figure is to be read in conjunction with the accompanying Golder Associates Ltd. report No. 09-1121-1062

**REFERENCE**

BÉLANGER, J. R., URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE D3256, 2001  
 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 18



PROJECT	STANTEC CORE CSO STORAGE OTTAWA, ONTARIO																			
TITLE	DEPTH TO BEDROCK RIDEAU CANAL AREA																			
<p style="margin: 0;"><b>Golder Associates</b> Ottawa, Ontario</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="4">PROJECT No. 09-1121-1062</td> </tr> <tr> <td>DESIGN</td> <td>ESO</td> <td>14 Jan 2010</td> <td rowspan="4" style="text-align: right; vertical-align: middle;">SCALE AS SHOWN    REV. 0</td> </tr> <tr> <td>GIS</td> <td>ABD</td> <td>14 Jan 2010</td> </tr> <tr> <td>CHECK</td> <td>ESO</td> <td>02 Feb. 2010</td> </tr> <tr> <td>REVIEW</td> <td>MIC</td> <td>02 Feb. 2010</td> </tr> </table>	PROJECT No. 09-1121-1062				DESIGN	ESO	14 Jan 2010	SCALE AS SHOWN    REV. 0	GIS	ABD	14 Jan 2010	CHECK	ESO	02 Feb. 2010	REVIEW	MIC	02 Feb. 2010	FIGURE: 4	
PROJECT No. 09-1121-1062																				
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**LEGEND**

- Possible Storage Tunnel Alignment
- Major Road
- Local road
- Faults
- Water

**TREND IN DEPTH TO BEDROCK**

- METRES**
- 0 to 2
  - 2 to 3
  - 3 to 5
  - 5 to 10
  - 10 to 15
  - 15 to 25
  - 25 to 50
  - 50 to 150

**NOTE:**

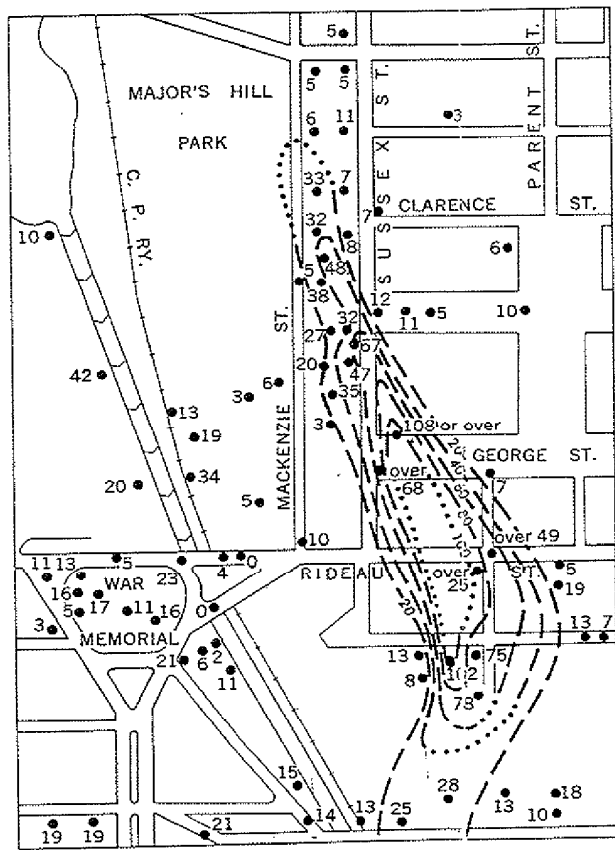
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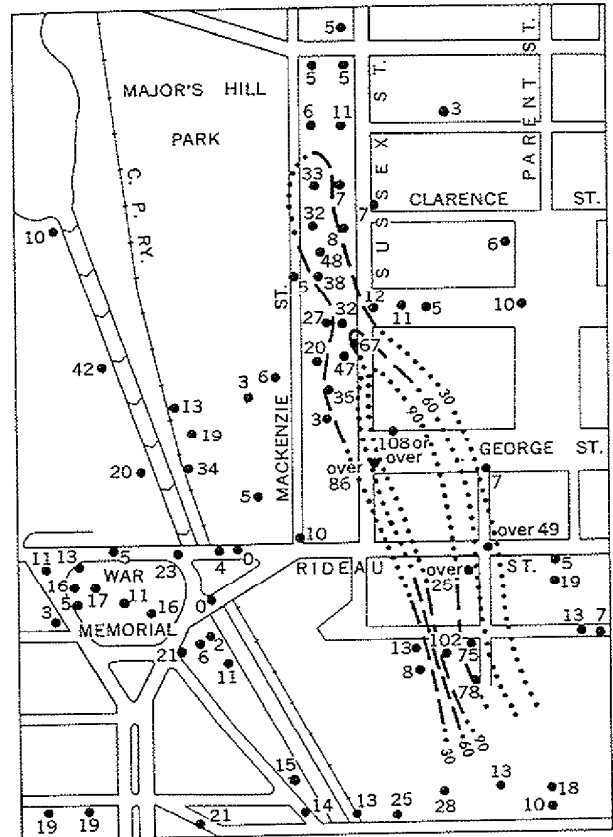
BÉLANGER, J. R., URBAN GEOLOGY OF THE NATIONAL CAPITAL AREA, GEOLOGICAL SURVEY OF CANADA, OPEN FILE D3256, 2001  
 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 18



PROJECT	STANTEC CORE CSO STORAGE OTTAWA, ONTARIO		
TITLE	DEPTH TO BEDROCK RIDEAU RIVER AREA		
 <b>Golder Associates</b> Ottawa, Ontario	PROJECT No. 09-1121-1062	SCALE AS SHOWN	REV. 0
	DESIGN   ESO   14 Jan 2010		
	GIS   ABD   14 Jan 2010		
	CHECK   ESO   02 Feb. 2010		
	REVIEW   MIC   02 Feb. 2010		
FIGURE: 5			




Drift-thickness contour interval 20 feet  
Scale: 1 inch to 600 feet



Drift-thickness contour interval 30 feet  
Scale: 1 inch to 600 feet

**REFERENCE**

Base Map Provided By GEOLOGICAL SURVEY OF CANADA  
Department of Mines and Technical Surveys  
MAP 39-1959

PROJECT	STANTEC CORE CSO STORAGE OTTAWA, ONTARIO		
TITLE	DRIFT-THICKNESS CONTOURS FILLED VALLEY AT RIDEAU AND SUSSEX		
 Golder Associates Ottawa, Ontario	PROJECT No. 09-1121-1062	SCALE AS SHOWN	REV. 0
	DESIGN ESO 27 Jan. 2010	<p style="text-align: center; font-size: 24pt; font-weight: bold;">FIGURE: 6</p>	
	GIS ABD 27 Jan. 2010		
	CHECK ESO 02 Feb. 2010		
REVIEW MIC 02 Feb. 2010			

**DATE** July 28, 2010**DOCUMENT No.** 09-1121-1062**TO** Adrien Comeau, P.Eng.  
Stantec Consulting**FROM** Mike Cunningham, P.Eng.**EMAIL** mcunningham@golder.com**GEOTECHNICAL INPUT  
SELECTION OF PREFERRED OPTION  
CSO STORAGE PROJECT  
OTTAWA, ONTARIO**

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This memo provides geotechnical input regarding the selection of the preferred option for the CSO Storage Project in Ottawa, Ontario. This memo presents a summary of input that has been previously provided at project meetings and through on-going consultation.

**Background**

The purpose of the CSO Storage Project is to identify and then develop the preferred alternative for providing additional storage in order to further reduce CSO discharges to the Ottawa River from the combined sewer network. The scope of the project involves completing an Environmental Assessment for selection of the preferred alternative and to then develop the functional design of that alternative.

The project is currently at the stage of selecting the preferred alternative from the 'short list' of alternatives that were previously selected from the initial 'long list' of alternatives.

The short list of alternatives includes the following:

- **Alternative 2a – Core Tunnel South:** This design includes an approximately 4.2 km long tunnel, between 2.8 and 3.7 m in diameter, which would be aligned:
  - east-west along Slater Street or Laurier Avenue, from LeBreton Flats to about the University of Ottawa Campus, then
  - northerly along Cumberland Avenue to the north part of Lower Town (near Cathart Street), and then
  - easterly beneath the Rideau River to terminate near the Keefer regulator.
- **Alternative 2b – Core Tunnel North:** This design includes an approximately 4.2 km long tunnel, between 2.8 and 3.7 m in diameter, which would be aligned:
  - east-west along Wellington Street, from LeBreton Flats to MacKenzie Avenue, then
  - northerly along MacKenzie Avenue to the north part of Lower Town, and then
  - easterly along St. Patrick Street (or possibly Sussex Drive and Boteler Street) to terminate near the Keefer regulator.



- **Alternative 4 – Long Tunnel:** This design includes an approximately 11 km long 2.4 m diameter tunnel which would essentially twin the existing east portion of the Interceptor Outfall Sewer (IOS). The alignment would extend easterly from the Keefer regulator to the sewage treatment plant (ROPEC). Various possible routes have been considered, some of which would closely parallel the IOS while others would follow very different routes.

## Evaluation

The three short listed options involve tunnel construction through varying ground conditions and with some differing challenges. To assist with the evaluation of the alternatives and selection of the preferred alternative, this section of the memo provides:

- a summary of the ground conditions along each alternative;
- a discussion of the feasibility of each alternative; and,
- a discussion of some possible construction risks associated with each alternative (which might impact on the construction costs).

This input is provided based solely on a review of existing available geotechnical data.

It is considered that a primary issue in regards to the feasibility, construction risks, and costs of these alternatives is the bedrock surface profile, since the tunnel will ideally be constructed in rock, or would at least avoid/limit mixed-face (i.e., tunnel face in both soil and rock) or transition conditions. A particular focus of this review has therefore been development of a bedrock surface profile along each alternative.

## Alternative 2A – Core Tunnel South

The attached sketch on Figure 1 shows the available bedrock surface information and inferred bedrock profile along Alternative 2A. The tunnel will have an invert level ranging from about elevation 44 m (west end, at LeBreton Flats) to about elevation 40 m (east end, near Keefer regulator).

The bedrock conditions for the Alternative 2A alignment can be summarized as follows:

- Through the ‘Downtown’ area, where the tunnel would be aligned along Slater or Laurier, the bedrock surface is quite shallow while the tunnel is quite deep, and therefore the tunnel would be constructed entirely in rock and with significant cover. The data does however also indicate that the bedrock through the eastern part of this alignment (east of about Bank Street) transitions from limestone to shale (then back to limestone for the remainder of the route). There is also some faulting associated with those transitions.
- In the area near the Rideau Canal crossing (and near City Hall to the west and the University of Ottawa to the east), the data indicates that the bedrock surface dips down and would be only about 5 m above the tunnel crown. There would therefore be minimal cover through this section, and even the risk of mixed-face conditions (if the rock surface undulates downward between the boreholes).
- Along Cumberland, where the tunnel would be aligned approximately north-south, the bedrock surface is again located well above the crown (but dipping down to the north).
- Where the alignment turns easterly towards the Rideau River crossing, there may again be only about 5 m of cover above the tunnel crown, and this would include the section beneath the Rideau River. It is also quite possible that bedrock is exposed on the river bed.

Based on these conditions, the following comments are provided:

- The proposed alignment and profile will apparently be located entirely in bedrock and the design is probably generally feasible for tunnel construction.
- In the area of the Rideau Canal crossing, there is the risk of mixed-face conditions. However the bedrock surface level is quite variable through this section and additional review of the geotechnical data in comparison to the exact alignment will be required. An alignment on the north side of the proposed corridor would probably be preferred.
- In the area of the Rideau River crossing, there may be limited rock cover. There could be the risk of mixed-face conditions (if the bedrock surface undulates). However the more likely risk is of having excessive water inflow into the tunnel due to a direct hydraulic connection to the river (via fractures in the bedrock). The existing IOS was however successfully constructed beneath the river in close proximity to this alignment and at the same level, so the proposed design is presumably feasible.
- Some of the variations of this alignment that were considered during development of this alternative involved tunnelling beneath private property. That may still be required, even for the current alignment, where significant turns are required (due to the minimum turning radius of the TBM equipment). Where that is the case, several possible challenges may exist:
  - Easements would be required to pass beneath the private properties.
  - It would need to be confirmed that the tunnel would not impact on the foundation support for the buildings on those properties, even though the tunnel would be in bedrock. For example, if the tunnel would extend beneath multi-storey buildings, those buildings might be supported on caissons socketed into the rock. The tunnel might therefore conflict with the caisson sockets, or might cause settlement of the caissons.
  - Even for properties which are not currently occupied by high-rise buildings, the presence of the tunnel might limit the future developability of the site, by restricting the future feasibility of deep foundations (for the same reasons as listed above for tunnelling beneath existing multi-storey buildings).
- This alignment involves a section of tunnel through shale (between about Bank Street and the Rideau Canal). This bedrock type is generally less competent than the limestone that is present over the remainder of the alignment (and more generally beneath most of the study area). The faulting associated with the bedrock transitions may present some localized technical challenges. For example, localized grouting may be required to control the groundwater inflow, or rock bolting could be required for roof support. However it is not expected that these issues present a significant negative issue in terms of selection of this alternative.

### **Alternative 2B – Core Tunnel North**

The attached sketch on Figure 2 shows the available bedrock surface information and inferred bedrock profile along Alternative 2B. The tunnel will have an invert level ranging from about elevation 44 m (west end, at LeBreton Flats) to elevation 40 m (east end, near Keefer regulator).

The bedrock conditions for the Alternative 2A alignment can be summarized as follows:

- Through the 'Downtown' area, along Wellington, the bedrock surface is quite shallow while the tunnel is quite deep, and therefore the tunnel would be constructed entirely in rock and with significant cover.

- In the area of the Rideau Canal crossing, immediately west of the Chateau Laurier hotel, there is a localized dip in the bedrock surface (apparently a filled bedrock valley). The data indicates that the tunnel crown would be only about 5 m below the bedrock surface. There would therefore be minimal cover through this section, and even the risk for mixed-face conditions.
  - Note: Though not shown on the profile (because it is off-set from the proposed alignment), there is a similar but even larger and deeper filled valley feature in the area of the Wellington/Rideau intersection with Sussex Drive.
- Along MacKenzie, where the tunnel would be aligned approximately north-south, the bedrock surface is again located well above the crown (but dipping down to the north).
- Similar to the alignment of the Core Tunnel South (since the two alignments converge), there may again be only about 4 or 5 m of cover where the alignment turns easterly towards the Rideau River crossing, and including the section beneath the river. It is also quite possible that bedrock is exposed on the river bed.

Based on these conditions, the following comments are provided:

- The proposed alignment and profile will apparently be located entirely within the bedrock and would closely follow the alignment and profile of the existing IOS. The design is therefore probably generally feasible for tunnel construction.
- The CSO storage tunnel should ideally be aligned no closer than 2 tunnel diameters from the existing IOS (clear spacing), recognizing that the IOS was installed by drill-and-blast methods and there may therefore have been damage to the surrounding rock.
- In the area of the Rideau Canal crossing, there is the risk of having inadequate rock cover or even mixed-face conditions. However the IOS was apparently successfully constructed through this area, fully in bedrock, and therefore the CSO Storage tunnel would also likely be constructed fully in bedrock (particularly if the CSO tunnel is located to the south of the IOS).
- It would be undesirable to extend the tunnel into the filled valley in the area of the Rideau-Sussex intersection. That valley is filled with water-bearing sand and gravel. To tunnel through this area:
  - There would probably need to be a change in tunnelling equipment types (from rock to soft-ground equipment) which would require that a shaft be constructed in this very congested area. The sand and gravel deposit might also need to be dewatered, which would be challenging to do in this congested area and might cause settlement of nearby buildings.
  - Alternatively the sand and gravel could be grouted to solidify it and make it feasible to tunnel through the valley using rock tunnelling equipment. However this grouting would be complicated and expensive to carry out, especially in this congested area.
- It will therefore be necessary for the alignment to turn north to continue up MacKenzie. To respect the 2-diameter separation distance from the IOS, and to not extend outside of the right-of-way and beneath private land (with tall/heavy buildings), a small radius turn will be required. Conventional TBM equipment may not be able to make that sharp of a turn.

- It is considered that the Wellington/Rideau-MacKenzie intersection may form a pinch-point where the tunnel alignment is restricted to a very narrow corridor by the IOS, the right-of-way limits, and the filled valley to the east. It is considered therefore that a much more detailed assessment of this particular area would be required before it could be confirmed that routing the tunnel through this area is even feasible (from a technical or cost perspective).
- As discussed previously for the Core Tunnel South route, there may be limited rock cover in the area of the Rideau River crossing and there may be a risk of having excessive water inflow. The existing IOS was however successfully constructed beneath the river in close proximity to this alignment and at the same level, so the proposed alignment is presumably feasible.

#### **Alternative 4 – Long Tunnel**

The attached sketch on Figure 3 shows the available bedrock surface information and inferred bedrock profile along Alternative 4. The tunnel would have an invert level ranging from about elevation 40 m (west end, at Keefer regulator) to about elevation 34 m (east end, at ROPEC).

The bedrock conditions for the Alternative 4 alignment can be summarized as follows:

- Along the west portion of the alignment, between the Keefer regulator and Blair Road, the bedrock surface is quite shallow while the tunnel is quite deep, and therefore the tunnel would be constructed entirely in rock and with significant cover.
- East of Blair Road the ground surface level dips down considerably in elevation. The bedrock surface undulates through this section and then also dips down to more than 25 m depth. In the transition zone, the rock level is quite irregular and a filled bedrock valley appears to be present.
- East of about Rebecca Crescent, the rock surface is entirely below the tunnel level and the construction would be carried out within a thick deposit of silty clay, which continues all the way to ROPEC.

Based on these conditions, the following comments are provided:

- The proposed alignment and profile will likely follow the alignment and profile of the existing IOS or, even if a different alignment is followed, the ground conditions will likely be similar. The design is therefore probably generally feasible for tunnel construction.
- The construction would involve tunnelling in rock for the west part of the alignment and then tunnelling in clay for the east part of the alignment, with a complicated transition zone in between. Tunnelling in the clay deposit would generally be more expensive than tunnelling in rock.
- The rock surface undulates through the transition zone such that there might not be a quick transition from rock to clay. There may be sections of mixed-face tunnelling, then a return to bedrock tunnelling, followed by tunnelling in glacial till, and then finally clay. These conditions are not well suited to mechanized tunnelling methods. Ground improvement (such as grouting) could be required to locally solidify the overburden until a convenient location was reached for a shaft to be installed so that the tunnelling equipment could be changed (from rock to soft ground). A very detailed geotechnical investigation program would be required to define the conditions in the transition, and there would still be an elevated risk of ground changes during tunnelling. The overlying ground has also been developed with a residential subdivision and there might not be a convenient location at which to locate a shaft. Carrying out an extensive ground improvement program might also not be feasible given the presence of the numerous private properties and houses, and that these properties are located on an irregular (i.e., non-grid) road network.

- For tunnelling through the clay section, although the available information indicates that the existing IOS was successfully constructed without causing excessive settlement of the overlying ground, damage to structures would be an issue of concern. The tunnel would be constructed in clay beneath numerous private residences and there is the potential for excessive settlements if the equipment and methods are not appropriate. Numerous easements would also need to be obtained.
- Although the area between Blair Road and ROPEC is essentially fully developed, the design would also need to consider the impacts on any future in-fill development or longer-term re-development, since the presence of the tunnel might preclude the future use of piled foundations for any higher structures, and might therefore limit the future development options for this area.
- There is a fairly broad corridor, extending both north and south of the existing IOS, through which the tunnel could be aligned. Some of the contemplated routes would be aligned close to the Ottawa River. That alignment might be beneficial in that it would not be necessary to pass beneath numerous private properties, and would thus avoid many of the challenges associated with soft-ground tunnelling (since the risk of excessive ground settlements causing damage would be reduced). However the bedrock surface appears to be deeper near the river and to be more undulating, such that there might be additional length of soft-ground tunnelling and more potential for alternating rock and soft-ground conditions. Alignments near the river might therefore be more costly. A more detailed review of any such alignments would be required if an alignment near the river was to be considered further.

## Assessment

Selection of the preferred alternative will be based on many considerations beyond the geotechnical issues. However, on balance, it is considered that the geotechnical issues are less challenging for Option 2A – Core Tunnel South.

We trust that this memo provides sufficient information for your present requirements.

Yours truly,

**GOLDER ASSOCIATES LTD.**



Mike Cunningham, P.Eng.  
Associate

MIC/TMS/cg

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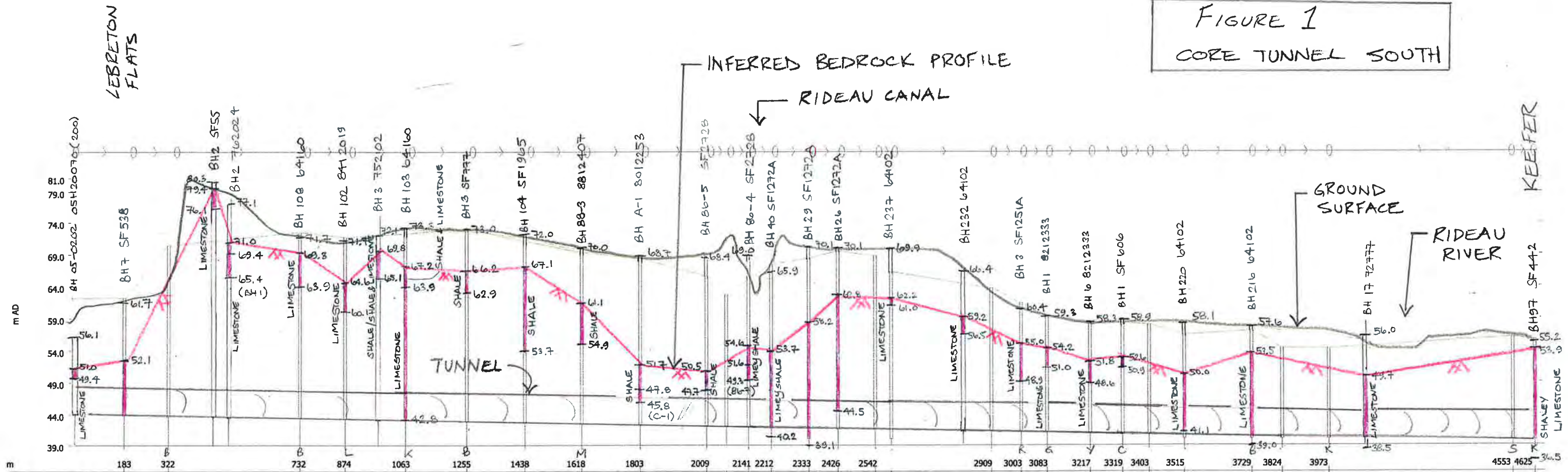
Attachments: Figures 1 to 3

WEST

SCALE  
H 1:12000  
V 1:600

EAST

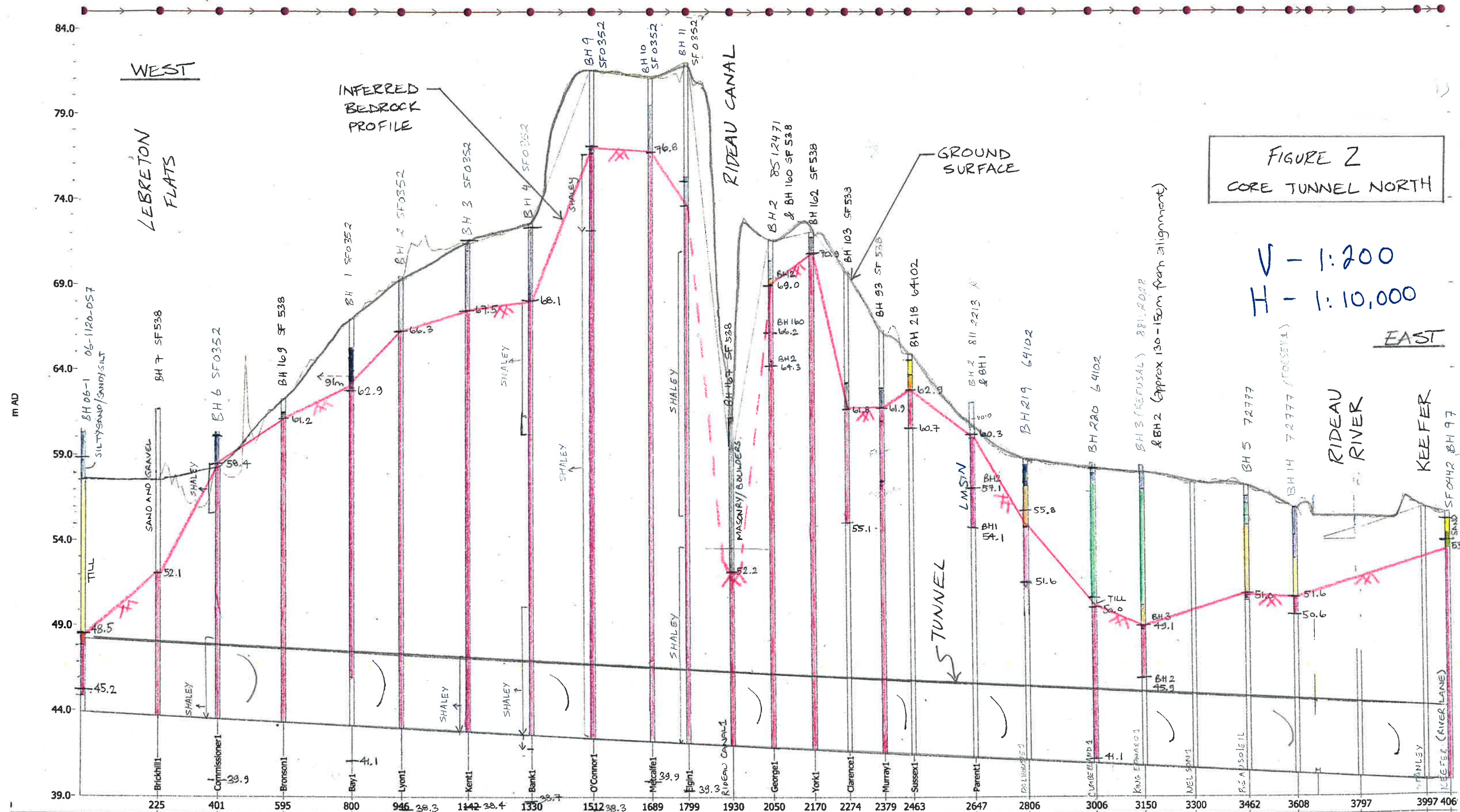
FIGURE 1  
CORE TUNNEL SOUTH



Link	WestEnd.S	Bronson.S	Bay.S	Lyon.S	Kent.S	Bank.S	O'Connor.S	Metcalfe.S	Elgin.S	Wilbrod.S	George.S	York.S	Guigues.S	Cathcart.S	King Edward.S							
length (m)	183.0	138.7	410.4	141.5	189.0	192.8	182.2	180.7	184.3	206.6	93.6	80.1	134.2	101.9	84.7	112.0	213.6	95.2	148.7	580.4	71.3	
width (mm)	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300
height (mm)	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300
us Inv (m AD)	43.930	43.682	43.466	43.213	43.073	42.885	42.693	42.511	42.329	42.142	41.386	41.315	41.100	40.947	40.695	40.435	40.337	40.195	40.076	39.886	36.5	
ds Inv (m AD)	43.682	43.466	43.213	43.073	42.885	42.693	42.511	42.329	42.142	41.899	41.315	41.212	40.947	40.812	40.435	40.337	40.195	40.076	39.886	36.5		
grad (m/m)	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100	0.00100		
Node	Brickhill	Bronson	Bay	Lyon	Kent	Bank	O'Connor	Metcalfe	Elgin	Waller	Wilbrod	Besserer	George	York	Guigues	Bruyere	King Edward	Stanley				
ground (m AD)	62.169	70.441	72.489	71.730	72.326	73.101	71.076	69.316	68.355	65.601	68.390	69.509	66.225	63.667	59.327	58.262	56.310	56.917	54.224	54.188	55.928	

FIGURE 2  
CORE TUNNEL NORTH

V - 1:200  
H - 1:10,000



Node	225	401	595	800	946	1142	1330	1512	1689	1799	1930	2050	2170	2274	2379	2463	2647	2806	3006	3150	3300	3462	3608	3797	3997	406	
Link length (m)	224.7	176.8	192.2	206.2	146.3	195.3	188.3	167.3	110.4	130.9	120.1	105.5	102.8	104.6	102.2	102.2	144.0	150.0	161.7	146.2	60.4	129.3	200.0	21.4			
width (mm)	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	
height (mm)	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	4300	
is inv (m AD)	43.705	43.705	43.529	43.335	43.130	42.984	42.788	42.600	42.418	42.241	42.130	41.999	41.879	41.760	41.656	41.551	41.466	41.283	41.124	40.924	40.780	40.630	40.468	40.322	40.132	40.132	39.932
fs inv (m AD)	43.705	43.529	43.335	43.130	42.984	42.788	42.600	42.418	42.241	42.130	41.999	41.879	41.760	41.656	41.551	41.466	41.283	41.124	40.924	40.780	40.630	40.468	40.322	40.132	40.132	39.932	



**DATE** September 6, 2012**PROJECT No.** 09-1121-1062**TO** Stephane D'Aoust / Adrien Comeau  
Stantec Consulting Ltd.**FROM** Erin O'Neill, P.Eng.  
Mike Cunningham, P.Eng.**EMAIL** Erin\_O'Neill@golder.com  
Mike\_Cunningham@golder.com**GEOTECHNICAL INPUT TO DESIGN ALTERNATIVES  
PREFERRED CORE SEWER STORAGE TUNNEL ALIGNMENTS  
CORE TUNNEL SOUTH (LAURIER/SLATER) AND KENT/LYON TUNNEL  
OTTAWA, ONTARIO**

This memo provides geotechnical input regarding design alternatives for the preferred alignments for the Combined Sewer Storage Tunnel (CSST) Project in Ottawa, Ontario. This memo summarizes input that has been previously provided at project meetings and through on-going consultation.

**1.0 BACKGROUND**

The purpose of the CSO Storage Project is to further reduce combined sewer overflows to the Ottawa River from the combined sewer network by identifying and then developing the preferred alternative for providing additional storage. The scope of the project involves completing an Environmental Assessment to select the preferred storage alternative and to then develop the functional design of that alternative.

From an initial „long list“ of alternative solutions (which included storage tunnels, tanks, and in-river storage), a „short list“ of alternatives was developed and evaluated. The three „short list“ alternatives included two core storage tunnels (north and south) connecting Booth Street to the Keefer regulator, and one „long tunnel“ from the Booth Street to ROPEC. Geotechnical input on the „long list“ and „short list“ alternatives was previously provided by Golder in technical memos dated February 2 and July 28, 2010, respectively.

From the „short list“ of alternatives, the preferred alignment for the combined sewer storage tunnel was identified as the „Alignment 2A: Core Tunnel South“. This alignment consists of an approximately 4.2 km long tunnel, 3.0 metres in diameter, along the following general alignment:

- East-west along Slater Street or Laurier Avenue, from LeBreton Flats to about the University of Ottawa Campus; then,
- Northerly along King Edward Avenue or Cumberland Avenue to the north part of Lower Town (near Cathart Street); and then,
- Easterly beneath the Rideau River, terminating within Stanley/New Edinburgh Park near the Keefer regulator.



A second 3.0 metre diameter north-south tunnel along Kent Street, Lyon Street, Elgin Street or Catherine Street was later added to the scope of work for this project. A preliminary geotechnical assessment for these tunnel alignments was provided by Golder as part of a separate project in a memo dated November, 2009, as input to the final "O'Connor Flood Control Trunk Level Measures Functional & Preliminary Design Report" prepared by Stantec.

This current memo provides additional geotechnical input related to the various design alternatives within the preferred east-west and north-south tunnels as described above and shown in Stantec figures ST-1 to ST-6 attached.

For the east-west Core Storage Tunnel, design alternatives being evaluated include (from west to east):

- General tunnel alignment through the downtown core along either Laurier Avenue or Slater Street (Figure ST-1);
- Alternative staging areas and alignment options at LeBreton Flats/CSST Inlet Chamber (Figure ST-2);
- Alternative alignments and staging areas between Elgin Street and the Rideau Canal (e.g., Confederation Park and City Hall areas (Figure ST-3), with staging areas as far east as the University of Ottawa's Tabaret Hall;
- General tunnel alignment through Lowertown along either Cumberland Street or King Edward Avenue (Figure ST-1);
- General tunnel alignments through Borderleau Park and across the Rideau River to Stanley/New Edinburgh Park (Figure ST-4); and,
- Northern and southern diversion sewer connections from the Keefer Regulator to the CSST/IOS connection (Figure ST-4).

For the north-south storage tunnel, design alternatives being considered include:

- General tunnel alignment along either Kent Street or Lyon Street (Figure ST-1/ST-5); and,
- Alternate staging areas at the north end of the Kent tunnel, near the Supreme Court (Figure ST-6).

## 2.0 EVALUATION CRITERIA

As outlined in our previous memos, for the proposed tunnel inverts, the preferred north-south and east-west tunnel alignments will likely be primarily in rock. For the tunnel construction, the following significant geotechnical issues would need to be considered:

- The amount of rock cover, and potential for „mixed face“ tunnelling conditions if there are significant changes in the top of rock elevation;
- The potential for rock or soil conditions which could impact the feasibility or costs of tunnel construction (e.g., poor working face stability, bouldery ground conditions, etc.);
- The potential for excessive groundwater inflow and the impacts of groundwater level lowering; and,
- The potential for ground movements that may impact on roadways, utilities or structures.

Construction of the shafts can also present a significant challenge/constraint on the tunnelling options. Some potential issues of concern relate to the following:

- The shoring requirements for overburden excavations, such as may be required due to: shaft depth; the proximity to structures, roadways, utilities, or the river; and, the presence of weak or permeable ground conditions.
- The potential for excessive groundwater inflow, if the shaft will be made through permeable overburden or bedrock, which is important in regards to: the significant pumping that could be required; the need for a dewatering discharge of suitable capacity and associated permits (and that meets MOE and City requirements for water quality); and the associated potential for settlement of surrounding structures due to the groundwater level lowering.

The geotechnical input provided in this memorandum is at a level of detail appropriate for route selection and evaluation of the proposed design alternatives and is based solely on a review of existing available geotechnical data, including published mapping and select borehole records, where available. More detailed geotechnical input will be required for functional, preliminary and detailed design of the selected alignment, including site-specific subsurface investigation.

### **3.0 EVALUATION**

Construction of the preferred north-south and east-west sewer alignments involves tunnel and shaft excavation through varying ground conditions and with some differing challenges. While construction of the preferred „short list“ alignments are considered feasible, one or more of the design alternatives being considered may be geotechnically preferred. To assist with the evaluation of the different design alternatives for the preferred alternatives (at each location listed above), this section of the memo provides comments on any significant differences in the anticipated rock and ground conditions which could result in additional geotechnical risks (which might impact on the construction costs).

#### **3.1 East-West Core Tunnel (formerly Core Tunnel South Option 2A)**

##### **3.1.1 Laurier Avenue vs. Slater Street (ST-1)**

- Through the „Downtown“ area along Slater Street or Laurier Avenue (between Bronson and Elgin) the bedrock surface is quite shallow while the tunnel is quite deep. Therefore the tunnel would be constructed entirely in rock and with significant cover along either alignment. Several faults run roughly perpendicular to both alignments, but are expected to be of limited width along the tunnel alignment.
- There is less shale bedrock (which is generally less competent than the limestone that is present over the remainder of the alignment) mapped along Slater Street than on Laurier Avenue. As such, while both alignments are feasible, Slater Street would be preferred geotechnically over Laurier Avenue.

##### **3.1.2 LeBreton Flats/CSST Inlet Chamber (ST-2)**

- In the vicinity of the CSST Inlet Chamber (Old Wellington Street and Albert Street between Booth Street and the Transitway), the subsurface conditions generally consist of fill over glacial till over bedrock. Published depth to bedrock mapping indicates that the bedrock surface is near-surface in this area (less than 2 metres depth), increasing in depth from north to south and from east to west (up to about 10 metres depth at Albert Street and Booth Street); however, boreholes put down in the area of Wellington Street and the Transitway indicate the bedrock surface to be between elevation (E.L.) 51 and 52 metres (some 10 metres depth) and, based on drilling currently underway along Albert Street, at around E.L. 47 meters (about 15 metres depth) on Albert Street, significantly deeper than indicated in published mapping.

- At these depths, and for a proposed tunnel obvert of around 48 metres, there would be limited or no rock cover above the sewer and a high potential of mixed face conditions or “daylighting” of the tunnel through the rock into the overlying glacial till soils in this area. The risk is moderately higher along Albert Street than Wellington Street and, as such, tunnelled alignments closer to Wellington Street may be geotechnically preferred over those along Albert Street/Slater Street west of Bronson Avenue. The potential risks due to reduced cover and/or poor quality rock are such that it may be advantageous to move the tunnel exit shaft further to the east, where bedrock is expected to be shallower, regardless of the selected alignment. Additional investigation between the Transitway and Slater Street will be needed to better assess the depth to bedrock in this area and to identify the potential length of limited or no rock cover.
- It is understood that west of the Transitway, open cut construction of the sewer is being considered, which would more easily accommodate the sharp angles along the alignment required for connections to existing infrastructure. While open cut construction would eliminate the risks and issues associated with roof support and mixed face conditions that are likely if this section is tunnelled, it would require very deep excavation of bouldery glacial till deposits below the water table. Excavations to this depth would require temporary shoring and active groundwater lowering in order to reduce impacts on existing services within the roadway.

### **3.1.3 Confederation Park/City Hall (Elgin Street to Rideau Canal) (ST-3)**

#### **3.1.3.1 Tunnels**

- A significant body of geotechnical data exists in the vicinity of the Confederation Park/City Hall design alternatives being considered. As shown on the attached Figure 1, available data indicates that the bedrock surface slopes down from Slater Street to Laurier Street and, along Laurier Street (between Elgin Street and the Rideau Canal), forms a valley within the rock surface as low as E.L. 50.5m. Bedrock along the northern alignment through Confederation Park is mapped primarily as limestone or limestone and shale, while boreholes along the southern alignments indicate primarily shale or limy-shale.
- Based on a review of the available historical geotechnical information in this area, it does not appear as though the tunnel will “daylight” through the rock into the overlying soils along the northern or southern alignments. But, along the southern (Laurier Avenue/City Hall) alignments, the thickness of rock cover over the tunnel appears to be minimal (as low as 4 metres) which may be problematic, particularly if the top of the rock is fractured (which is relatively common, particularly in more shaley deposits). If the rock surface undulates downward between boreholes, there may even be a risk of mixed-face conditions. Shale is more prevalent along the southern alignment, and that condition is more likely to require additional roof support, and, unlike limestone, shale is more prone to degradation when exposed to air, the presence of combustible gases and the potential for swelling. Significant concerns regarding minimal rock cover and potentially difficult ground conditions therefore exist within the southern alignment options.
- If the northern alignment through Confederation Park is selected, the tunnel will need to pass beneath the Laurier Street Bridge. Care should be taken to avoid aligning the tunnel beneath the bridge foundations to avoid undermining the caissons which are socketed in rock.
- The northern tunnel alignment through Confederation Park is expected to have greater rock cover, more competent limestone bedrock, shallower overburden excavations at the shaft site, and less potential for impacts of groundwater level lowering and for ground movements that may impact adjacent structures (see discussion for shafts below). As such, the northern tunnel alignment through Confederation Park is preferred geotechnically over the southern alignments along Laurier Avenue.

### 3.1.3.2 Shafts

- It is understood that an intermediate shaft location is being planned in the vicinity of the Rideau Canal which could potentially be open for many months (see Figure ST-3). Three shaft locations (CW1 to CW3) are located west of the Canal, while another three locations (CE-1 to CE-3) are being considered east of the Canal.
- Dewatering of the shafts will result in drainage of the surrounding bedrock, which will then „under drain“ a surrounding area, and could lead to draw-downs in the bottom portion of the overburden soils. Where the overburden soils comprise a thick deposit of sensitive clay, there is a risk of settlement if the clay is stressed beyond its pre-consolidation pressure.
  - The main part of the City Hall building is supported on a raft foundation on sensitive clay, hence there is an increased risk for shafts along the southern alignments (CW-2 and CW-3, and to a lesser extent, CE-1 and CE-2) of inducing consolidation settlements which may affect the structural integrity of City Hall from the combined effects of the raft loading and the under-drainage.
  - The Laurier Street Bridge is supported on piles and rock-socketted caissons, whereas the east and west approach embankments are grade-supported. Differential settlement of the approaches relative to the bridge embankments is therefore a potential concern for shafts in these areas (CW-2, CW-3, CE-1, CE-2).
  - At CE-3, near Tabaret Hall, existing information indicates that the rock is overlain by stiff to very stiff clay and glacial till, which is at relatively low risk of dewatering induced settlement, although it is understood that the building is supported on footings.
  - To the north (near CW-1), the National Arts Centre is supported by footings on rock, whereas the MacKenzie King Bridge is supported on piles. Therefore none of these structures are likely vulnerable to settlements from dewatering of shafts along the northern alignment.
- Shoring costs and risks are largely influenced by the thickness of overburden deposits, shaft depth, proximity to structures, and the presence of weak or permeable ground conditions.
  - Shaft excavations along the southern alignments (CW-2, CW-3) west of the Rideau Canal would be more costly because the rock is much deeper, and shaft excavation in soil would extend in close proximity to, and several metres below, the founding level of the adjacent City Hall parkade. To avoid/limit settlements of the parking garage foundations, a stiff and watertight shoring system would be needed for the shaft (such as a diaphragm wall). A portion of the tunnel both upstream and downstream of the shaft would also likely need to be made watertight by grouting.
  - A shaft at CE-1 and CE-2 will also involve higher shoring costs because of the thickness of overburden deposits (10 metres or more) and presence of firm clay. Preliminary information indicates that the top of rock is at about E.L. 60m at CE-2 and deeper than E.L. 56 at CE-1. Given the depth, a robust shoring system will likely be required.
  - At CW-1 existing information indicates that the top of rock is expected to be between E.L. 58 to 59 m, and that the rock is overlain by 7 to 8 metres of fill and glacial till. Shoring of the overburden at CW-1 could likely be carried out using conventional soldier pile and lagging.

- At CE-3, existing information indicates that the top of rock is expected to be at E.L.62m, and that the rock is overlain by 8 metres of stiff to very stiff clay and glacial till. Shoring in the overburden at this location could likely be carried out using conventional soldier pile and lagging.
- CW-1 is considered the preferred geotechnical location for a shaft in this area. Of the other shaft locations being considered, CW-2 and CW-3 pose the highest risk geotechnically, followed by CE-1 and CE-2, then CE-3.

#### **3.1.4 Cumberland Street vs. King Edward Avenue (ST-1)**

- Along the Cumberland/King Edward corridor, where the tunnel would be aligned approximately north-south, the bedrock surface is located above the crown (but dips down to the north, where rock cover will be limited). Published mapping indicates slightly more rock cover along Cumberland Street than along King Edward Avenue. Of these two corridors, Cumberland Street would be slightly preferred over King Edward Avenue from a geotechnical perspective.

#### **3.1.5 Borderleau Park and Rideau River Crossing (ST-4)**

- There is little available geotechnical information in the area of Borderleau Park or the Rideau River. The available information indicates that the park is overlain by 4 to 6 metres of miscellaneous fills and alluvium over 1 to 3 metres of glacial till. The bedrock surface at the Rideau River near the northern design alignment is indicated to be at about E.L. 50 m. It is also quite possible that bedrock is exposed on the river bed and likely slopes down to the south. The existing Interceptor Outfall Sewer was successfully constructed beneath the river near the more northerly alignment and at about the same elevation as the proposed CSST. There is no available top of rock information at the east end of Cathart Street (along the southern design alternative), but the increased thickness of fill in this area suggests that bedrock may be deeper than E.L. 48m elevation, and thus rock crown cover along this southern alignment could be 3 to 4 metres or less.
- With limited rock cover, there is an increased likelihood of requiring additional crown reinforcement prior to or during excavation (e.g., grouted rock anchors or rock bolts or liner plates), and an increased risk of having excessive water flow into the tunnel due to a hydraulic connection to the river (via fractures in the bedrock). As such, the southern alignment is likely to be higher risk and therefore probably not preferred from a geotechnical perspective.

#### **3.1.6 Diversion Sewer Connections to the Keefer Regulator (ST-4)**

- In Stanley/New Edinburgh Park, published mapping and available boreholes indicate that the top of rock is at a depth of between 1 and 5 metres below ground surface, with depth to bedrock increasing towards the River. Very few boreholes have previously been put down within the area of "reclaimed land" beyond the original shoreline, which constitutes much of the northern and southern diversion sewer alignments. In these areas, the bedrock surface may be deeper, and the overburden fill likely thicker, loose and wet. Based on the limited available information, the risks associated with the northern and southern diversion sewer alignments are likely about the same.

## **3.2 North-South Tunnel (formerly Kent/Lyon Tunnel)**

### **3.2.1 Kent Street vs. Lyon Street (ST-1/ST-5)**

- Available information indicates that the proposed tunnel would be constructed within bedrock along either the Kent Street or Lyon Street tunnel alignments, with a proposed invert of about E.L. 45m. Billings formation shale is mapped to the east of Kent Street and Verulam formation limestone (which is older than Billings) is mapped to the west. Deep boreholes in the area indicate that the tunnel would likely be in limestone along both the Kent and Lyon alignments, with at least two diameters of rock cover.
- A significant fault is indicated on published mapping between Kent Street and Lyon Street, running the full length of the alignment from Catherine Street to Wellington Street, although the exact position and orientation of this feature is not known. While faults in this area are considered „inactive“ (i.e. not actively moving) and are often healed/cemented to some degree, they do represent zones of potential structural weakness in the rock and/or increased groundwater flow to a tunnel or shaft. Poorer rock quality in these areas could impact tunnelling machine performance and could require special roof support systems, grouting or dewatering in advance of the tunnelling to minimize or address some of these risks.
- Deep boreholes advanced along the Kent Street alignment as part of a previous study indicate that, at approximately the proposed tunnel elevation, the limestone contains several thin, nearly vertical healed fractures which could be indicative of faulting. No similarly deep borehole data is available along Lyon Street. Additional investigation will be required along either of these alignments to better assess these risks, however, it is understood that, from a hydraulics perspective, the Kent Street alignment is favoured because of connections at the south end with the proposed Catherine Street Tunnel and potential conflicts with the Lyon Street LRT station at the north end.

### **3.2.2 Supreme Court Staging Areas (ST-6)**

- At both proposed shaft locations, previous borehole records indicate that limestone bedrock is anticipated at a depth of about 5 metres below ground surface and is overlain by fill and/or glacial till. Faults are known to exist within this part of the City and one in particular is thought to cross the green space in front of the Supreme Court of Canada, trending in a NW-SE direction. Most sources identify it to the west of the proposed easterly shaft site, but the exact location is far from certain, and there is a possibility of other unidentified faults in the immediate area.
- As discussed previously, faults represent potential zones of structural weakness in the rock and/or increased groundwater flow to a tunnel or shaft. In this general area, and more likely so if the tunnel and shaft are extended to the western location, additional rock support and/or groundwater control measures may be required. As such, the shorter tunnel and east shaft site near Kent Street and Wellington Street are geotechnically preferred.

## **Assessment**

The selection of the preferred design alternatives at each site and along the general tunnel alignment will be based on many considerations beyond the geotechnical issues. However, on balance, it is considered that the geotechnical issues are generally about the same along the general Laurier/Slater, Cumberland/King Edward and Kent/Lyon tunnel alignments, with a slight geotechnical preference towards the Slater, Cumberland and Lyon routes. Areas of particular focus include the alignment alternatives for the east-west core storage tunnel near City Hall/Confederation Park, where the northern alignment through Confederation Park is considered significantly less challenging than the southerly routes closer to City Hall, and to a lesser extent at the Rideau River crossing, where the northern route is preferred.

We trust that this memo provides sufficient information for your present requirements.

Yours truly,

**GOLDER ASSOCIATES LTD.**



Erin O'Neill, P.Eng.  
Associate

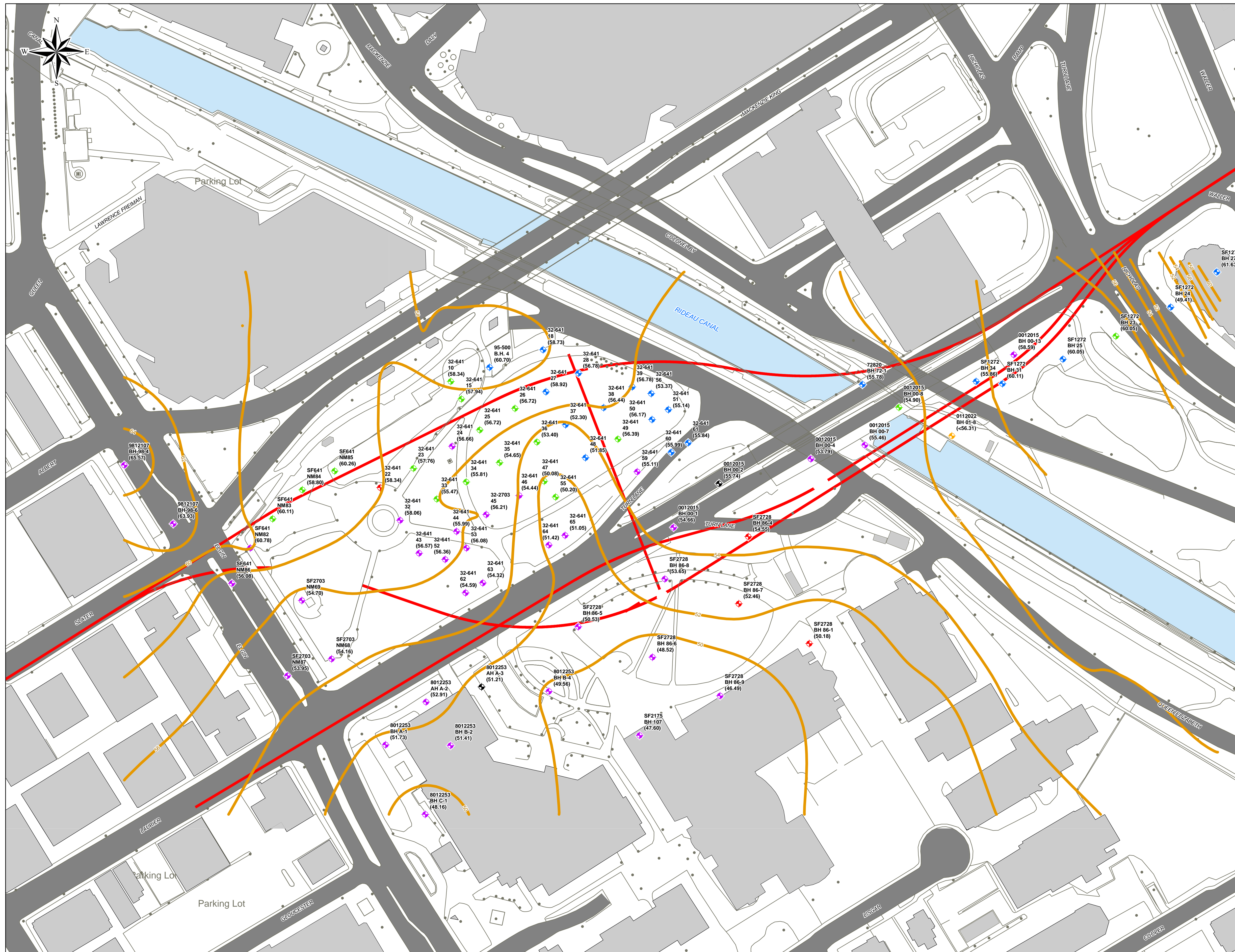


Mike Cunningham, P.Eng.  
Associate

ESOWC/TJN/MIC/bg

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Attachments: Figure 1 – Borehole Location Plan at Top of Bedrock Elevations  
Stantec Figures ST-1 to ST-6

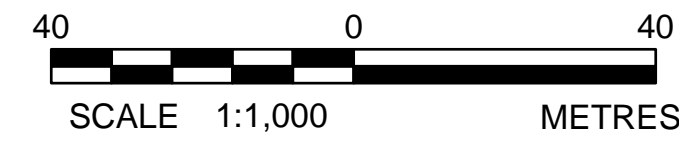



- LEGEND**
- ◆ APPROXIMATE BOREHOLE LOCATION
  - 72820 --- PROJECT CODE
  - BH 72-1 --- HOLE NUMBER
  - (55.78) --- TOP OF BEDROCK ELEVATION
  - BEDROCK TYPE (WITHIN SAMPLED BOREHOLES)**
  - ◆ LIMESTONE
  - ◆ LIMY-SHALE
  - ◆ SHALE
  - ◆ LIMESTONE AND SHALE
  - ◆ AUGER REFUSAL
  - ◆ BEDROCK BELOW DEPTH OF INVESTIGATION
  - PROPOSED CSST ALIGNMENTS
  - INTERPRETED DEPTH TO BEDROCK CONTOURS (metres)



**REFERENCE**

BASE DATA PROVIDED BY THE MINISTRY OF ONTARIO  
 PROJECTION: MODIFIED TRANSVERSE MERCATOR DATUM: NAD 83  
 COORDINATE SYSTEM: MTM ZONE 9



PROJECT	REVIEW OF GEOTECHNICAL INFORMATION CONFEDERATION PARK/CITY HALL		
TITLE	BOREHOLE LOCATION PLAN AT TOP OF BEDROCK ELEVATIONS		
 Golder Associates Ottawa, Ontario	PROJECT No.	09-1121-1062	SCALE AS SHOWN
	DESIGN	ESO Oct. 2011	REV. 0
	GIS	JEM Oct. 2011	FIGURE 1
	CHECK	ESO Sept. 2012	
REVIEW	MIC Sept. 2012		

Path: N:\Projects\2011\11-1062\Drawings\CityHall\BoreholeLocationPlan.mxd



Figure ST-1

# Lebreton Flats

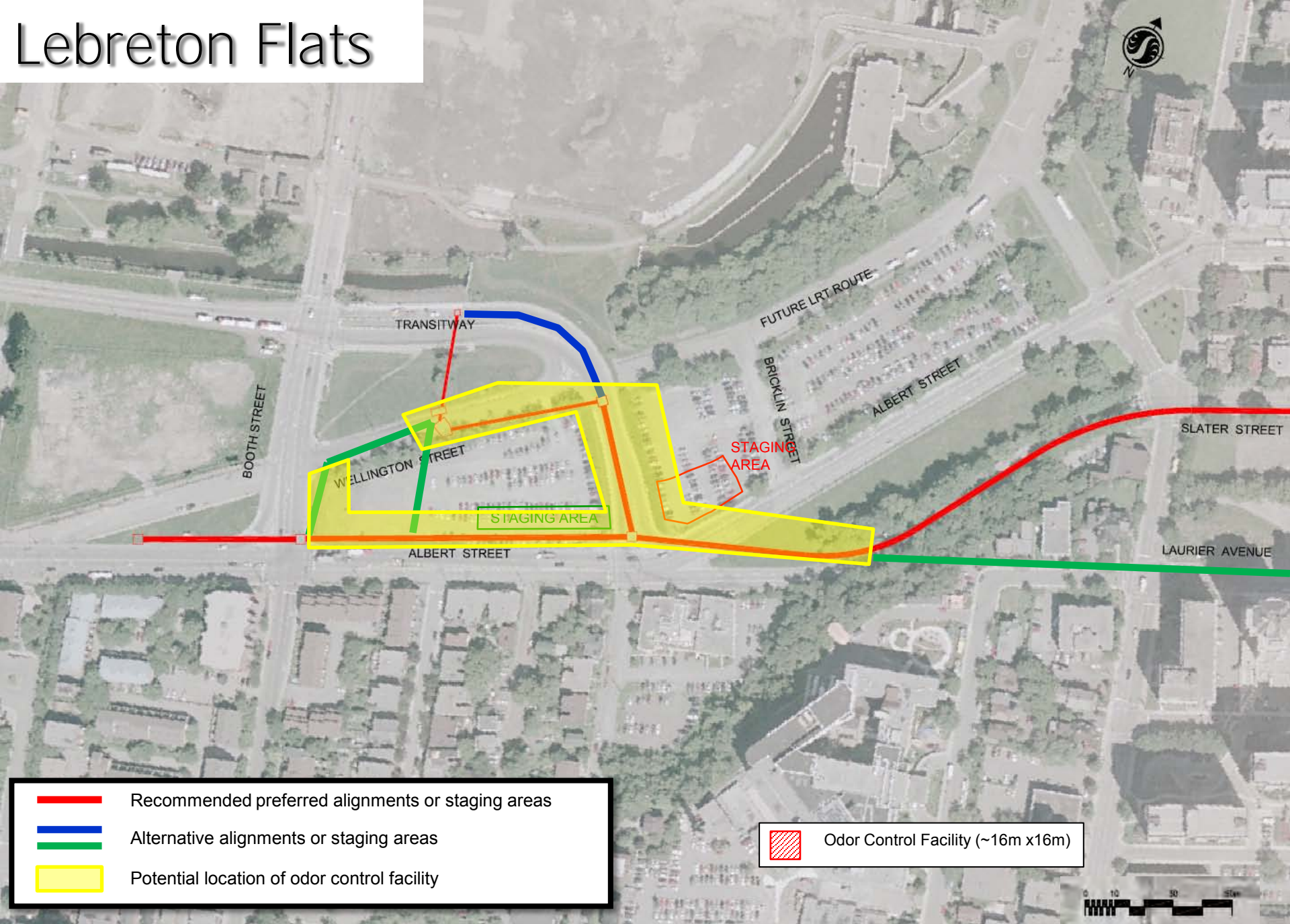
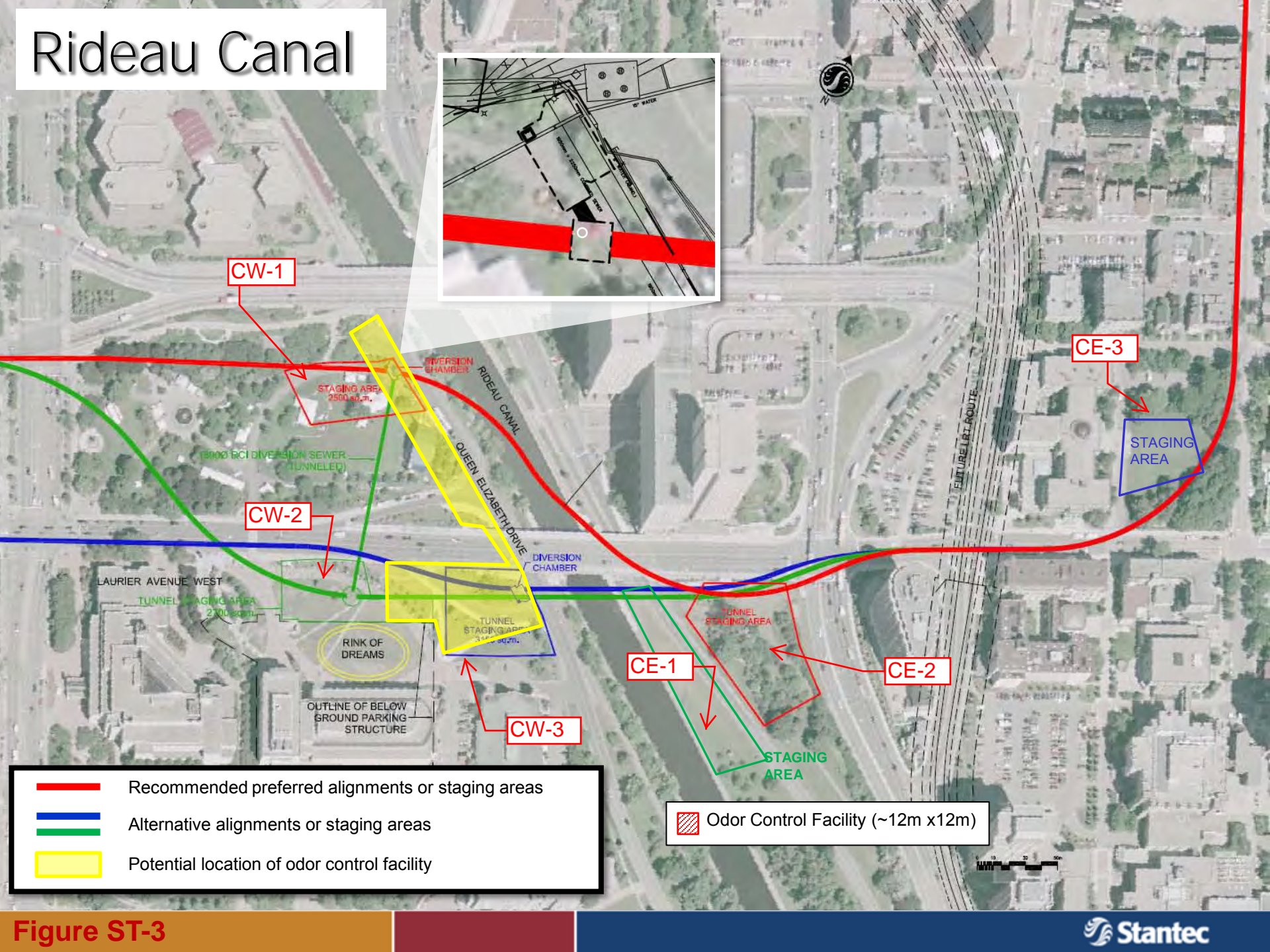


Figure ST-2

# Rideau Canal



CW-1

CW-2

CW-3

CE-1

CE-2

CE-3

STAGING AREA  
2500 sq.m.

TUNNEL STAGING AREA  
2700 sq.m.

TUNNEL STAGING AREA  
3400 sq.m.

TUNNEL STAGING AREA

STAGING AREA

STAGING AREA

- Recommended preferred alignments or staging areas
- Alternative alignments or staging areas
- Alternative alignments or staging areas
- Potential location of odor control facility

Odor Control Facility (~12m x 12m)

Figure ST-3

# Stanley/New Edinburgh Parks

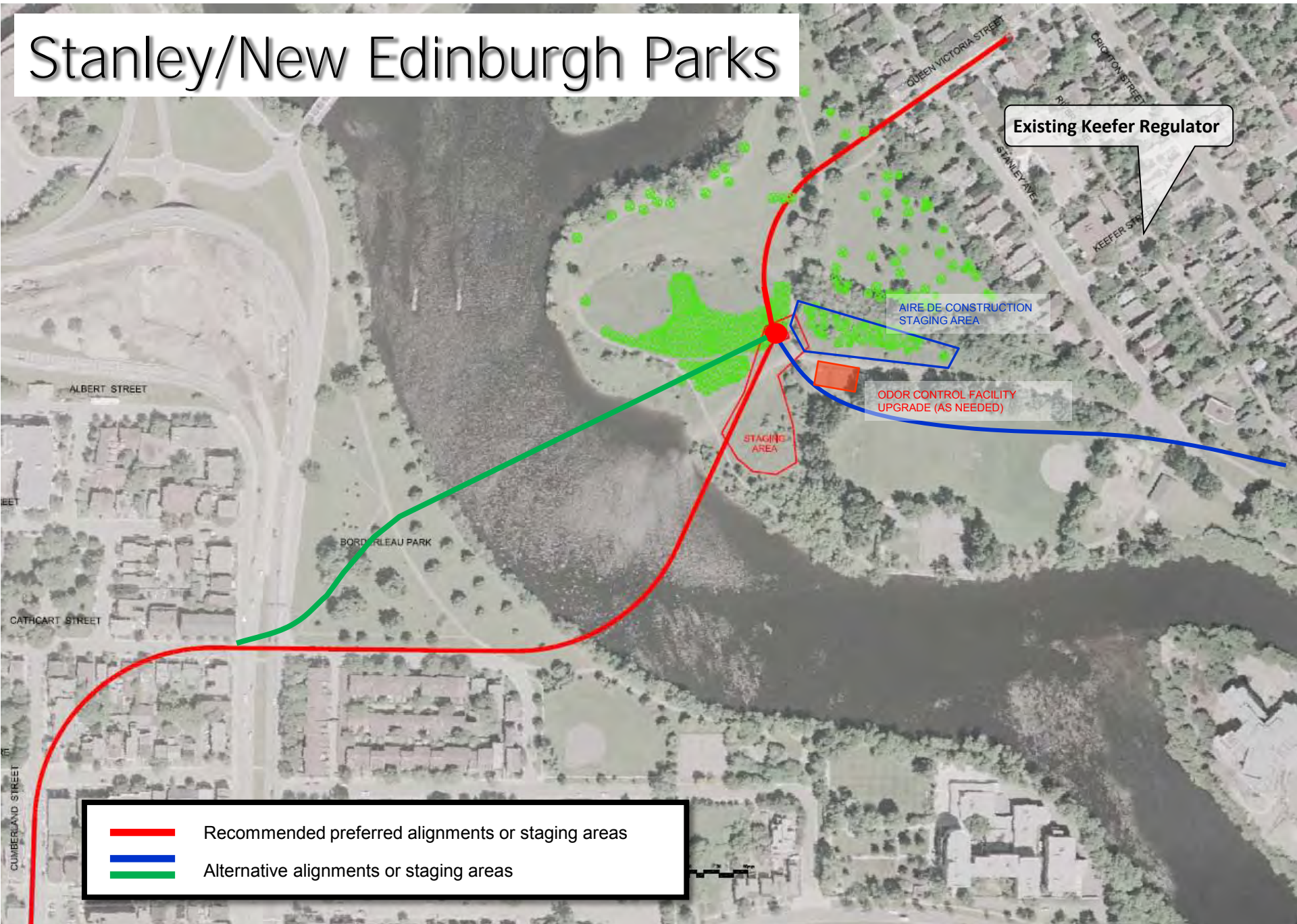


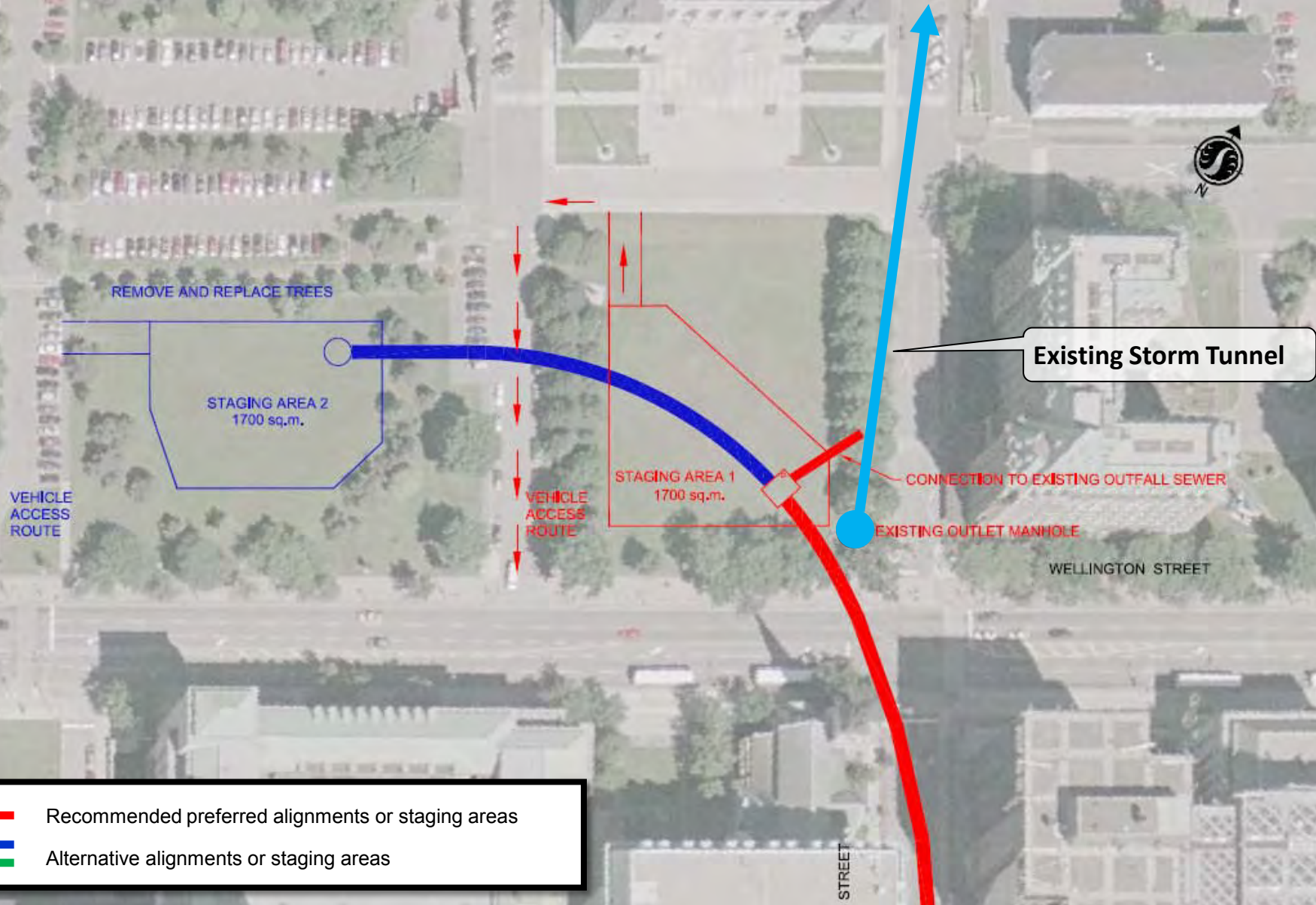
Figure ST-4

# Kent Tunnel



Figure ST-5

# Kent Tunnel






	Recommended preferred alignments or staging areas
	Alternative alignments or staging areas
	Alternative alignments or staging areas

Figure ST-6

**Appendix E**  
**Opinion of Probable Costs – Short**  
**Listed Alternatives**

## Combined Sewage Storage EA & Functional Design

1634-00965

1-Jun-10

### Linear Regressions Based on Detailed Opinion of Probable Costs for High and Low Range

Diameter (I.D.)	Unit Costs*		Unit Costs for Long Bores	
	high \$/m	low \$/m	high \$/m	low \$/m
2.44 m ---->	\$ 23,129	\$ 19,294	\$ 18,815	\$ 15,084
3.65 m ---->	\$ 26,638	\$ 24,471		
$\$/m = \text{Diam.} \cdot m + \text{intercept}$	$m = 2,900$	$4,278$		
	$\text{intercept} = \$ 16,054$	$\$ 8,856$		

\*note that these \$\$\$ only apply to short tunnels (cheaper with longer bores i.e. long tunnel)

### Sample Cost Estimate

D	3.05 m	Area	7.306 m <sup>2</sup>
L	7,650 m	Volume	55,892 m <sup>3</sup>
high \$/m	\$ 24,898	high \$	\$190M
low \$/m	\$ 21,904	low \$	\$168M

### Capital Costs + Allowance (76%) for Short Listed Alternatives

Description	D (m)	L (m)	V (m <sup>3</sup> )	\$ hi	\$ low	End Point	Comment
Alt 2a: Core Tunnel @ 2750mm diam.	2.75	4250	25,200	\$102M	\$88M	Keefer	Core Tunnel South - Minimum Volume
Alt 2a: Core Tunnel @ 3650mm diam.	3.65	4250	44,500	\$113M	\$104M	Keefer	Core Tunnel South - Maximum volume
Alt 3: Long Tunnel @ 2400mm diam.	2.44	11900	55,600	\$224M	\$180M	ROPEC	Long Tunnel
Long (3) + North-South Tunnels @ 2400mm diam.	2.44	13650	63,800	\$263M	\$212M	ROPEC + Wellington	Long Term Vision
Core (2a) + North-South Tunnels @ 2400mm diam.	2.44	6000	28,000	\$139M	\$116M	Keefer + Wellington	Recommended Solution - Minimum Volume
Core (2a) + North-South Tunnels @ 3000mm diam.	3.05	6000	43,800	\$149M	\$131M	Keefer + Wellington	Recommended Solution - Maximum Volume

Summary of Capital Costs - HIGH RANGE

Preliminary Opinion of Probable Capital Costs

Description of Works	Capital Costs						Capital Costs + 76% allowance					
	Data	Alt. ID										
	Sum of Capital Cost		3+) Phase 1a - Core (E-W)	3+) Phase 1b - Lyon	3+) Phase 2 - Keefeer to Blair	3+) Phase 3 - Blair to ROPEC	Sum of Capital Cost (+ allowance)					
	2a) Core no Lyon	3) Long Tunnel					2a) Core no Lyon	3) Long Tunnel	3+) Phase 1a - Core (E-W)	3+) Phase 1b - Lyon	3+) Phase 2 - Keefeer to Blair	3+) Phase 3 - Blair to ROPEC
3650mm ID (4500mm OD) Short Rock Tunnel	\$42,500,000	--	--	--	--	--	\$74,800,000	--	--	--	--	--
Maintenance access shaft to tunnel	\$5,000,000	\$17,000,000	\$5,000,000	\$2,000,000	\$9,000,000	\$2,000,000	\$8,800,000	\$29,920,000	\$8,800,000	\$3,520,000	\$15,840,000	\$3,520,000
Entry shaft for tunnelling	\$3,000,000	\$6,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000	\$5,280,000	\$10,560,000	\$5,280,000	\$5,280,000	\$5,280,000	\$5,280,000
2400mm-C140 Sanitary Sewer (10-12 m deep)	\$3,000,000	\$3,000,000	\$3,000,000	--	--	--	\$5,280,000	\$5,280,000	\$5,280,000	--	--	--
New weir Chamber at existing regulators	\$3,000,000	\$3,000,000	\$3,000,000	--	--	--	\$5,280,000	\$5,280,000	\$5,280,000	--	--	--
New weir Chamber at RCI	\$2,500,000	\$2,500,000	\$2,500,000	--	--	--	\$4,400,000	\$4,400,000	\$4,400,000	--	--	--
2440mm ID (3000mm OD) Short Rock Tunnel	\$2,000,000	--	\$36,000,000	\$13,600,000	\$44,000,000	--	\$3,520,000	--	\$63,360,000	\$23,936,000	\$77,440,000	--
Exit shaft for tunnelling	\$1,500,000	\$1,500,000	\$1,500,000	--	--	--	\$2,640,000	\$2,640,000	\$2,640,000	--	--	--
Mob/Demob - Tunnelling	\$1,000,000	\$1,000,000	\$1,000,000	--	\$1,000,000	\$1,000,000	\$1,760,000	\$1,760,000	\$1,760,000	--	\$1,760,000	\$1,760,000
1800mm-C140 Sanitary Sewer (6-8 m deep)	\$825,000	\$825,000	\$825,000	--	--	--	\$1,452,000	\$1,452,000	\$1,452,000	--	--	--
2440mm ID (3000mm OD) Short Clay Tunnel	--	\$26,400,000	--	--	--	\$26,400,000	--	\$46,464,000	--	--	--	\$46,464,000
2440mm ID (3000mm OD) Long Rock Tunnel	--	\$65,960,000	--	--	--	--	--	\$116,089,600	--	--	--	--
New Kent Regulator	--	--	--	\$4,000,000	--	--	--	--	--	\$7,040,000	--	--
<b>Grand Total</b>	<b>\$64,325,000</b>	<b>\$127,185,000</b>	<b>\$55,825,000</b>	<b>\$22,600,000</b>	<b>\$57,000,000</b>	<b>\$32,400,000</b>	<b>\$113,212,000</b>	<b>\$223,845,600</b>	<b>\$98,252,000</b>	<b>\$39,776,000</b>	<b>\$100,320,000</b>	<b>\$57,024,000</b>

Sum of Unit Quantities (Check)								
Sum of Unit Quantity	Alt. ID	2a) Core no Lyon	3) Long Tunnel	3+) Phase 1a - Core (E-W)	3+) Phase 1b - Lyon	3+) Phase 2 - Keefeer to Blair	3+) Phase 3 - Blair to ROPEC	(blank)
Description of Works								
1800mm-C140 Sanitary Sewer (6-8 m deep)		275	275	275				
2400mm-C140 Sanitary Sewer (10-12 m deep)		500	500	500				
2440mm ID (3000mm OD) Long Rock Tunnel			9700					
2440mm ID (3000mm OD) Short Clay Tunnel			2200				2200	
2440mm ID (3000mm OD) Short Rock Tunnel		250		4500	1700	5500		
3650mm ID (4500mm OD) Short Rock Tunnel		4250						
Entry shaft for tunnelling		1	2	1	1	1	1	
Exit shaft for tunnelling		1	1	1				
Maintenance access shaft to tunnel		5	17	5	2	9	2	
Mob/Demob - Tunnelling		1	1	1		1	1	
New Kent Regulator					1			
New weir Chamber at existing regulators		2	2	2				
New weir Chamber at RCI		1	1	1				
(blank)								

Combined Sewage Storage EA and Functional Design  
Detailed Cost Estimate - HIGH RANGE

Total \$359,335,000 \$632,429,600

Alt. ID	Location of Works	Description of Works	Unit	Unit Quantity	Capital Costs		
					Unit Cost (\$/unit)	Capital Cost	Capital Cost (+ allowance)
2a) Core no Lyon		Mob/Demob - Tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
2a) Core no Lyon	Main Storage Tunnel	3650mm ID (4500mm OD) Short Rock Tunnel	m	4,250.00	\$10,000	\$42,500,000	\$74,800,000
2a) Core no Lyon	CCC to Tunnel	1800mm-C140 Sanitary Sewer (6-8 m deep)	m	275.00	\$3,000	\$825,000	\$1,452,000
2a) Core no Lyon		Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
2a) Core no Lyon	approx 1 / 500m	Maintenance access shaft to tunnel	ea	5.00	\$1,000,000	\$5,000,000	\$8,800,000
2a) Core no Lyon		Exit shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
2a) Core no Lyon	Tunnel outlet to IOS	2440mm ID (3000mm OD) Short Rock Tunnel	m	250.00	\$8,000	\$2,000,000	\$3,520,000
2a) Core no Lyon	RCI to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
2a) Core no Lyon	RRC to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
2a) Core no Lyon	1 each Rideau Canal & Keefer	New weir Chamber at existing regulators	ea	2.00	\$1,500,000	\$3,000,000	\$5,280,000
2a) Core no Lyon		New weir Chamber at RCI	ea	1.00	\$2,500,000	\$2,500,000	\$4,400,000
					\$0	\$0	\$0
3+) Phase 1a - Core (E-W)		Mob/Demob - Tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
3+) Phase 1a - Core (E-W)	Main Storage Tunnel	2440mm ID (3000mm OD) Short Rock Tunnel	m	4,250.00	\$8,000	\$34,000,000	\$59,840,000
3+) Phase 1a - Core (E-W)	CCC to Tunnel	1800mm-C140 Sanitary Sewer (6-8 m deep)	m	275.00	\$3,000	\$825,000	\$1,452,000
3+) Phase 1a - Core (E-W)		Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
3+) Phase 1a - Core (E-W)	approx 1 / 500m	Maintenance access shaft to tunnel	ea	5.00	\$1,000,000	\$5,000,000	\$8,800,000
3+) Phase 1a - Core (E-W)		Exit shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3+) Phase 1a - Core (E-W)	Tunnel outlet to IOS	2440mm ID (3000mm OD) Short Rock Tunnel	m	250.00	\$8,000	\$2,000,000	\$3,520,000
3+) Phase 1a - Core (E-W)	RCI to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3+) Phase 1a - Core (E-W)	RRC to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3+) Phase 1a - Core (E-W)	1 each Rideau Canal & Keefer	New weir Chamber at existing regulators	ea	2.00	\$1,500,000	\$3,000,000	\$5,280,000
3+) Phase 1a - Core (E-W)		New weir Chamber at RCI	ea	1.00	\$2,500,000	\$2,500,000	\$4,400,000
					\$0	\$0	\$0
3+) Phase 1b - Lyon	Main Tunnel	2440mm ID (3000mm OD) Short Rock Tunnel	m	1,700.00	\$8,000	\$13,600,000	\$23,936,000
3+) Phase 1b - Lyon	assume 1 needed	Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
3+) Phase 1b - Lyon	Access/drop shafts	Maintenance access shaft to tunnel	ea	2.00	\$1,000,000	\$2,000,000	\$3,520,000
3+) Phase 1b - Lyon		New Kent Regulator	ea	1.00	\$4,000,000	\$4,000,000	\$7,040,000
					\$0	\$0	\$0
3+) Phase 2 - Keefer to Blair		Mob/Demob - Tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
3+) Phase 2 - Keefer to Blair	Main Tunnel	2440mm ID (3000mm OD) Short Rock Tunnel	m	5,500.00	\$8,000	\$44,000,000	\$77,440,000
3+) Phase 2 - Keefer to Blair	approx 1 / 500m	Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
3+) Phase 2 - Keefer to Blair		Maintenance access shaft to tunnel	ea	9.00	\$1,000,000	\$9,000,000	\$15,840,000
					\$0	\$0	\$0
3+) Phase 3 - Blair to ROPEC		Mob/Demob - Tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
3+) Phase 3 - Blair to ROPEC	Main Tunnel	2440mm ID (3000mm OD) Short Clay Tunnel	m	2,200.00	\$12,000	\$26,400,000	\$46,464,000
3+) Phase 3 - Blair to ROPEC	approx 1 / 500m	Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
3+) Phase 3 - Blair to ROPEC		Maintenance access shaft to tunnel	ea	2.00	\$1,000,000	\$2,000,000	\$3,520,000
					\$0	\$0	\$0
3) Long Tunnel	Main Storage Tunnel	2440mm ID (3000mm OD) Long Rock Tunnel	m	9,700.00	\$6,800	\$65,960,000	\$116,089,600
3) Long Tunnel	CCC to Tunnel	1800mm-C140 Sanitary Sewer (6-8 m deep)	m	275.00	\$3,000	\$825,000	\$1,452,000
3) Long Tunnel		Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
3) Long Tunnel	approx 1 / 500m	Maintenance access shaft to tunnel	ea	15.00	\$1,000,000	\$15,000,000	\$26,400,000
3) Long Tunnel		Exit shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3) Long Tunnel		Mob/Demob - Tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
3) Long Tunnel	RCI to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3) Long Tunnel	RRC to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3) Long Tunnel	1 each Rideau Canal & Keefer	New weir Chamber at existing regulators	ea	2.00	\$1,500,000	\$3,000,000	\$5,280,000
3) Long Tunnel		New weir Chamber at RCI	ea	1.00	\$2,500,000	\$2,500,000	\$4,400,000
3) Long Tunnel	Main Tunnel	2440mm ID (3000mm OD) Short Clay Tunnel	m	2,200.00	\$12,000	\$26,400,000	\$46,464,000
3) Long Tunnel	approx 1 / 500m	Entry shaft for tunnelling	ea	1.00	\$3,000,000	\$3,000,000	\$5,280,000
3) Long Tunnel		Maintenance access shaft to tunnel	ea	2.00	\$1,000,000	\$2,000,000	\$3,520,000
					\$0	\$0	\$0
					\$0	\$0	\$0
					\$0	\$0	\$0



Summary of Capital Costs - LOW RANGE

Preliminary Opinion of Probable Capital Costs

Description of Works	Capital Costs						Capital Costs + 76% allowance					
	Data	Alt. ID					Sum of Capital Cost (+ allowance)					
	Sum of Capital Cost	2a) Core no Lyon	3) Long Tunnel	3+) Phase 1a - Core (E-W)	3+) Phase 1b - Lyon	3+) Phase 2 - Keefe to Blair	3+) Phase 3 - Blair to ROPEC	2a) Core no Lyon	3) Long Tunnel	3+) Phase 1a - Core (E-W)	3+) Phase 1b - Lyon	3+) Phase 2 - Keefe to Blair
3650mm ID (4500mm OD) Short Rock Tunnel	\$42,500,000	--	--	--	--	--	\$74,800,000	--	--	--	--	--
2400mm-C140 Sanitary Sewer (10-12 m deep)	\$3,000,000	\$3,000,000	\$3,000,000	--	--	--	\$5,280,000	\$5,280,000	\$5,280,000	--	--	--
New weir Chamber at existing regulators	\$3,000,000	\$3,000,000	\$3,000,000	--	--	--	\$5,280,000	\$5,280,000	\$5,280,000	--	--	--
Maintenance access shaft to tunnel	\$2,500,000	\$8,500,000	\$2,500,000	\$1,000,000	\$4,500,000	\$1,000,000	\$4,400,000	\$14,960,000	\$4,400,000	\$1,760,000	\$7,920,000	\$1,760,000
New weir Chamber at RCI	\$2,500,000	\$2,500,000	\$2,500,000	--	--	--	\$4,400,000	\$4,400,000	\$4,400,000	--	--	--
2440mm ID (3000mm OD) Short Rock Tunnel	\$1,750,000	--	\$31,500,000	\$11,900,000	\$38,500,000	--	\$3,080,000	--	\$55,440,000	\$20,944,000	\$67,760,000	--
Entry shaft for tunnelling	\$1,500,000	\$3,000,000	\$1,500,000	\$1,500,000	\$1,500,000	\$1,500,000	\$2,640,000	\$5,280,000	\$2,640,000	\$2,640,000	\$2,640,000	\$2,640,000
Exit shaft for tunnelling	\$1,000,000	\$1,000,000	\$1,000,000	--	--	--	\$1,760,000	\$1,760,000	\$1,760,000	--	--	--
1800mm-C140 Sanitary Sewer (6-8 m deep)	\$825,000	\$825,000	\$825,000	--	--	--	\$1,452,000	\$1,452,000	\$1,452,000	--	--	--
Mob/Demob - Tunnelling	\$500,000	\$500,000	\$500,000	--	\$500,000	\$500,000	\$880,000	\$880,000	\$880,000	--	\$880,000	\$880,000
2440mm ID (3000mm OD) Short Clay Tunnel	--	\$17,600,000	--	--	--	\$17,600,000	--	\$30,976,000	--	--	--	\$30,976,000
2440mm ID (3000mm OD) Long Rock Tunnel	--	\$62,080,000	--	--	--	--	--	\$109,260,800	--	--	--	--
New Kent Regulator	--	--	--	\$4,000,000	--	--	--	--	--	\$7,040,000	--	--
<b>Grand Total</b>	<b>\$59,075,000</b>	<b>\$102,005,000</b>	<b>\$46,325,000</b>	<b>\$18,400,000</b>	<b>\$45,000,000</b>	<b>\$20,600,000</b>	<b>\$103,972,000</b>	<b>\$179,528,800</b>	<b>\$81,532,000</b>	<b>\$32,384,000</b>	<b>\$79,200,000</b>	<b>\$36,256,000</b>

Description of Works	Sum of Unit Quantities (Check)							
	Alt. ID	2a) Core no Lyon	3) Long Tunnel	3+) Phase 1a - Core (E-W)	3+) Phase 1b - Lyon	3+) Phase 2 - Keefe to Blair	3+) Phase 3 - Blair to ROPEC	(blank)
1800mm-C140 Sanitary Sewer (6-8 m deep)		275	275	275				
2400mm-C140 Sanitary Sewer (10-12 m deep)		500	500	500				
2440mm ID (3000mm OD) Long Rock Tunnel			9700					
2440mm ID (3000mm OD) Short Clay Tunnel			2200				2200	
2440mm ID (3000mm OD) Short Rock Tunnel		250		4500	1700	5500		
3650mm ID (4500mm OD) Short Rock Tunnel		4250						
Entry shaft for tunnelling		1	2	1	1	1	1	
Exit shaft for tunnelling		1	1	1				
Maintenance access shaft to tunnel		5	17	5	2	9	2	
Mob/Demob - Tunnelling		1	1	1		1	1	
New Kent Regulator					1			
New weir Chamber at existing regulators		2	2	2				
New weir Chamber at RCI		1	1	1				
(blank)								

Combined Sewage Storage EA and Functional Design  
Detailed Cost Estimate - LOW RANGE

Total \$291,405,000 \$512,872,800

Alt. ID	Location of Works	Description of Works	Unit	Unit Quantity	Capital Costs		
					Unit Cost (\$/unit)	Capital Cost	Capital Cost (+ allowance)
2a) Core no Lyon		Mob/Demob - Tunnelling	ea	1.00	\$500,000	\$500,000	\$880,000
2a) Core no Lyon	Main Storage Tunnel	3650mm ID (4500mm OD) Short Rock Tunnel	m	4,250.00	\$10,000	\$42,500,000	\$74,800,000
2a) Core no Lyon	CCC to Tunnel	1800mm-C140 Sanitary Sewer (6-8 m deep)	m	275.00	\$3,000	\$825,000	\$1,452,000
2a) Core no Lyon		Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
2a) Core no Lyon	approx 1 / 500m	Maintenance access shaft to tunnel	ea	5.00	\$500,000	\$2,500,000	\$4,400,000
2a) Core no Lyon		Exit shaft for tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
2a) Core no Lyon	Tunnel outlet to IOS	2440mm ID (3000mm OD) Short Rock Tunnel	m	250.00	\$7,000	\$1,750,000	\$3,080,000
2a) Core no Lyon	RCI to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
2a) Core no Lyon	RRC to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
2a) Core no Lyon	1 each Rideau Canal & Keefer	New weir Chamber at existing regulators	ea	2.00	\$1,500,000	\$3,000,000	\$5,280,000
2a) Core no Lyon		New weir Chamber at RCI	ea	1.00	\$2,500,000	\$2,500,000	\$4,400,000
					\$0	\$0	\$0
3+) Phase 1a - Core (E-W)		Mob/Demob - Tunnelling	ea	1.00	\$500,000	\$500,000	\$880,000
3+) Phase 1a - Core (E-W)	Main Storage Tunnel	2440mm ID (3000mm OD) Short Rock Tunnel	m	4,250.00	\$7,000	\$29,750,000	\$52,360,000
3+) Phase 1a - Core (E-W)	CCC to Tunnel	1800mm-C140 Sanitary Sewer (6-8 m deep)	m	275.00	\$3,000	\$825,000	\$1,452,000
3+) Phase 1a - Core (E-W)		Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3+) Phase 1a - Core (E-W)	approx 1 / 500m	Maintenance access shaft to tunnel	ea	5.00	\$500,000	\$2,500,000	\$4,400,000
3+) Phase 1a - Core (E-W)		Exit shaft for tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
3+) Phase 1a - Core (E-W)	Tunnel outlet to IOS	2440mm ID (3000mm OD) Short Rock Tunnel	m	250.00	\$7,000	\$1,750,000	\$3,080,000
3+) Phase 1a - Core (E-W)	RCI to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3+) Phase 1a - Core (E-W)	RRC to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3+) Phase 1a - Core (E-W)	1 each Rideau Canal & Keefer	New weir Chamber at existing regulators	ea	2.00	\$1,500,000	\$3,000,000	\$5,280,000
3+) Phase 1a - Core (E-W)		New weir Chamber at RCI	ea	1.00	\$2,500,000	\$2,500,000	\$4,400,000
					\$0	\$0	\$0
3+) Phase 1b - Lyon	Main Tunnel	2440mm ID (3000mm OD) Short Rock Tunnel	m	1,700.00	\$7,000	\$11,900,000	\$20,944,000
3+) Phase 1b - Lyon	assume 1 needed	Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3+) Phase 1b - Lyon	Access/drop shafts	Maintenance access shaft to tunnel	ea	2.00	\$500,000	\$1,000,000	\$1,760,000
3+) Phase 1b - Lyon		New Kent Regulator	ea	1.00	\$4,000,000	\$4,000,000	\$7,040,000
					\$0	\$0	\$0
3+) Phase 2 - Keefer to Blair		Mob/Demob - Tunnelling	ea	1.00	\$500,000	\$500,000	\$880,000
3+) Phase 2 - Keefer to Blair	Main Tunnel	2440mm ID (3000mm OD) Short Rock Tunnel	m	5,500.00	\$7,000	\$38,500,000	\$67,760,000
3+) Phase 2 - Keefer to Blair	approx 1 / 500m	Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3+) Phase 2 - Keefer to Blair		Maintenance access shaft to tunnel	ea	9.00	\$500,000	\$4,500,000	\$7,920,000
					\$0	\$0	\$0
3+) Phase 3 - Blair to ROPEC		Mob/Demob - Tunnelling	ea	1.00	\$500,000	\$500,000	\$880,000
3+) Phase 3 - Blair to ROPEC	Main Tunnel	2440mm ID (3000mm OD) Short Clay Tunnel	m	2,200.00	\$8,000	\$17,600,000	\$30,976,000
3+) Phase 3 - Blair to ROPEC	approx 1 / 500m	Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3+) Phase 3 - Blair to ROPEC		Maintenance access shaft to tunnel	ea	2.00	\$500,000	\$1,000,000	\$1,760,000
					\$0	\$0	\$0
3) Long Tunnel	Main Storage Tunnel	2440mm ID (3000mm OD) Long Rock Tunnel	m	9,700.00	\$6,400	\$62,080,000	\$109,260,800
3) Long Tunnel	CCC to Tunnel	1800mm-C140 Sanitary Sewer (6-8 m deep)	m	275.00	\$3,000	\$825,000	\$1,452,000
3) Long Tunnel		Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3) Long Tunnel	approx 1 / 500m	Maintenance access shaft to tunnel	ea	15.00	\$500,000	\$7,500,000	\$13,200,000
3) Long Tunnel		Exit shaft for tunnelling	ea	1.00	\$1,000,000	\$1,000,000	\$1,760,000
3) Long Tunnel		Mob/Demob - Tunnelling	ea	1.00	\$500,000	\$500,000	\$880,000
3) Long Tunnel	RCI to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3) Long Tunnel	RRC to Storage Tunnel	2400mm-C140 Sanitary Sewer (10-12 m deep)	m	250.00	\$6,000	\$1,500,000	\$2,640,000
3) Long Tunnel	1 each Rideau Canal & Keefer	New weir Chamber at existing regulators	ea	2.00	\$1,500,000	\$3,000,000	\$5,280,000
3) Long Tunnel		New weir Chamber at RCI	ea	1.00	\$2,500,000	\$2,500,000	\$4,400,000
3) Long Tunnel	Main Tunnel	2440mm ID (3000mm OD) Short Clay Tunnel	m	2,200.00	\$8,000	\$17,600,000	\$30,976,000
3) Long Tunnel	approx 1 / 500m	Entry shaft for tunnelling	ea	1.00	\$1,500,000	\$1,500,000	\$2,640,000
3) Long Tunnel		Maintenance access shaft to tunnel	ea	2.00	\$500,000	\$1,000,000	\$1,760,000
					\$0	\$0	\$0
					\$0	\$0	\$0
					\$0	\$0	\$0





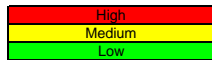
**Appendix F**  
**Evaluation Matrices – Alternative Design**  
**Concepts**

**Table F-1**

Criteria		Rationale for Inclusion / Indicator	W1a	W1b	W2	W3
<b>Technical</b>						
T1	Construction Risks	Potential for construction difficulties due to soil/bedrock/groundwater Proximity to existing foundations etc. Conflicts with existing infrastructure/other utilities Potential for contaminated soil/groundwater	Medium	Low	High	High
	Comments		May impact new Brickhill vortex drop structure Very risky to tunnel portion west of Bronson Ave / escarpment due to very little to no rock cover. May be forced to open cut with deep secant wall shoring.	Rock tunneling may be used to approximately the Transitway. There is substantially more rock cover as we move north in Lebreton Flats.	Very risky to tunnel portion west of Bronson Ave / escarpment due to very little to no rock cover. May be forced to open cut with deep secant wall shoring. Bend at Old Wellington and last EWT segment to be constructed using open trench methods	Very risky to tunnel portion west of Bronson Ave / escarpment due to very little to no rock cover. May be forced to open cut with deep secant wall shoring. Need to work in proximity to 1200mm watermain
T2	Schedule	Anticipated start time and duration of construction Approval needs	Medium	Low	Medium	High
	Comments		Open cut construction with secant wall is time consuming.	Rock tunnel is expected to take less time than secant wall construction at this depth.	Open cut construction with secant wall is time consuming.	Open cut construction with secant wall is time consuming. This alignment has the most open cut and is along Albert St. where many potential conflicts will need to be addressed.
T3	Flexibility	Potential for addressing other system issues and/or future regulatory changes such as stormwater treatment Works provide additional system benefits such as flood control or system redundancy	Medium	Medium	Medium	Low
	Comments		Offers the less flexibility (redundancy) than W3.	Offers the less flexibility (redundancy) than W3.	Offers the less flexibility (redundancy) than W3.	Offers the most flexibility through redundancy.
T4	Reliability/Complexity	Complexity/simplicity of the operation and maintenance of the infrastructure Ability to consistently meet Council directive for CSO control	Low	Low	Low	Low
	Comments		No operational concerns	No operational concerns	No operational concerns	No operational concerns
<b>Natural Environment</b>						
N1	Impact on Significant Natural Features	Disruption to mature vegetation or trees; Potential impacts on significant natural areas; River crossings or riparian area disruptions	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A
N2	Impact on Ecological processes	Disruption to wildlife linkages Potential effects on known fish habitat	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A
N3	Impact on quality of receiving water	Number and volume of wastewater overflows	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A

**Table F-1**

Criteria	Rationale for Inclusion / Indicator	W1a	W1b	W2	W3
<b>Socio-Cultural</b>					
S1	Effect on urban green space/open space Quality and quantity of open space Urban Tree Removal Loss of use during construction	Low	Low	Low	Low
	Comments	N/A	N/A	N/A	N/A
S2	Cultural heritage values or features Symbolic cultural value - cultural landscapes Potential for heritage significance - built heritage Requirement for special architectural treatments Potential for archaeological significance	Low	Low	Low	Low
	Comments	N/A	N/A	N/A	N/A
S3	Disruption to community Duration of construction Permanent structures that would impact views or aesthetics Impacts to recreational activities (events programming, pathways, boating) Impacts due to odors and/or O&M activities	Medium	Low	High	High
	Comments	Open cut (secant wall) construction will take significant time and will result in some disruptions to Albert St. Corridor.	Work can be undertaken outside of busy ROWs	Open cut (secant wall) construction will take significant time and will be very disruptive to Albert St. Corridor.	Open cut (secant wall) construction will take significant time and will be very disruptive to Albert St. Corridor.
S4	Consistency with planning policies/processes Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies. Effect on potential site development	Low	Low	Low	Low
	Comments	N/A	N/A	N/A	N/A
S5	Impact on level of service Potential for flooding and ponding during the full range of wet weather events	Low	Low	Low	Low
	Comments	N/A	N/A	N/A	N/A
S6	Property Issues Ownership - City owned versus publicly owned versus private Possible access restrictions - site security requirements Right of way or land acquisition needed	Medium	Medium	Medium	Medium
	Comments	Impacts NCC parcels.	Impacts primarily City parcels west of Brickhill	Impacts City parcels west of Brickhill	Impacts NCC parcels east of Booth Alleviates future conflict(s) on City parcels north of Albert.
<b>Economy</b>					
E1	Impact on businesses and/or land owners Number/extent of businesses affected (during and/or after construction) Duration of construction/impact Loss of opportunity costs	Medium	Low	Medium	High
	Comments	Sewer to be laid across Albert - deep open cut will be disruptive	Work can be undertaken outside of busy ROWs	Sewer to be laid across Albert - deep open cut will be disruptive	Sewer to be laid along Albert to Booth - deep open cut will be lengthy and disruptive
E2	Affordability Capital cost Cost of property / easement	Medium	Low	Medium	High
	Comments	Expected to be high cost because of the need for some deep watertight shoring (secant wall).	Expected to be the least cost alternative (not including loss of development potential on City parcels)	Expected to be high cost because of the need for some deep watertight shoring (secant wall).	Expected to be the highest cost alternative because of the need for deep watertight shoring (secant wall).
E3	Sustainability Operation & maintenance costs	Low	Low	Low	Low
	Comments	All alignments are comparable	All alignments are comparable	All alignments are comparable	All alignments are comparable
	Preferred		✓		



Highest Impact - least Desirable  
 Medium Impact - Neutral  
 Lowest Impact - Most Desirable

Criteria		Rationale for Inclusion / Indicator	C1: Confederation Park	C2: Diversion in Confederation Park	C3: Diversion south of Laurier
<b>Technical</b>					
T1	Construction Risks	Potential for construction difficulties due to soil/bedrock/groundwater Proximity to existing foundations etc. Conflicts with existing infrastructure/other utilities Potential for contaminated soil/groundwater	Low	High	High
	Comments		No significant infrastructure impact expected. Fewer geotechnical concerns than C2 & C3. Lower risk of dewatering induced settlement impacts than C2 & C3.	No significant infrastructure impact expected. Long diversion sewer must be hand mined. Risk of unstable tunnel roof. Risk of dewatering induced settlement impacts.	900mm watermain may need to be relocated Risk of unstable tunnel roof. Risk of dewatering induced settlement impacts.
T2	Schedule	Anticipated start time and duration of construction Approval needs	Low	High	Low
	Comments				
T3	Flexibility	Potential for addressing other system issues and/or future regulatory changes such as stormwater treatment Works provide additional system benefits such as flood control or system redundancy	Low	Low	Low
	Comments		N/A	N/A	N/A
T4	Reliability/Complexity	Complexity/simplicity of the operation and maintenance of the infrastructure Ability to consistently meet Council directive for CSO control	Low	Medium	Medium
	Comments		Expected to be easier since diversion chamber and EWT are adjacent. Lower risk of non-compliance with CSO control objectives.	More problematic since diversion chamber and EWT are apart from each other. Lower risk of non-compliance with CSO control objectives.	Expected to be easier since diversion chamber and EWT are adjacent. Potential for increased risk of non-compliance with CSO control objectives.
<b>Natural Environment</b>					
N1	Impact on Significant Natural Features	Disruption to mature vegetation or trees; Potential impacts on significant natural areas; River crossings or riparian area disruptions	Low	Low	Low
	Comments		N/A	N/A	N/A
N2	Impact on Ecological processes	Disruption to wildlife linkages Potential effects on known fish habitat	Low	Low	Low
	Comments		N/A	N/A	N/A
N3	Impact on quality of receiving water	Number and volume of wastewater overflows	Low	Low	Medium
	Comments		N/A	N/A	Potential for increased risk of non-compliance with CSO control objectives.

**Table F-2**

Criteria		Rationale for Inclusion / Indicator	C1: Confederation Park	C2: Diversion in Confederation Park	C3: Diversion south of Laurier
<b>Socio-Cultural</b>					
S1	Effect on urban green space/open space	Quality and quantity of open space Urban Tree Removal Loss of use during construction	Medium	Low	Low
	Comments		Temporary loss of useable green space during construction	Temporary loss of less-used green space during construction	Temporary loss of less-used green space during construction
S2	Cultural heritage values or features	Symbolic cultural value - cultural landscapes Potential for heritage significance - built heritage Requirement for special architectural treatments Potential for archaeological significance	Medium	Medium	Low
	Comments		Site of national significance.	Both Confederation Park and Festival Plaza are of national significance and Festival plaza has restrictive covenant.	No significant impact
S3	Disruption to community	Duration of construction Permanent structures that would impact views or aesthetics Impacts to recreational activities (events programming, pathways, boating) Impacts due to odors and/or O&M activities	Medium	Medium	Medium
	Comments		Some disruptions to Queen Elizabeth Dr. traffic expected. Programming of larger events at Confederation Park (and possibly Festival Plaza) will be affected. Approx. 15% of Confederation Park for 18 months. Approx 10% of total public land for min. 18 months.	Some disruptions to Laurier Ave. traffic expected. Programming of larger events at Festival Plaza (and possibly Confederation Park) will be affected. Approx. 10% of Confederation Park for 8 months. Approx. 15% of Festival Plaza for 18 months. Approx 11.5% of total public land for min. 18 months	Limited disruptions to Laurier Ave. traffic expected. Laurier off ramp to Queen Elizabeth will need to be closed-dedicated to construction traffic. Approx 5% of total public lands for min. 18 months. No significant impacts to programming in Confederation Park or Festival Plaza expected.
S4	Consistency with planning policies/processes	Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies. Effect on potential site development	Medium	Low	Low
	Comments		Some potential to impact future site development	No significant impact	No significant impact
S5	Impact on level of service	Potential for flooding and ponding during the full range of wet weather events.	Low	Low	High
	Comments		Lower risk of flooding during extreme events	Lower risk of flooding during extreme events	119 properties are at greater risk of flooding during extreme events (double compared to C1 and C2 risk level)
S6	Property Issues	Ownership - City owned versus publicly owned versus private Possible access restrictions - site security requirements Right of way or land acquisition needed	Medium	High	Low
	Comments		Long term impacts expected to be minimal. Total new encumbrance of 100m @ +/-19m depth	Shallow diversion sewer has more potential long term impacts to Confed. Park than C1. Total new encumbrance of 100-225m with 100m at a depth of +/- 15m.	Long term impacts expected to be minimal.

**Table F-2**

Criteria		Rationale for Inclusion / Indicator	C1: Confederation Park	C2: Diversion in Confederation Park	C3: Diversion south of Laurier
<b>Economy</b>					
E1	Impact on businesses and/or land owners	Number/extent of businesses affected (during and/or after construction) Duration of construction/impact Loss of opportunity costs	Low	Low	Low
	Comments				
E2	Affordability	Capital cost Cost of property / easement	Low	High	Medium
	Comments		Expected to be lowest capital costs.	Expected to be highest capital cost.	Capital costs expected to be higher than C1 based on geotechnical risks.
E3	Sustainability	Operation & maintenance costs	Low	Medium	Low
	Comments		Lowest maintenance requirement	Higher maintenance requirement due to longer tunneled diversion sewer	Lowest maintenance requirement
	Preferred		✓		

High
Medium
Low

Highest Impact - least Desirable  
 Medium Impact - Neutral  
 Lowest Impact - Most Desirable

**Table F-3**

Criteria		Rationale for Inclusion / Indicator	CW-1	CW-2	CW-3	CE-1	CE-2	CE-3
<b>Technical</b>								
T1	Construction Risks	Potential for construction difficulties due to soil/bedrock/groundwater Proximity to existing foundations etc. Conflicts with existing infrastructure/other utilities Potential for contaminated soil/groundwater	Low	High	High	High	Medium	Low
	Comments		No significant infrastructure impact expected. Fewer geotechnical concerns than south tunnel route. Lower risk of dewatering induced settlement impacts than south tunnel route. (3,100 m <sup>2</sup> +) )	No significant infrastructure impact expected. Long diversion sewer must be hand mined. Risk of unstable tunnel roof. Risk of dewatering induced settlement impacts. (2,700 m <sup>2</sup> )	900mm watermain cuts through the centre of the site and may need to be relocated Risk of unstable tunnel roof. Risk of dewatering induced settlement impacts. (3,100 m <sup>2</sup> )	Valve chamber & 3x750mm and 1x400mm diam. water mains at location of potential access shaft Adjacent to canal wall Very narrow site at EWT access location Risk of dewatering induced settlement impacts if alignment stays south. Sloping site (2,000 m <sup>2</sup> )	750mm diam. watermain and 400 mm diam. gas main adjacent to potential access shaft Sloping site Risk of dewatering induced settlement impacts if alignment stays south. (1,200 m <sup>2</sup> possibly larger with vegetation removal)	No significant infrastructure impact expected. Flat site Lower risk of dewatering induced settlement (1,700 m <sup>2</sup> )
T2	Schedule	Anticipated start time and duration of construction Approval needs	Low	Medium	Low	Medium	Medium	Medium
	Comments		Single construction site for both diversion structure and staging area	Two construction sites required, one for diversion structure and one for staging area	Single construction site for both diversion structure and staging area	Two construction sites required, one for diversion structure and one for staging area	Two construction sites required, one for diversion structure and one for staging area	Two construction sites required, one for diversion structure and one for staging area
T3	Flexibility	Potential for addressing other system issues and/or future regulatory changes such as stormwater treatment Works provide additional system benefits such as flood control or system redundancy	Low	Low	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A	N/A	N/A
T4	Reliability/Complexity	Complexity/simplicity of the operation and maintenance of the infrastructure Ability to consistently meet Council directive for CSO control	Low	Low	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A	N/A	N/A
<b>Natural Environment</b>								
N1	Impact on Significant Natural Features	Disruption to mature vegetation or trees; Potential impacts on significant natural areas; River crossings or riparian area disruptions	Low	Medium	Medium	Low	Medium	High
	Comments		No significant impact expected.	A number of trees.	Vegetation incl. mature trees & shrubs	No significant impact expected.	Vegetation incl. mature trees & shrubs	Significant vegetation incl. mature trees & shrubs
N2	Impact on Ecological processes	Disruption to wildlife linkages Potential effects on known fish habitat	Low	Low	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A	N/A	N/A
N3	Impact on quality of receiving water	Number and volume of wastewater overflows	Low	Low	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A	N/A	N/A

**Table F-3**

Criteria		Rationale for Inclusion / Indicator	CW-1	CW-2	CW-3	CE-1	CE-2	CE-3
<b>Socio-Cultural</b>								
S1	Effect on urban green space/open space	Quality and quantity of open space Urban Tree Removal Loss of use during construction	High	High	Low	Low	Low	High
	Comments		Programming of larger events at Confederation Park (and possibly Festival Plaza) will be affected. Approx. 15% of Confederation Park for 18 months. Approx 10% of total public land for min. 18 months.	Programming of larger events at Festival Plaza and Confederation Park will be affected. Approx. 10% of Confederation Park for 8 months. Approx. 15% of Festival Plaza for 18 months. Approx 12% of total public land for min. 18 months	Approx 5% of total public lands for min. 18 months. No significant impacts to programming in Confederation Park or Festival Plaza expected. Impacts route of Ceremonial changing of the Guard for two seasons.	Passive Some disruption to use of pathway expected.	Passive Some disruption to use of pathway expected.	Site is well used by students Only green space on the campus
S2	Cultural heritage values or features	Symbolic cultural value - cultural landscapes Potential for heritage significance - built heritage Requirement for special architectural treatments Potential for archaeological significance	Medium	Low	Low	Low	Low	Medium
	Comments		N/A	N/A	N/A	N/A	N/A	N/A
S3	Disruption to community	Duration of construction Permanent structures that would impact views or aesthetics Impacts to recreational activities (events programming, pathways, boating) Impacts due to odors and/or O&M activities	Low	Low	Medium	High	Medium	Medium
	Comments		Some disruptions to Queen Elizabeth Dr. traffic expected.	Some disruptions to Laurier Ave. traffic expected.	Limited disruptions to Laurier Ave. traffic expected. Laurier off ramp to Queen Elizabeth will need to be closed (dedicated to construction traffic).	Significant impact on Colonel By expected since site likely to spill onto adjacent roadway Construction area required west of canal for diversion chamber on RCI and connection to EWT	Limited disruptions expected on Laurier and/or Nicholas Construction area required west of canal for diversion chamber on RCI and connection to EWT	Limited disruptions expected on Laurier and/or Cumberland Construction area required west of canal for diversion chamber on RCI and connection to EWT
S4	Consistency with planning policies/processes	Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies. Effect on potential site development	Low	Low	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A	N/A	N/A
S5	Impact on level of service	Potential for flooding and ponding during the full range of wet weather events.	Low	Medium	High	Medium	Medium	Medium
	Comments		Lower risk of flooding during extreme events	Dependent on location of diversion chamber, increased risk with south EWT alignment and diversion chamber.	119 properties are at greater risk of flooding during extreme events	Dependent on location of diversion chamber, increased risk with south EWT alignment and diversion chamber.	Dependent on location of diversion chamber, increased risk with south EWT alignment and diversion chamber.	Dependent on location of diversion chamber, increased risk with south EWT alignment and diversion chamber.
S6	Property Issues	Ownership - City owned versus publicly owned versus private Possible access restrictions - site security requirements Right of way or land acquisition needed	Medium	Low	Medium	Medium	Medium	Medium
	Comments		NCC Property	City property, with NCC Covenant	NCC/DND/Park Canada property	NCC/Parks Canada property	NCC Property	University of Ottawa property

**Table F-3**

Criteria	Rationale for Inclusion / Indicator	CW-1	CW-2	CW-3	CE-1	CE-2	CE-3
<b>Economy</b>							
E1	Impact on businesses and/or land owners	Number/extent of businesses affected (during and/or after construction) Duration of construction/impact Loss of opportunity costs	Low	Low	Low	Low	Low
	Comments	Expected to be comparable for all alternatives	Expected to be comparable for all alternatives	Expected to be comparable for all alternatives	Expected to be comparable for all alternatives	Expected to be comparable for all alternatives	Expected to be comparable for all alternatives
E2	Affordability	Capital cost Cost of property / easement	Low	High	High	High	Medium
	Comments	Expected to be most cost effective site. Lowest shoring costs	Additional costs over CW-1: \$1.5M - Shoring \$3.0M - Diversion sewer \$2.5 to 5.0M - Constrained site + cost of separate excavation for diversion structure. + cost for control of groundwater Risk of poor rock cover	Additional costs over CW-1: \$1.5M - Shoring \$4.0M - Relocate watermain Additional costs of up to \$5M if the staging area is reduced to satisfy landowners. + cost for control of groundwater Risk of poor rock cover	Additional costs over CW-1: \$1.5M - Shoring \$2.0 to 4.0M - Constrained site + cost of separate excavation for diversion structure. Risk of poor rock cover	Additional costs over CW-1: \$1.5M - Shoring \$2.0 to 4.0M - Constrained site + cost of separate excavation for diversion structure. Risk of poor rock cover if south alignment maintained	Additional costs over CW-1: \$2.0 to 4.0M - Constrained site + cost of separate excavation for diversion structure.
E3	Sustainability	Operation & maintenance costs	Low	Low	Low	Low	Low
	Comments	N/A temporary facility	N/A temporary facility	N/A temporary facility	N/A temporary facility	N/A temporary facility	N/A temporary facility
	Preferred					✓	

High
Medium
Low

Highest Impact - least Desirable  
 Medium Impact - Neutral  
 Lowest Impact - Most Desirable

**Table F-4**

Criteria		Rationale for Inclusion / Indicator	EWT NORTH	EWT SOUTH	RRC DIVERSION NORTH	RRC DIVERSION SOUTH
<b>Technical</b>						
T1	Construction Risks	Potential for construction difficulties due to soil/bedrock/groundwater Proximity to existing foundations etc. Conflicts with existing infrastructure/other utilities Potential for contaminated soil/groundwater	Low	Medium	Medium	Medium
	Comments			Risk surface appears to dip in a southerly direction. Additional reinforcement or additional precautions may be necessary.	Contaminated soils will need to be dealt with	Contaminated soils will need to be dealt with
T2	Schedule	Anticipated start time and duration of construction Approval needs	Low	Medium	Low	Low
	Comments			Construction will progress more slowly if special precautions are required due to thin rock cover.	All alignments are comparable	All alignments are comparable
T3	Flexibility	Potential for addressing other system issues and/or future regulatory changes such as stormwater treatment Works provide additional system benefits such as flood control or system redundancy	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	Offers the ability to re-route dry weather flows away from the Keefer regulator to the IOS
T4	Reliability/Complexity	Complexity/simplicity of the operation and maintenance of the infrastructure Ability to consistently meet Council directive for CSO control	Low	Low	Low	Medium
	Comments		No operational concerns	No operational concerns	Excess sewage is capture past the regulator and thus provides a more reliable solution.	Excess sewage is captured before the regulator where potential overflows must be anticipated and captured before they take place. Premature storage of sewage would reduce the effectiveness of the solution.
<b>Natural Environment</b>						
N1	Impact on Significant Natural Features	Disruption to mature vegetation or trees; Potential impacts on significant natural areas; River crossings or riparian area disruptions	Low	Low	Low	Low
	Comments		N/A	N/A	Some trees may be impacted	Some trees may be impacted
N2	Impact on Ecological processes	Disruption to wildlife linkages Potential effects on known fish habitat	Low	Low	Low	Low
	Comments		N/A	N/A	N/A	N/A
N3	Impact on quality of receiving water	Number and volume of wastewater overflows	Low	Low	Low	Medium
	Comments		N/A	N/A	N/A	Higher risk of CSO due to the fact that the diversion structure is upstream of the regulator.

Criteria	Rationale for Inclusion / Indicator	EWT NORTH	EWT SOUTH	RRC DIVERSION NORTH	RRC DIVERSION SOUTH
<b>Socio-Cultural</b>					
S1	Effect on urban green space/open space Urban Tree Removal Loss of use during construction	Low	Low	Low	Low
	Comments	temporary disruptions anticipated comparable for all alternative alignments	temporary disruptions anticipated comparable for all alternative alignments	temporary disruptions anticipated comparable for all alternative alignments	temporary disruptions anticipated comparable for all alternative alignments
S2	Cultural heritage values or features Symbolic cultural value - cultural landscapes Potential for heritage significance - built heritage Requirement for special architectural treatments Potential for archaeological significance	Medium	Medium	Medium	Medium
	Comments	Archaeological potential exists at the entry shaft and connection chamber	Archaeological potential exists at the entry shaft and connection chamber	Archaeological potential exists along alignment Stage 2 assessment will be necessary.	Archaeological potential exists along alignment Stage 2 assessment will be necessary.
S3	Disruption to community Duration of construction Permanent structures that would impact views or aesthetics Impacts to recreational activities (events programming, pathways, boating) Impacts due to odors and/or O&M activities	Low	Low	Medium	Medium
	Comments	Alignment is below grade, surge shaft/connection chamber will be visible from surface as a low profile structure with air vents.	Alignment is below grade, surge shaft/connection chamber will be visible from surface as a low profile structure with air vents.	Temporary disruptions to community are expected for installation of diversion chamber and sewer.	Temporary disruptions to community are expected for installation of diversion chambers and sewer
S4	Consistency with planning policies/processes Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies. Effect on potential site development	Low	Low	Low	Low
	Comments	N/A	N/A	N/A	N/A
S5	Impact on level of service Potential for flooding and ponding during the full range of wet weather events	Low	Low	Low	Medium
	Comments	N/A	N/A	N/A	Increase in downstream dam level may lead to increase in hydraulic grade line in Rideau River Collector during large runoff events effectively increasing basement flooding risks.
S6	Property Issues Ownership - City owned versus publicly owned versus private Possible access restrictions - site security requirements Right of way or land acquisition needed	Medium	Low	Medium	Low
	Comments	Primarily impacts City parcels. May encumber NCC lands in Bordeleau Park.	Primarily impacts City parcels.	Will encumber NCC lands in Stanley Park.	Will encumber City lands in New Edinburg Park.
<b>Economy</b>					
E1	Impact on businesses and/or land owners Number/extent of businesses affected (during and/or after construction) Duration of construction/impact Loss of opportunity costs	Low	Low	Low	Low
	Comments	N/A	N/A	N/A	N/A
E2	Affordability Capital cost Cost of property / easement	Low	Medium	Low	Medium
	Comments	Expected to be the least cost alternative.	May be more costly if additional precautionary measures are necessary to deal with thin rock cover.	Expected to be the least cost alternative.	Expected to be slightly more costly due to the need for bending weir in diversion chamber and new downstream weir chamber.
E3	Sustainability Operation & maintenance costs	Low	Low	Low	Low
	Comments	All alignments are comparable	All alignments are comparable	Simplest to operate	More costly to operate due to the need for bending weir in diversion chamber and new downstream weir chamber.
	Preferred		✓	✓	

High
Medium
Low

Highest Impact - least Desirable  
 Medium Impact - Neutral  
 Lowest Impact - Most Desirable

**Table F-5**

Criteria		Rationale for Inclusion / Indicator	CW-1	CW-2
<b>Technical</b>				
T1	Construction Risks	Potential for construction difficulties due to soil/bedrock/groundwater Proximity to existing foundations etc. Conflicts with existing infrastructure/other utilities Potential for contaminated soil/groundwater	Low	Low
	Comments		Need to work adjacent existing PWGSC tunnel - no conflict expected.	Need to pass under existing PWGSC tunnel - no conflict expected. Need to extend tunnel portion on radius to staging area.
T2	Schedule	Anticipated start time and duration of construction Approval needs	Low	Medium
	Comments		Single construction site for tunnel and overflow structure.	Two construction sites required, one for tunnel construction and one for overflow structure.
T3	Flexibility	Potential for addressing other system issues and/or future regulatory changes such as stormwater treatment Works provide additional system benefits such as flood control or system redundancy	Low	Low
	Comments		N/A	N/A
T4	Reliability/Complexity	Complexity/simplicity of the operation and maintenance of the infrastructure Ability to consistently meet Council directive for CSO contro	Low	Low
	Comments		End result is the same.	End result is the same.
<b>Natural Environment</b>				
N1	Impact on Significant Natural Features	Disruption to mature vegetation or trees; Potential impacts on significant natural areas; River crossings or riparian area disruptions	Low	Low
	Comments		No significant impact expected.	No significant impact expected.
N2	Impact on Ecological processes	Disruption to wildlife linkages Potential effects on known fish habitat	Low	Low
	Comments		No significant impact expected.	No significant impact expected.
N3	Impact on quality of receiving water	Number and volume of wastewater overflows	Low	Low
	Comments		End result is the same.	End result is the same.

**Table F-5**

Criteria		Rationale for Inclusion / Indicator	CW-1	CW-2
<b>Socio-Cultural</b>				
S1	Effect on urban green space/open space	Quality and quantity of open space Urban Tree Removal Loss of use during construction	Medium	Medium
	Comments		No significant permanent impacts expected (similar for both areas). Loss of use of part of lawn for 12 to 18 months.	No significant permanent impacts expected (similar for both areas). Loss of use of part of majority of staging area for 12 to 18 months. Some loss of use of part of lawn in front of Supreme Court for a duration of approx 6 months.
S2	Cultural heritage values or features	Symbolic cultural value - cultural landscapes Potential for heritage significance - built heritage Requirement for special architectural treatments Potential for archaeological significance	Low	Low
	Comments		Located in front of Supreme Court and adjacent to other historically significant buildings.	Located adjacent to Supreme Court and other historically significant buildings.
S3	Disruption to community	Duration of construction Permanent structures that would impact views or aesthetics Impacts to recreational activities (events programming, pathways, boating) Impacts due to odors and/or O&M activities	Low	Low
	Comments		Some minor disruptions to traffic to Supreme Court expected.	Some minor disruptions to traffic to Supreme Court expected.
S4	Consistency with planning policies/processes	Compatibility with current zoning, NCC, Parks Canada, PWGSC plans and/or existing MOE policies. Effect on potential site development	Low	Low
	Comments		Compatible	Compatible
S5	Impact on level of service	Potential for flooding and ponding during the full range of wet weather events.	Low	Low
	Comments		End result is the same for both staging areas	End result is the same for both staging areas
S6	Property Issues	Ownership - City owned versus publicly owned versus private Possible access restrictions - site security requirements Right of way or land acquisition needed	Medium	Medium
	Comments		PWGSC property with NCC oversight.	PWGSC property with NCC oversight.
<b>Economy</b>				
E1	Impact on businesses and/or land owners	Number/extent of businesses affected (during and/or after construction) Duration of construction/impact Loss of opportunity costs	Low	Low
	Comments		Few businesses are expected to be impacted.	Few businesses are expected to be impacted.
E2	Affordability	Capital cost Cost of property / easement	Low	High
	Comments		Expected to be most cost effective alternative.	Additional costs over Staging Area 1: + cost of separate excavation for overflow structure. + cost for an additional 110m of tunnel on radius (\$1.5M). + costs to abandon extra tunnel length.
E3	Sustainability	Operation & maintenance costs	Low	Low
	Comments		End result is the same for both staging areas	End result is the same for both staging areas
	Preferred		✓	

High
Medium
Low

Highest Impact - least Desirable  
 Medium Impact - Neutral  
 Lowest Impact - Most Desirable

**Appendix G**  
**Opinion of Probable Costs**  
**Recommended Solution**

## Opinion of Probable Capital Costs - Recommended Solution

Site	Construction Cost (Incl. 30% Contingency)	Project Delivery Allowance (28.6%)A	Total Project Cost <sup>B</sup>	Odour Control Cost <sup>C</sup>	Total Project Cost (Including Odour Control)
<b>East-West Tunnel (EWT)</b>					
EWT Tunneling	\$62,918,700	\$17,994,000	\$80,912,700	\$0	\$80,912,700
Site 1 (West End)	\$6,630,000	\$1,896,000	\$8,526,000	\$4,179,000	\$12,705,000
Site 2 (KST/EWT)	\$587,600	\$168,000	\$755,600	\$0	\$755,600
Site 3 (Rideau Canal)	\$2,895,100	\$828,000	\$3,723,100	\$2,508,000	\$6,231,100
Site 4 (Cumberland)	\$503,100	\$144,000	\$647,100	\$0	\$647,100
Site 5 (Stanley Park)	\$7,291,700	\$2,085,000	\$9,376,700	\$0	\$9,376,700
<b>Subtotal EWT</b>	<b>\$80,826,200</b>	<b>\$23,115,000</b>	<b>\$103,941,200</b>	<b>\$6,687,000</b>	<b>\$110,628,200</b>
<b>Kent Street Tunnel (KST)</b>					
KST Tunneling	\$30,898,400	\$8,837,000	\$39,735,400	\$0	\$39,735,400
Site 6 (KST Outlet)	\$2,223,000	\$636,000	\$2,859,000	\$0	\$2,859,000
Site 7 (Florence)	\$1,610,700	\$461,000	\$2,071,700	\$0	\$2,071,700
Site 8 (McLeod)	\$712,400	\$204,000	\$916,400	\$0	\$916,400
Site 9 (Catherine)	\$1,864,200	\$533,000	\$2,397,200	\$2,508,000	\$4,905,200
<b>Subtotal KST</b>	<b>\$37,308,700</b>	<b>\$10,671,000</b>	<b>\$47,979,700</b>	<b>\$2,508,000</b>	<b>\$50,487,700</b>
<b>TOTAL</b>	<b>\$118,134,900</b>	<b>\$33,786,000</b>	<b>\$151,920,900</b>	<b>\$9,195,000</b>	<b>\$161,115,900</b>

### Notes:

- A. Breakdown of project cost allowances is provided with the full cost breakdown.
- B. Total project cost includes project delivery costs (i.e. engineering, project management, utility relocations, etc.).
- C. Odour control cost includes the construction contingency and cost allowance.

## Notes

- 1 To develop a cost estimate for the rock tunnels, three tunneling Contractors in Ontario were approached and were provided with the conceptual design details and geotechnical information available at the time. The Contractors provided costs per meter for rock tunneling based on various tunnel lengths and finished sewer diameters, which excluded the costs of TBM entry/exit shafts, access shafts and associated infrastructure (i.e. new diversion chambers, etc.)
- 2 LS costing provided by three (3) tunneling Contractors (accounts for excavation, rock removal, concrete diaphragm walls, etc.).
- 3 Geotechnical T.M identified issues with disposal of shale cuttings due to high metals content. Assumed all cuttings through 450m length of EWT through shale will require contaminated disposal.
- 4 In areas with low rock cover or through Shale, additional rock bolting may be required. Identifying an actual cost is not possible until additional geotechnical information is available. A 10% premium was added to the cost of tunneling through areas with limited rock cover and through Shale.
- 5 Assumed that sheet piling will be installed due to depth and water tightness versus traditional soldier pile/lagging shoring systems.
- 6 Cost is based on MCON Price List 2012, plus 30% markup for labour and Contractor OH&P.
- 7 Assumed that hydraulic rock removal by line drilling and hoe-ramming can be employed and that rock blasting would not be used.
- 8 Based on historical geotechnical reports, existing fill material (top 1.8-2.1m) is contaminated and will require either reuse onsite or offsite disposal. Assume 10% of excavated material requires offsite disposal.
- 9 Contaminated groundwater is anticipated due to historical land use in the area. Onsite groundwater treatment will be required.
- 10 For the purpose of the FDR, it was assumed that the pullback sewer from the RRC would be tunneled through rock to reduce surface disturbances. Completing the sewer by open-cut would be in the order of 10-20% more expensive when accounting for site restoration, traffic/pedestrian control and contaminated soil disposal.
- 11 It is assumed that the surge tank will also serve as the TBM access shaft. Assumes that concrete diaphragm walls will be used for excavation protection and for permanent tank walls following construction.
- 12 Assumed that a stand-alone control building would be required for housing the electrical, control and communications equipment. There is a potential to utilize the existing Keefer Biofilter building, but modifications/additions would be required, as there is limited space.
- 13 Historical geotechnical reports indicate that the soil will likely be contaminated. Assumed that 50% of excavated soil (4.5m depth to bedrock) would require offsite disposal.
- 14 Through discussions with PWGSC, it was identified that special working restrictions would apply at the Supreme Court site. In particular, to reduce the impact of construction on MPs and Judges, work stoppages can occur upon their request. It is assumed that all work for the TBM access shaft and tunneling activities for the KST will be completed during night work.
- 15 To connect the KST outlet chamber to the existing Kent Storm Sewer, it is assumed that the sewer will be installed by rock tunneling due to the depth of the works.
- 16 The cost for hand-mining was assumed to be \$150/m<sup>3</sup> + 35% OH&P.
- 17 Assumed that a raise-bore will be used from the de-aeration chamber to the top of bedrock for the future drop pipe installation. The cost is based on previous large diameter top-down drilling. Further investigation into method for drop pipe installation required at the preliminary/detailed design stage.
- 18 Assumed that the east and west Catherine de-aeration chambers would be constructed by hand-mining and lined with structural concrete.
- 19 Assumed that the drop pipes will be lined with steel pipe.
- 20 The cost estimate for the Catherine Access chamber assumes that the permanent KST access and the de aeration chambers c/w drop pipes will be installed under this contract. The Vortex chambers and combined sewer tie-ins at surface level will be completed at the time of the O'Connor TLMs implementation.
- 21 In order to complete the crossing of the EWT and KST at Kent/Slater, specialty measures are required. It is anticipated that the EWT would be constructed first. Prior to the TBM arriving the EWT/KST junction, the EWT at this location would be outfitted with low strength concrete to 'bridge' the pipe to allow the KST TBM to pass through the EWT.

- 22 Assumed that Albert restoration is handled as part of other project
- 23 The published fault zone running north-south between Kent and Lyon may require additional rock bolting, rock grouting and/or groundwater control.

Combined Sewage Storage Tunnel (CSST)					Revised: November, 2012		
COST ESTIMATE (CLASS IV)					Revised By Cgoodwin		
LOCATION: East-West Tunnel (EWT)							
STANTEC PROJECT NO.: 1634-00965							
Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Mob/Demob - Tunnelling	LS	\$1,000,000	1	\$1,000,000		
2	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$1,000,000	
<b>Division 2 - Site/Civil Work</b>							
1	3000mm ID (3800mm OD) Short Rock Tunnel	m	\$9,000	4423	\$39,807,000		1
2	Entry shaft for tunnelling	LS					Cost Included with RRC Site (Surge Tank)
3	Mid-Point Shaft	LS	\$3,000,000	1	\$3,000,000		2
4	Exit shaft for tunnelling	LS	\$1,500,000	1	\$1,500,000		2
	<b>Division Subtotal</b>					\$44,307,000	
<b>Division 16 - Electrical</b>							
1	Hydro Service and Transformer	LS	\$50,000	1	\$50,000		
2	Temporary Generators for TBM	LS	\$250,000	1	\$250,000		
3	Cables and Ducting	m	\$200	100	\$20,000		
4	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
	<b>Division Subtotal</b>					\$420,000	
<b>Provisional Items</b>							
1	Contaminated Rock Cuttings Disposal (Shale)	m3	\$225	5000	\$1,125,000		3
2	Bolting/special structural measures for areas of the EWT through Shale near Confederation Park (450m) - 10% premium on tunneling cost	m	\$900	450	\$405,000		4
3	Bolting/special structural measures for areas of the EWT with limited rock cover (i.e. from Guiges to Stanley Park (875m) and Nicholas Street valley (5m) - 10% premium on tunneling cost	m	\$900	880	\$792,000		4
4	Extra TBM work and hand-mining to completed the EWT/KST crossing	LS	\$250,000	1	\$250,000		21
5	Cost premium for GW control and additional rock bolting for the EWT passing through the Kent/Lyon fault zone	LS	\$100,000	1	\$100,000		23
	<b>Division Subtotal</b>					\$2,672,000	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$48,399,000</b>	
<b>Construction Contingency</b>				30%		<b>\$14,519,700</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$62,918,700</b>	

**Combined Sewage Storage Tunnel (CSST)**

Revised: November, 2012

**COST ESTIMATE (CLASS IV)**

Revised by: S D'Aoust

LOCATION: West End (Lebreton Flats - SITE 1)  
Northern Alignment along LRT to Commissioner  
STANTEC PROJECT NO.: 1634-00965

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
2	Bypass Pumping, Control of Water (Extensive)	LS	\$75,000	1	\$75,000		
3	Traffic Control	LS	\$25,000	1	\$75,000		
4	Earth Excavation						
4.1	Chamber 1	m3	\$50	125	\$6,250		
4.2	1500mm CCC Overflow/Diversion Sewer	m3	\$50	960	\$48,000		
4.3	Chamber 3	m3	\$50	820	\$41,000		
4.4	3000mm CCC/BSS Diversion Sewer (Ch.3 to stub)	m3	\$50	3910	\$195,500		
5	Rock Removal						
5.1	3000mm CCC/BSS Diversion Sewer (Ch.3 to stub)	m3	\$100	1,360	\$136,000		
5.2	Chamber 1	m3	\$100	60	\$6,000		
5.3	Chamber 3	m3	\$100	378	\$37,800		
6	Granular Backfill						
6.1	Chamber 1	m3	\$35	99	\$3,453		
6.2	1500mm CCC Overflow/Diversion Sewer	m3	\$35	868	\$30,384		
6.3	Chamber 3	m3	\$35	336	\$11,761		
6.4	3000mm CCC/BSS Diversion Sewer (Ch.3 to stub)	m3	\$35	3,309	\$115,821		
7	Shoring						5
7.1	Chamber 1	m2	\$650	150	\$97,500		
7.2	1500mm CCC Overflow/Diversion Sewer (Ch. 1 to 3)	m2	\$650	960	\$624,000		
7.3	Chamber 3	m2	\$650	561	\$364,650		
7.4	3000mm CCC/BSS Diversion Sewer (Ch.3 to stub)	m2	\$650	2,088	\$1,357,200		
8	Precast Concrete Chambers						6
8.1	Chamber 1 (1200mm chimney)	ea	\$5,200	1	\$5,200		
8.2	Chamber 3 (2400mmx4100mm chimney)	ea	\$29,300	1	\$29,300		
9	Concrete Sewer Pipe (Assume Class 140-D)						7
9.1	1500mm CCC Overflow/Diversion Sewer (Ch. 1 to 3)	m	\$1,600	52	\$83,200		
9.2	3000mm CCC/BSS Diversion Sewer (Ch.3 to stub)	m	\$6,300	85	\$535,500		
9	Existing manhole retrofit	LS	\$15,000	1	\$15,000		
10	Restoration (Extensive)	LS	\$50,000	1	\$50,000		22
11	Groundwater Control	LS	\$75,000	1	\$75,000		
	<b>Division Subtotal</b>					\$4,094,000	
<b>Division 3 - Concrete</b>							
1	Structural Concrete (Rebar, formwork, material, placement)						
1.1	Chamber 1	m3	\$1,750	20	\$35,000		
1.2	Chamber 3	m3	\$1,750	110	\$192,500		
	<b>Division Subtotal</b>					\$228,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$50,000	
<b>Division 11 - Equipment/Mechanical</b>							
1	1800mm Modulating Gate, Actuator and Control	LS	\$85,000	1	\$85,000		
	<b>Division Subtotal</b>					\$85,000	
<b>Division 13 - Special Construction</b>							
1	Level Monitoring (Ultrasonic & Radar)	LS	\$5,000	2	\$10,000		
2	Level Monitoring (floats)	LS	\$2,000	2	\$4,000		
3	SCADA	LS	\$60,000	1	\$60,000		
4	RPU/HMI Programming, Verification & Commissioning	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$124,000	
<b>Division 16 - Electrical</b>							
1	Concrete Encased Underground Ducts	m	\$250	250	\$62,500		
2	Hydro Service and Transformer	LS	\$75,000	1	\$75,000		
3	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
	<b>Division Subtotal</b>					\$238,000	
<b>Provisional Items</b>							
1	Contaminated Soil Disposal (Assume \$90/tonne)	m3	\$225	582	\$131,000		8
2	Contaminated Groundwater Disposal	LS	\$150,000	1	\$150,000		9
	<b>Division Subtotal</b>					\$281,000	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$5,100,000</b>	
<b>Construction Contingency</b>				30%		<b>\$1,530,000</b>	
<b>ENGINEER'S OPINION OF COST (CONSTRUCTION)</b>						<b>\$6,630,000</b>	

\*For additional information regarding cost estimates, refer to the NOTES sheet.

**Combined Sewage Storage Tunnel (CSST)**

Revised: November, 2012

**COST ESTIMATE (CLASS IV)**

Revised By Cgoodwin

LOCATION: KST/CSST Junction Maintenance Access Shaft - SITE 2

STANTEC PROJECT NO.: 1634-00965

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Traffic Control	LS	\$25,000	1	\$25,000		
2	Hardware and Concrete Removals (internal) - Major	LS	\$50,000	0	\$0		
3	Groundwater Control (Extensive)	LS	\$50,000	1	\$50,000		
4	Earth Excavation and Granular Backfill	m3	\$90	288	\$25,920		
5	Rock Removal	m3	\$100	684	\$68,400		7
6	Shoring and Bracing	LS	\$650	128	\$83,200		5
7	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
8	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
	<b>Division Subtotal</b>					\$353,000	
<b>Division 3 - Concrete</b>							
1	Structural Concrete (Formwork, Reinforcement, Placement)	m3	\$1,750	19.2	\$33,600		
2	Precast Concrete Structures (1500mmØ chimney)	LS	\$50,000	1	\$50,000		6
	<b>Division Subtotal</b>					\$83,600	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$15,000	1	\$15,000		
	<b>Division Subtotal</b>					\$15,000	

Provisional Items		Units	Unit Cost	Quantity	Estimate	Division Total	Notes
	-	0	\$0	0	\$0		
	<b>Division Subtotal</b>					\$0	

<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$452,000</b>	
<b>Construction Contingency</b>				30%		<b>\$135,600</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$587,600</b>	

**Combined Sewage Storage Tunnel (CSST)**  
**COST ESTIMATE (CLASS IV)**  
**LOCATION: Rideau Canal Interceptor (RCI) - SITE 3**  
**STANTEC PROJECT NO.: 1634-00965**

Revised: November, 2012  
 Revised By Cgoodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Bypass Pumping, Control of Water (Extensive)	LS	\$75,000	1	\$75,000		
2	Traffic Control	LS	\$10,000	1	\$10,000		
3	Hardware and Concrete Removals (internal) - Major	LS	\$50,000	1	\$50,000		
4	Groundwater Control (Extensive)	LS	\$150,000	1	\$150,000		
5	Earth Excavation and Granular Backfill						
5.1	Diversion Chamber	m3	\$90	840	\$75,600		
5.2	Overflow Dam Structure	m3	\$90	208	\$18,743		
6	Rock Removal						
6.1	Diversion Chamber	m3	\$100	420	\$42,000		7
7	Shoring						5
7.1	Diversion Chamber	m2	\$650	460	\$299,000		
7.2	Overflow Dam Structure	m3	\$650	374	\$243,100		
8	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
9	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
	<b>Division Subtotal</b>					\$1,064,000	
<b>Division 3 - Concrete</b>							
1	Structural Concrete (Formwork, Reinforcement, Placement)						
1.1	Diversion Chamber	m3	\$1,750	90.3	\$158,025		
2	Concrete Fill	m3	\$100	135	\$13,500		
3	Precast Concrete Structures						6
3.1	2400x2400 Chimney	LS	\$42,900	2	\$85,800		
3.2	Access Shaft (2400x4800 chimney)	LS	\$111,900	1	\$111,900		
3.3	1200mm Access Chimney	LS	\$7,150	2	\$14,300		
	<b>Division Subtotal</b>					\$383,525	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$50,000	
<b>Division 11 - Equipment/Mechanical</b>							
1	Isolation Gate, Actuator and Control	LS	\$85,000	3	\$255,000		
2	5000mm Bending Weir	LS	\$90,000	1	\$90,000		
	<b>Division Subtotal</b>					\$345,000	
<b>Division 13 - Special Construction</b>							
1	Instrumentation and Control	LS	\$75,000	0	\$0		
2	Level Monitoring (Ultrasonic & Radar)	LS	\$5,000	2	\$10,000		
3	Level Monitoring (floats)	LS	\$2,000	2	\$4,000		
4	WAN Fibre Connection	LS	\$15,000	1	\$15,000		
5	SCADA	LS	\$60,000	1	\$60,000		
6	RPU/HMI Programming, Verification & Commissioning	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$139,000	
<b>Division 16 - Electrical</b>							
1	Hydro Service and Transformer	LS	\$75,000	1	\$75,000		
2	Weatherproof Equipment Enclosures (General and UPS)	LS	\$50,000	1	\$50,000		
3	Cables and Ducting	m	\$200	100	\$20,000		
4	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
	<b>Division Subtotal</b>					\$245,000	
<b>Provisional Items</b>							
	<b>Division Subtotal</b>					\$0	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$2,227,000</b>	
<b>Construction Contingency</b>				30%		<b>\$668,100</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$2,895,100</b>	

**Combined Sewage Storage Tunnel (CSST)**  
**COST ESTIMATE (CLASS IV)**  
**LOCATION: Cumberland Maintenance Access Shaft - SITE 4**  
**STANTEC PROJECT NO.: 1634-00965**

Revised: November, 2012  
 Revised By Cgoodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Traffic Control	LS	\$75,000	1	\$75,000		
2	Groundwater Control (Extensive)	LS	\$50,000	1	\$50,000		
3	Earth Excavation and Granular Backfill	m3	\$90	180	\$16,200		
4	Rock Removal	m3	\$100	180	\$18,000		7
5	Shoring and Bracing	LS	\$650	80	\$52,000		5
6	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
7	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
	<b>Division Subtotal</b>					\$312,000	
<b>Division 3 - Concrete</b>							
1	Structural Concrete (Formwork, Reinforcement, Placement)	m3	\$1,750	19.2	\$33,600		
2	Precast Concrete Structures (1500mmØ chimney)	LS	\$26,000	1	\$26,000		6
3	General Modifications - Minor	LS	\$50,000	0	\$0		
4	-	LS	\$0	1	\$0		
	<b>Division Subtotal</b>					\$60,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$15,000	1	\$15,000		
	<b>Division Subtotal</b>					\$15,000	
<b>Provisional Items</b>							
	-	0	\$0	0	\$0		
	<b>Division Subtotal</b>					\$0	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$387,000</b>	
<b>Construction Contingency</b>				30%		<b>\$116,100</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$503,100</b>	

**Combined Sewage Storage Tunnel (CSST)**

Revised: November, 2012

**COST ESTIMATE (CLASS IV)**

Revised By Cgoodwin

LOCATION: Rideau River Collector (Keefer/CSST Outlet) - SITE 5

STANTEC PROJECT NO.: 1634-00965

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Bypass Pumping, Control of Water (Extensive)	LS	\$75,000	1	\$75,000		
2	Traffic Control	LS	\$15,000	1	\$15,000		
3	Hardware and Concrete Removals (internal) - Major	LS	\$15,000	1	\$15,000		
4	Groundwater Control (Extensive)	LS	\$150,000	1	\$150,000		
5	Earth Excavation and Granular Backfill						
5.1	RRC Sump Chamber	m3	\$90	41	\$3,645		
5.2	Surge Tank/CSST Outlet Chamber	m3	\$90	795	\$71,569		
5.3	IOS Connection Chamber	m3	\$90	122	\$10,935		
6	Rock Removal						7
6.1	RRC Sump Chamber	m3	\$100	203	\$20,250		
6.2	Surge Tank/CSST Outlet Chamber	m3	\$100	2209	\$220,893		
6.3	IOS Connection Chamber	m3	\$100	338	\$33,750		
7	Shoring						5
7.1	RRC Sump Chamber	m2	\$650	52	\$33,800		
7.2	IOS Connection Chamber	m2	\$650	131	\$84,825		
8	3000mm ID (3800mm OD) Short Rock Tunnel	m	\$9,000	268	\$2,412,000		10
9	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
10	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
	<b>Division Subtotal</b>					\$3,247,000	
<b>Division 3 - Concrete</b>							
1	Structural Concrete (Formwork, Reinforcement, Placement)						
1.1	RRC Sump Chamber	m3	\$1,750	21	\$36,750		
1.2	Surge Tank/CSST Outlet Chamber	m3	\$1,750	746	\$1,305,726		11
1.3	IOS Connection Chamber	m3	\$1,750	41	\$71,505		
2	Precast Concrete Structures						6
2.1	RRC Sump Chamber (1200x1200 chimney)	LS	\$16,300	1	\$16,300		
2.2	Surge Tank/CSST Outlet Chamber	LS	\$24,700	1	\$24,700		
	<b>Division Subtotal</b>					\$1,455,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$50,000	
<b>Division 11 - Equipment/Mechanical</b>							
1	1800mm Modulating Gate, Actuator and Control	LS	\$70,000	1	\$70,000		
2	1500mm Isolation Gate, Actuator and Control	LS	\$50,000	1	\$50,000		
3	All Other Division 11 Work	LS	\$20,000	1	\$20,000		
	<b>Division Subtotal</b>					\$140,000	
<b>Division 13 - Special Construction</b>							
1	Instrumentation and Control	LS	\$75,000	0	\$0		
2	Level Monitoring (Ultrasonic & Radar)	LS	\$5,000	2	\$10,000		
3	Level Monitoring (floats)	LS	\$2,000	2	\$4,000		
4	WAN Fibre Connection	LS	\$15,000	1	\$15,000		
5	SCADA	LS	\$60,000	1	\$60,000		
6	RPU/HMI Programming, Verification & Commissioning	LS	\$50,000	1	\$50,000		
7	Control Building	m2	\$2,400	50	\$120,000		12
	<b>Division Subtotal</b>					\$259,000	
<b>Division 16 - Electrical</b>							
1	Hydro Service and Transformer	LS	\$50,000	1	\$50,000		
2	Cables and Ducting	m	\$200	100	\$20,000		
3	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
4	Weatherproof Equipment Enclosures (General and UPS)	LS	\$50,000	1	\$50,000		
5	All Other Division 16 Work	LS	25%		\$55,000		
	<b>Division Subtotal</b>					\$275,000	
<b>Provisional Items</b>							
1	Contaminated Soil and Ground Water - Extensive	LS	\$75,000	1	\$75,000		13
2	Contaminated Soil Disposal (Assume \$90/tonne)	m3	\$225	479	\$108,000		9
	<b>Division Subtotal</b>					\$183,000	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$5,609,000</b>	
<b>Construction Contingency</b>				30%		<b>\$1,682,700</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$7,291,700</b>	

**Combined Sewage Storage Tunnel (CSST)**

**COST ESTIMATE (CLASS IV)**

LOCATION: Kent Street Tunnel (KST)

STANTEC PROJECT NO.: 1634-00965

Revised: November, 2012

Revised By Cgoodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Mob/Demob - Tunnelling	LS	\$1,000,000	1	\$1,000,000		
2	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$1,000,000	
<b>Division 2 - Site/Civil Work</b>							
1	3000mm ID (3800mm OD) Short Rock Tunnel	m	\$9,000	1612	\$14,508,000		1
2	Entry shaft for tunnelling	LS	\$3,000,000	1	\$3,000,000		2
3	Exit shaft for tunnelling	m	\$1,500,000	1	\$1,500,000		2
4	All Other Division 2 Work	LS	\$20,000	1	\$20,000		
	<b>Division Subtotal</b>					\$19,028,000	
<b>Division 3 - Concrete</b>							
1	Formwork and Reinforcement	m3	\$1,750	0	\$0		
2	Concrete Fill	m3	\$700	0	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 16 - Electrical</b>							
1	Hydro Service and Transformer	LS	\$50,000	1	\$50,000		
2	Temporary Generators for TBM	LS	\$500,000	1	\$500,000		
3	Cables and Ducting	m	\$200	100	\$20,000		
4	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
5	All Other Division 16 Work	LS	25%		\$167,500		
	<b>Division Subtotal</b>					\$838,000	
<b>Provisional Items</b>							
1	Premium for nightwork to complete the TBM access shaft and tunneling operations for the KST (20% premium on KST tunneling costs)	m	\$1,800.0	1612	\$2,901,600		14
	<b>Division Subtotal</b>					\$2,901,600	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$23,768,000</b>	
<b>Construction Contingency</b>				30%		<b>\$7,130,400</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$30,898,400</b>	

**Combined Sewage Storage Tunnel (CSST)**  
**COST ESTIMATE (CLASS IV)**  
 LOCATION: KST Outlet - SITE 6  
 STANTEC PROJECT NO.: 1634-00965

Revised: November, 2012  
 Revised By Colin Goodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Traffic Control	LS	\$25,000	1	\$25,000		
2	Hardware and Concrete Removals (internal) - Minor	LS	\$10,000	1	\$10,000		
3	Groundwater Control (Basic)	LS	\$40,000	1	\$40,000		
4	Earth Excavation and Granular Backfill	m3	\$90	882	\$79,380		
5	Rock Removal	m3	\$100	1470	\$147,000		7
6	1200mmx1200mm Precast Manhole	m	\$3,000	12	\$36,000		6
7	Shoring and Bracing	m2	\$650	672	\$436,800		5
8	3000mm ID (3800mm OD) Short Rock Tunnel	m	\$9,000	60	\$540,000		15
9	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
10	Restoration (Extensive)	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$1,440,000	
<b>Division 3 - Concrete</b>							
1	Formwork and Reinforcement	m3	\$1,750	120	\$210,000		
2	General Modifications - Minor	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$260,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$10,000	1	\$10,000		
	<b>Division Subtotal</b>					\$10,000	
<b>Provisional Items</b>							
	-	0	0	0	\$0		
	<b>Division Subtotal</b>					\$0	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$1,710,000</b>	
<b>Construction Contingency</b>				30%		<b>\$513,000</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$2,223,000</b>	

**Combined Sewage Storage Tunnel (CSST)**  
**COST ESTIMATE (CLASS IV)**  
 LOCATION: Florence Flushing Structure - SITE 7  
 STANTEC PROJECT NO.: 1634-00965

Revised: November, 2012  
 Revised By Cgoodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Bypass Pumping, Control of Water (Extensive)	LS	\$150,000	0	\$0		
2	Traffic Control	LS	\$25,000	1	\$25,000		
3	Hardware and Concrete Removals (internal) - Major	LS	\$50,000	0	\$0		
4	Groundwater Control (Extensive)	LS	\$50,000	0	\$0		
5	Earth Excavation and Granular Backfill	m3	\$90	1400	\$126,000		
6	Rock Removal	m3	\$100	1100	\$110,000		7
7	Shoring and Bracing	m2	\$650	448	\$291,200		5
8	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
9	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
10	All Other Division 2 Work	LS	\$20,000	1	\$20,000		
	<b>Division Subtotal</b>					\$673,000	
<b>Division 3 - Concrete</b>							
1	Formwork and Reinforcement	m3	\$1,750	69.24	\$121,170		
2	Precast Concrete Structures						6
2.1	Chimney (2400mmØ)	LS	\$60,600	1	\$60,600		
	<b>Division Subtotal</b>					\$182,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$25,000	1	\$25,000		
	<b>Division Subtotal</b>					\$25,000	
<b>Division 11 - Equipment/Mechanical</b>							
1	2400mm Modulating Gate and Actuator	LS	\$80,000	1	\$80,000		
2	All Other Division 11 Work	LS	\$20,000	1	\$20,000		
	<b>Division Subtotal</b>					\$100,000	
<b>Division 13 - Special Construction</b>							
1	Instrumentation and Control	LS	\$15,000	1	\$15,000		
2	Level Monitoring (Ultrasonic & Radar)	LS	\$5,000	2	\$10,000		
3	Level Monitoring (floats)	LS	\$2,000	2	\$4,000		
4	SCADA	LS	\$20,000	1	\$20,000		
5	RPU/HMI Programming, Verification & Commissioning	LS	\$10,000	1	\$10,000		
	<b>Division Subtotal</b>					\$59,000	
<b>Division 16 - Electrical</b>							
1	Cables and Ducting	m	\$200	50	\$10,000		
2	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
3	Weatherproof Equipment Enclosures (General and UPS)	LS	\$50,000	1	\$50,000		
4	All Other Division 16 Work	LS	25%	1	\$40,000		
	<b>Division Subtotal</b>					\$200,000	
<b>Provisional Items</b>							
	-	0	0		\$0		
	<b>Division Subtotal</b>					\$0	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$1,239,000</b>	
<b>Construction Contingency</b>				30%		<b>\$371,700</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$1,610,700</b>	

**Combined Sewage Storage Tunnel (CSST)**  
**COST ESTIMATE (CLASS IV)**  
 LOCATION: McLeod - SITE 8  
 STANTEC PROJECT NO.: 1634-00965

Revised: November, 2012  
 Revised By Cgoodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Bypass Pumping, Control of Water (Extensive)	LS	\$150,000	0	\$0		
2	Traffic Control	LS	\$25,000	1	\$25,000		
3	Hardware and Concrete Removals (internal) - Major	LS	\$50,000	0	\$0		
4	Groundwater Control (Extensive)	LS	\$50,000	1	\$50,000		
5	Earth Excavation and Granular Backfill	m3	\$90	363	\$32,670		
4	Rock Removal	m3	\$100	363	\$36,300		7
5	Shoring and Bracing	m2	\$650	336	\$218,400		5
6	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
7	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
8	All Other Division 2 Work	LS	\$20,000	1	\$20,000		
	<b>Division Subtotal</b>					\$483,000	
<b>Division 3 - Concrete</b>							
1	Precast Concrete Structures						
1.1	Chimney (1500mmØ)	LS	\$23,400	1	\$23,400		6
2	General Modifications - Minor	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$50,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$15,000	1	\$15,000		
	<b>Division Subtotal</b>					\$15,000	
<b>Provisional Items</b>							
	-	0	0		\$0		
	<b>Division Subtotal</b>					\$0	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$548,000</b>	
<b>Construction Contingency</b>				30%		<b>\$164,400</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$712,400</b>	

**Combined Sewage Storage Tunnel (CSST)**

**COST ESTIMATE (CLASS IV)**

LOCATION: Catherine - SITE 9  
 STANTEC PROJECT NO.: 1634-00965

Revised: November, 2012

Revised By Cgoodwin

Item No.	Division and Description	Units	Unit Cost	Quantity	Estimate	Division Total	Notes
<b>Division 1 - General Requirements</b>							
1	Administration	LS	0%	1	\$0		
	<b>Division Subtotal</b>					\$0	
<b>Division 2 - Site/Civil Work</b>							
1	Bypass Pumping, Control of Water (Extensive)	LS	\$150,000	0	\$0		
2	Traffic Control	LS	\$35,000	1	\$35,000		
3	Hardware and Concrete Removals (internal) - Major	LS	\$50,000	0	\$0		
4	Groundwater Control (Extensive)	LS	\$75,000	1	\$75,000		
5	Earth Excavation and Granular Backfill						
5.1	Catherine Access Shaft	m3	\$90	332.75	\$29,948		
5.2	Temporary Shaft for Drop Shaft Raise Bore Installation (East)	m3	\$90	332.75	\$29,948		
5.3	Temporary Shaft for Drop Shaft Raise Bore Installation (West)	m3	\$90	332.75	\$29,948		
6	Rock Removal						7
6.1	Catherine Access Shaft	m3	\$100	348	\$34,788		
7	Shoring and Bracing						5
7.1	Catherine Access Shaft	m2	\$650	242	\$157,300		
7.2	Temporary Shaft for Drop Shaft Raise Bore Installation (East)	m2	\$650	154	\$100,100		
7.3	Temporary Shaft for Drop Shaft Raise Bore Installation (West)	m2	\$650	154	\$100,100		
8	Hand Mining for De-aeration Chamber	LS	\$55,080	2	\$110,160		16
9	Raise Bore for Drop Pipe Installation	LS	\$65,000	2	\$130,000		17
10	Site Work including removals, infrastructure relocations and utility trenching - Extensive	LS	\$75,000	1	\$75,000		
11	Restoration (Moderate)	LS	\$25,000	1	\$25,000		
	<b>Division Subtotal</b>					\$933,000	
<b>Division 3 - Concrete</b>							
1	Formwork and Reinforcement						
1.1	De-Aeration Chamber (East)	m3	\$1,750	28	\$48,431		18
1.2	De-Aeration Chamber (West)	m3	\$1,750	28	\$48,431		
2	Precast Concrete Structures						
2.1	Chimney (1500mmØ)	LS	\$23,400	1	\$23,400		6
	<b>Division Subtotal</b>					\$121,000	
<b>Division 5 - Metals</b>							
1	Landings and Ladders	LS	\$50,000	1	\$50,000		
2	Drop Pipe (Steel, 1350mm)	LS	\$10,000	1	\$10,000		19
3	Drop Pipe (Steel, 1650mm)	LS	\$15,000	1	\$15,000		19
	<b>Division Subtotal</b>					\$75,000	
<b>Division 13 - Special Construction</b>							
1	SCADA	LS	\$60,000	1	\$60,000		
2	RPU/HMI Programming, Verification & Commissioning	LS	\$50,000	1	\$50,000		
	<b>Division Subtotal</b>					\$110,000	
<b>Division 16 - Electrical</b>							
1	Hydro Service and Transformer	LS	\$75,000	1	\$75,000		
2	Cables and Ducting	m	\$200	100	\$20,000		
3	Low Voltage Distribution/Breaker Panel in Enclosure	LS	\$100,000	1	\$100,000		
	<b>Division Subtotal</b>					\$195,000	
<b>Provisional Items</b>							
-		0	0		\$0		20
	<b>Division Subtotal</b>					\$0	
<b>ESTIMATED TOTAL CONSTRUCTION COST</b>						<b>\$1,434,000</b>	
<b>Construction Contingency</b>				30%		<b>\$430,200</b>	
<b>ENGINEER'S TOTAL OPINION OF COST</b>						<b>\$1,864,200</b>	



**Appendix H**  
**Stage 1 Archaeological Assessment**



**FINAL REPORT – Original Report  
Stage 1 Archaeological Assessment,  
Combined Sewage Storage Tunnel,  
Project Information, Ottawa River  
Action Plan Project No. 3, City of  
Ottawa, Carleton County, Ontario**

**Project No. 163400965  
August 28, 2012**

**CIF # P371-001-2012**

**Prepared for:**

Infrastructure Services & Community  
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## Executive Summary

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The City of Ottawa has developed the Ottawa River Action Plan (ORAP) with the purpose to improve water quality in the Ottawa River. The Combined Sewage Storage Tunnel Project is one of 17 projects of which ORAP has identified that will control Combined Sewer Overflows (CSO) and limit the amount of pollutants going into the Ottawa River.

The Combined Sewage Storage Tunnel (CSST) Plan entails the storing of overflow in massive underground tanks, three-metre-wide tunnels totaling six kilometres in length and running from the LeBreton Flats to New Edinburgh. The overflow can then be funneled to the waste water treatment plant later on, once there's enough capacity to handle it.

A Stage 1 Archaeological Assessment (AA) was done in preparation for the Environmental Assessment. Based on a review of aerial imagery, archaeological potential modeling, information regarding registered archaeological and historical sites in the vicinity, local history, local physiography and topography, census returns, and 19<sup>th</sup> century maps of the project area, some areas within the Project Area are considered to have elevated potential for the presence of previously unknown archaeological resources of prehistoric or historic disposition.

It is recommended that areas identified as having potential for the presence of archaeological resources be subjected to a Stage 2 Property Assessment.

It is recommended that the remaining areas of project be released from further archaeological requirements and development be allowed to proceed.

The Stage 1 AA was conducted in accordance with the 2011 *Standards and Guidelines for Consultant Archaeologists* prepared by the Ministry of Tourism and Culture (MTC) (MTC, 2011a).

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## Project Personnel

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Project Director	Courtney Cameron, M.A., Licence #P371
Archival Research	Courtney Cameron, M.A., Nancy Oakley, BA
Fieldwork	
Report and Graphics	Courtney Cameron, M.A.

## **1.0 Introduction**

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The Combined Sewage Storage Tunnel (CSST) Project Area is located within downtown Ottawa (Figure 1). The study corridor limits extend from the west at the intersection of Wellington Street and Albert Street, in the east at the intersection of Queen Victoria Street and River Lane, north from the Supreme Court of Canada at the intersection of Kent Street and Wellington Street and south to the intersection of Kent Street and Catherine Street. The tunnels are approximately 6 km in length and access shafts will be required approximately every 1000 m. Several above ground staging areas, air vents, and outbuildings are proposed (Figures 2 to 8).

A Stage 1 AA background study was undertaken in preparation for the Environmental Assessment. The Stage 1 study was completed by Courtney Cameron, M.A., Assistant Archaeologist with Stantec (Licence #P371). Vincent Bourgeois, M.A., Senior Archaeologist acted as senior reviewer.

The Stage 1 was conducted in accordance with the 2011 *Standards and Guidelines for Consultant Archaeologists* prepared by the Ministry of Tourism and Culture (MTC) (MTC 2011a).

## **2.0 Project Context**

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### **2.1 DEVELOPMENT CONTEXT**

The CSST Project is one of 17 projects within the City of Ottawa's Ottawa River Action Plan (ORAP) initiative and a critical component of the City's overall plan to further control combined sewer overflows (CSO), and improve water quality in the Ottawa River.

Currently, CSOs to the Ottawa River meet most but not all provincial CSO control targets set by the Ministry of Environment. In February 2010, the City of Ottawa adopted a policy of having zero CSO events during the swimming season in a Design Year, while accepting some overflows during rainy years or heavy rainfall events. The City's Combined Sewer Area Pollution Prevention and Control Plan (PPCP) identified combined sewage storage within the Ultimate Combined Sewer Area as the most cost effective way of meeting and further reducing CSO beyond the minimum regulatory requirements.

The CSST Project is being planned as a Schedule C project in accordance with the requirements of the Municipal Class Environmental Assessment, 2007/2011. The design basis is to provide a level of control that, for the representative Design Year (1980); results in zero (0) overflow events in the average swimming season. The recommended solution involves the provision of a 4,200 m long Core tunnel which would effectively twin the existing interceptor sewer (from its start in LeBreton Flats to just east of the Rideau River), combined with a 1,700 m long north-south tunnel which would provide the balance of the necessary CSO control storage (Figure 2). This CSST brings a number of ancillary benefits including:

- Added operational flexibility and reliability in that the Core tunnel provides redundancy to the aging interceptor;
- Opportunities to share storage volume between overflow points and also with the existing interceptor; and,
- The north-south tunnel provides flood relief to a portion of the City Core during extreme runoff events.

## **2.2 PROJECT AREA**

The Project Area is located in the downtown Ottawa core within the townships of Nepean and Gloucester, County of Carleton. The Project Area crosses parts of Lots 4 & 5, Gore, Gloucester; parts of Lots A, B, C, and D, Broken Front D; Lots B, C, D, E, and F, Broken Front C; Lot 40 Conc A & 1 on Ottawa River; Lot 39 Conc 1 on Ottawa River, Ottawa, in Carleton County, Ontario. The closest major topographic feature is the Ottawa River approximately 110 m north of the Project Area.

The preferred alignment consists of two tunnels with associated surface features and one isolated access point along the west side of the Rideau Canal.

The first tunnel starts at the Supreme Court of Canada at the intersection of Wellington Street and Kent Street and runs south along Kent Street to the intersection of Kent Street and Catherine Street. There is one proposed construction staging area on the grounds of the Supreme Court of Canada and five possible locations for proposed access or regulators along the alignment (Figures 3 and 4).

The second tunnel of the alignment starts at the intersection of Albert Street, Slater Street, Transit Way and Empress Avenue. The proposed alignment follows Transit Way north to Wellington Street and then runs west along Wellington Street until it intersects with Albert Street; the proposed alignment then runs east along Albert Street until it intersects with Slater Street. The proposed alignment continues along Slater Street from Arthur Street to the Rideau Canal, crosses the Rideau Canal and continues east along Laurier Avenue to Cumberland Street. It will then follow Cumberland Street north to Cathcart Street. The proposed alignment will then run east along Cathcart Street through Bordeleau Park, crosses the Rideau River and goes through New Edinburgh Park to Queen Victoria Street. The proposed alignment ends at the intersection of Queen Victoria Street and River Lane. There are four proposed construction staging areas along this tunnel (a parking lot on Albert Street, the grounds of Confederation Park, a green space between Nicholas Street and Colonel By Drive, and New Edinburgh Park), and nine possible locations for proposed access or regulators (Figures 5, 6, 7, and 8).

The isolated access point is a proposed new chamber to house the raised overflow dam. The structure will be located north of Wellington Street along the west side of the Rideau Canal (Figure 6).

The proposed construction method is by tunneling and will not impact the ground surface. Only areas identified as access points, odor control vets, or surface buildings will result in surface disturbance.

**2.3 HISTORICAL CONTEXT**

**2.3.1 Archaeological Culture History of Eastern Ontario**

Overall, archaeological research in many parts of Eastern Ontario has been fairly limited, at least compared to adjoining areas in Southern Ontario and northern New York State, resulting in only a limited understanding of the cultural processes that occurred in this part of the province. The following summary of the prehistoric occupation of Eastern Ontario (see Table 1 for chronological chart) is based on syntheses in Archaeologix (2008), Ellis and Ferris (1990), Jacques Whitford (2008), Pilon (1999) and Wright (1995).

Identifiable human occupation of Ontario begins just after the end of the Wisconsin Glacial period. The first human settlement can be traced back 11,000 years, when this area was settled by Native groups that had been living to the south of the emerging Great Lakes. This initial occupation is referred to as the "Paleo-Indian" archaeological culture.

Early Paleo-Indian (EPI) (11,000-10,400 before present BP) settlement patterns suggest that small groups, or "bands", followed a pattern of seasonal mobility extending over large territories. Many (although by no means all) of the EPI sites were located on former beach ridges associated with Lake Algonquin, the post-glacial lake occupying the Lake Huron/Georgian Bay basin, and research/evidence indicates that the vegetative cover of these areas would have consisted of open spruce parkland, given the cool climatic conditions. Sites tend to be located on well-drained loamy soils, and on elevations in the landscape, such as knolls. The fact that assemblages of artifacts recovered from EPI sites are composed exclusively of stone skews our understanding of the general patterns of resource extraction and use. However, the taking of large game, such as caribou, mastodon and mammoth, appears to be of central importance to the sustenance of these early inhabitants. Moreover, EPI site location often appears to be located in areas which would have intersected with migratory caribou herds.

<b>Table 1 Southern Ontario Prehistoric Cultural Chronology, Years Before Present (BP)</b>		
<b>ARCHAEOLOGICAL PERIOD</b>	<b>TIME</b>	<b>CHARACTERISTICS</b>
Early Paleo-Indian	11,000–10,400 BP	caribou and extinct Pleistocene mammal hunters, small camps
Late Paleo-Indian	10,400–10,000 BP	smaller but more numerous sites
Early Archaic	10,000-8,000 BP	slow population growth, emergence of woodworking industry, development of specialised tools
Middle Archaic	8,000–4,500 BP	environment similar to present, fishing becomes important component of subsistence, wide trade networks for exotic goods
Late Archaic	4,500-3,100 BP	increasing site size, large chipped lithic tools, introduction of bow hunting
Terminal Archaic	3,100-2,950 BP	emergence of true cemeteries with inclusion of exotic trade goods
Early Woodland	2,950-2,400 BP	introduction of pottery, continuation of Terminal Archaic settlement and subsistence patterns
Middle Woodland	2,400-1,400 BP	increased sedentism, larger settlements in spring and summer, dispersed smaller settlement in fall and winter, some elaborate mortuary ceremonialism
Transitional Woodland	1,400-1,100 BP	incipient agriculture in some locations, seasonal hunting & gathering

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Late Woodland (Early Iroquoian)	1,100-700 BP	limited agriculture, development of small village settlement, small communal longhouses
Late Woodland (Middle Iroquoian)	700-600 BP	shift to agriculture as major component of subsistence, larger villages with large longhouses, increasing political complexity
Late Woodland (Late Iroquoian)	600- 350 BP	very large villages with smaller houses, politically allied regional populations, increasing trading network

The Late Paleo-Indian (LPI) period (10,400-10,000 BP) is poorly understood compared to the EPI, the result of less research focus than the EPI. As the climate warmed the spruce parkland was gradually replaced and the vegetation of Southern Ontario began to be dominated by closed coniferous forests. As a result many of the large game species that had been hunted in the EPI period either moved north with the more open vegetation, or became locally extinct. Like the EPI, LPI peoples covered large territories as they moved around to exploit different resources. Environmental conditions in Eastern Ontario were sufficient to allow for a Late Paleo-Indian occupation, although the evidence of such is still very limited.

The transition from the Paleo-Indian period to the Archaic archaeological culture of Ontario prehistory is evidenced in the archaeological record by the development of new tool technologies, the result of utilizing an increasing number of resources as compared to peoples from earlier archaeological cultures, and developing a broader based series of tools to more intensively exploit those resources. During the Early Archaic period (10,000-8,000 BP), the jack and red pine forests that characterized the LPI environment were replaced by forests dominated by white pine with some associated deciduous elements. Early Archaic projectile points differ from Paleo-Indian forms most notably by the presence of side and corner notching on their bases. A ground stone tool industry, including celts and axes, also emerges, indicating that woodworking was an important component of the technological development of Archaic peoples. Although there may have been some reduction in the degree of seasonal mobility, it is still likely that population density during the Early Archaic was low, and band territories large.

The development of more diversified tool technology continued into the Middle Archaic period (8,000-4,500 BP). The presence of grooved stone net-sinkers suggests an increase in the importance of fishing in subsistence activities. Another new tool, the bannerstone, also made its first appearance during this period. Bannerstones are ground stone weights that served as counterbalance for "atlatls" or spear-throwers, again indicating the emergence of a new technology. The increased reliance on local, often poor quality chert resources for chipped stone tools suggests that in the Middle Archaic groups inhabited smaller territories lacking high quality raw materials. In these instances lower quality materials which had been glacially deposited in local tills and river gravels were used.

This reduction in territory size appears to have been the result of gradual region-wide population growth, which forced a reorganization of subsistence patterns, as a larger population had to be supported from the resources of a smaller area. Stone tools designed specifically for the preparation of wild plant foods suggest that subsistence catchment was being widened and new resources being more intensively exploited. A major development of the later part of the Middle Archaic period was the initiation of long distance trade. In particular, native copper tools manufactured from sources near Lake Superior were being widely traded.

During the later part of the Middle Archaic (5,500-4,500 BP) a distinctive occupation, or tradition, known as the Laurentian Archaic, appears in south-eastern Ontario, western Quebec, northern New York and Vermont. Laurentian Archaic sites are found only within the transitional zone between the deciduous forests to the south and coniferous forests to the north known as the Canadian Biotic Province and are identifiable through the association of certain diagnostic tool types, including ground slate semi-lunar knives (or “ulus”), plummets for use in fishing, ground slate points and knives, and ground stone gouges, adzes and grooved axes. It is thought that there was less reliance on plant foods and a greater reliance on hunting and fishing in this region than for Archaic peoples in southern and south-western Ontario. Laurentian Archaic sites have been found in the middle Ottawa River valley, along the Petawawa River and Trent River watersheds, and at Brockville.

The trend towards decreased territory size and a broadening subsistence base continued during the Late Archaic (4,500-2,900 BP). Late Archaic sites are far more numerous than either Early or Middle Archaic sites. It appears that the increase in numbers of sites at least partly represents an increase in population. However, around 4,500 BP water levels in the Great Lakes began to rise, taking their modern form. It is likely that the relative paucity of earlier Archaic sites is due to their being inundated under the rising lake levels.

The appearance of the first true cemeteries occurs during the Late Archaic. Prior to this period, individuals were interred close to the location where they died. However, with the advent of the Late Archaic and local cemeteries individuals who died at a distance from the cemetery would be returned for final burial at the group cemetery often resulting in disarticulated skeletons, occasionally missing minor bone elements (e.g. finger bones). The emergence of local group cemeteries has been interpreted as being a response to both increased population densities and competition between local groups for access to resources, in that cemeteries would have provided symbolic claims over a local territory and its resources.

Increased territoriality and more limited movement are also consistent with the development of distinct local styles of projectile points. The trade networks which began in the Middle Archaic expand during this period, and begin to include marine shell artifacts (such as beads and gorgets) from as far away as the Mid-Atlantic coast. These marine shell artifacts and native copper implements show up as grave goods, indicating the value of the items. Other artifacts such as polished stone pipes and slate gorgets also appear on Late Archaic sites. One of the more unusual of the Late Archaic artifacts is the “birdstone”, a small, bird-like effigy usually manufactured from green banded slate.

The Early Woodland period (2,900-2,200 BP) is distinguished from the Late Archaic period primarily by the addition of ceramic technology. While the introduction of pottery provides a useful demarcation point for archaeologists, it may have made less difference in the lives of the Early Woodland peoples. The first pots were very crudely constructed, thick walled, and friable. It has been suggested that they were used in the processing of nut oils by boiling crushed nut fragments in water and skimming off the oil. These vessels were not easily portable, and individual pots must not have enjoyed a long use life. There have also been numerous Early Woodland sites located at which no pottery was found, suggesting that these poorly constructed, undecorated vessels had yet to assume a central position in the day-to-day lives of Early Woodland peoples.

Other than the introduction of this rather limited ceramic technology, the life-ways of Early Woodland peoples show a great deal of continuity with the preceding Late Archaic period. For instance, birdstones continue to be manufactured, although the Early Woodland varieties have "pop-eyes" which protrude from the sides of their heads. Likewise, the thin, well-made projectile points which were produced during the terminal part of the Archaic period continue in use. However, the Early Woodland variants were side-notched rather than corner-notched, giving them a slightly altered and distinctive appearance. The trade networks which were established in the Middle and Late Archaic also continued to function, although there does not appear to have been as much traffic in marine shell during the Early Woodland period. These trade items were included in increasingly sophisticated burial ceremonies, some of which involved construction of burial mounds.

In terms of settlement and subsistence patterns, the Middle Woodland (2,400 B.C.-1,400 BP) provides a major point of departure from the Archaic and Early Woodland periods. While Middle Woodland peoples still relied on hunting and gathering to meet their subsistence requirements, fish were becoming an even more important part of the diet. Middle Woodland vessels are often heavily decorated with hastily impressed designs covering the entire exterior surface and upper portion of the vessel interior. Consequently, even very small fragments of Middle Woodland vessels are easily identifiable.

It is also at the beginning of the Middle Woodland period that rich, densely occupied sites appear along the margins of major rivers and lakes. While these areas had been utilized by earlier peoples, Middle Woodland sites are significantly different in that the same location was occupied off and on for as long as several hundred years. Because this is the case, rich deposits of artifacts often accumulated. Unlike earlier seasonally utilized locations, these Middle Woodland sites appear to have functioned as base camps, occupied off and on over the course of the year. There are also numerous small upland Middle Woodland sites, many of which can be interpreted as special purpose camps from which localized resource patches were exploited. This shift towards a greater degree of sedentism continues the trend witnessed from at least Middle Archaic times, and provides a prelude to the developments that follow during the Late Woodland period. Burial mounds, such as the Serpent Mounds at Rice Lake, near Peterborough, are seen during this period, although their use markedly declines around 1550 BP.

The relatively brief period of the Transitional Woodland period is marked by the acquisition of cultivar plants species, such as maize and squash, from communities living south of the Great Lakes. The appearance of these plants began a transition to food production, which consequently led to a much reduced need to acquire naturally occurring food resources. Sites were thus occupied for longer periods and by larger numbers of people.

The Late Woodland period in southern Ontario is associated with societies referred to as the Ontario Iroquois Tradition. This period is often divided into three temporal components; Early, Middle and Late Iroquoian (see Table 1).

Early Iroquoian peoples continued to practice similar subsistence and settlement patterns as the Transitional Woodland. Villages tended to be small, with small longhouse dwellings that housed either nuclear or, with increasingly, extended families. Smaller camps and hamlets associated with villages served as temporary bases from which wild plant and game resources were

acquired. Horticulture appears to have been for the most part a supplement to wild foods, rather than a staple.

The Middle Iroquoian period marks the point at which a fully developed horticultural system (based on corn, bean, and squash) emerged, and at which point cultivars became the staple food source. In this period villages become much larger than in the Early Iroquoian period, and longhouses also become much larger, housing multiple, though related, nuclear families. Food production through horticulture resulted in the abandonment of seasonal mobility that had characterized aboriginal life for millennia. Hunting, fishing, and gathering of wild food activities continued to occur at satellite camps. However, for the most part most Iroquoian people inhabited large, sometimes fortified villages throughout southern Ontario.

During the Late Iroquoian period longhouses became smaller again, although villages became even larger. Most, if not all, of the Iroquoian communities along the north shore of Lake Ontario had moved by about 1600 either northward, joining with other groups in Simcoe County to form the Petun and Huron, or westward to join other ancestral groups of the Neutral, situated at the west end of Lake Ontario and the Niagara Peninsula. It was in 1615 that Samuel de Champlain travelled with Huron Warriors through Prince Edward County in an attack on an Iroquois village on the south shore of Lake Ontario, beginning at the False Duck Islands east of the current Project Area. By the late 1600s the New York state based Five Nations Iroquois, in particular the Seneca, were using the central north shore of Lake Ontario for hunting, fishing, and participation in the European fur trade.

In the absence of protracted Iroquoian occupation of the north shore of Lake Ontario, the area was occupied by the Mississauga, a band of the Ojibwa nation by the time of initial contact between Aboriginals and Europeans. It was the Mississauga who established links to French fur traders in Southern Ontario in the 1600s.

### **2.3.2 Historic Period Context**

Recorded history of the area begins in 1610, when Étienne Brûlé travelled up the Ottawa River and made note of the water falls which are located to the west of the Project Area (DeVolpi 1964). Champlain followed in 1613, and subsequently named the falls, Chaudière Falls. Despite the early mention of the area, the Ottawa region didn't become settled until the early 1800s; when Philmon Wright arrived from Boston with a small group of settlers and established a community on the north side of the Ottawa River (Holzman and Tosh 1999, DeVolpi 1964, Nagy 1974). He started trading timber in 1806 and the region became known for the square timber trade and settlers slowly began to populate the region (Nagy 1974).

In 1818 soldier's arrived at Richmond's Landing on the LeBreton Flats and it became the location of the first settlement on the south side of the Ottawa River in 1818 and can be seen on an early map of the area ca. 1818 - 1828 (Figure 9, Holzman and Tosh 1999, Nagy 1974). In 1809 this area (Lot 40 Conc A) was the earliest granted parcel of land within the Project Area. It was granted to Robert Randall in 1809, and it wasn't until 1820 that it came into the possession of LeBreton (Appendix A).

Until the building of the canal the area was sparsely settled and was a collection of smaller communities known by several different names: Iles aux Chaudière, Barrière, Place des

Rideaux, Chaudière Falls, The Point, Bellows' Landing, Richmond Landing, Collins Landing, and Nepean (DeVolpi 1964, Holzman and Tosh 1999). These communities were based around timber/lumber mills and were comprised mostly of log cabins.

However, it was the construction of the Canal (1826 to 1832) that spurred the first real settlement on the current site of Ottawa (Nagy 1974). Colonel By, along with overseeing the construction of the Canal, was charged with subdividing the land into lots. Hence, Bytown was founded in 1826, and the Byward market installed in 1827 (Figure 10, Nagy 1974). During the mid-1800s, the squared timber trade was replaced with the sawn lumber trade, requiring the construction of sawmills (Nagy 1974).

The building of the canal increased the population rapidly and by 1831 Nepean Township, including Bytown, which consisted of Upper and Lower town, had a population of approximately 3,000 (DeVolpi 1964) and New Edinburgh, in Gloucester township was settled.

It wasn't until 1855 that Ottawa received its current name (Holzman and Tosh 1999). Ottawa received its name in honour of the two hundredth anniversary of the first large flotilla of furs brought by the Outaouak in 1654 from the west side of Lake Michigan to be traded with the French in Montreal (Rayburn 1997).

In 1857, Queen Victoria unexpectedly chose Ottawa as the Capital of Upper Canada. Up until that point, Ottawa was primarily an industrial town, fueled by the lumber trade. Once Ottawa became the capital of Upper Canada and after confederation of Canada, Ottawa became more metropolitan, and parliament and federal buildings were being constructed in once was the military grounds along the Ottawa River. This change from an industrial to metropolitan city can be seen in the many historic neighborhoods and architecture of the different periods.

## **2.4 EXISTING CONDITIONS**

### **2.4.1 Environment**

The Project Area is located within the Eastern Ontario section of the physiographic region of the Lowlands of the St. Lawrence (Hills et al 1944). St. Lawrence forest region is characterized by a variety of both coniferous and deciduous tree species, the most predominant of which include sugar maple and beech. Also found in this region are red maple yellow birch, basswood, white ash, largetooth aspen, red and burr oak. Coniferous trees present in the region include eastern hemlock, eastern white pine, white spruce and balsam fir (Rowe, 1977, p. 94). The Project Area has been extensively developed and little of the natural forest cover remains.

The Project Area is located to the south of the Ottawa River and is relatively flat with the presence of some escarpments. The Rideau Canal and the Rideau River run through the study Area.

The bedrock of the Project Area is predominately limestone and shale of the Paleozoic age and covered mostly with thin unconsolidated sediments up to 2 m thick. The surficial geology of the Project Area varies between till, clay and silt deposits, silty sand fluvial terraces, and channel cuts in marine clay (Geological survey of Canada 1982, Chapman & Putnam 1984). Chapman and Putnam (1984) identified two physiological regions that occur within the Project Area. These are the Ottawa Valley Clay Plains and the Russell and Prescott Sand Plains regions. The

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Project Area is characterized by clay plains interrupted by rock or sand ridges of the Ottawa Valley Clay Plains and sand plains of the Russell and Prescott Sand Plains (Figure 11). The soils within the project area are within the City of Ottawa are considered disturbed due to the extensive urban development.

**2.4.2 Heritage Resources**

There are at present, no registered archaeological sites located within the proposed Project Area. However, there are 26 registered archaeological sites located within 1 km of the Project Area (Table 2, MTC 2012b). There have been over 100 archaeological studies conducted in and around the Project Area. A list of the reports can be found in Appendix B.

Table 2 Registered archaeological sites within 1 km of the proposed Project Area.

<b>Borden Number</b>	<b>Name</b>	<b>Type</b>
BiFw-11	Marlborough Avenue	Pre-contact
BiFw-12	Parliament Hill	Pre-contact, Historic
BiFw-22	Rideau Hall	Historic
BiFw-33	Sapper's Bridge	Historic
BiFw-34	Curran Residence	Historic
BiFw-35	Old Supreme Court Building	Historic
BiFw-36	Fournier's Dry Good Store	Historic
BiFw-37	Brittania hotel	Historic
BiFw-38	Carriage Way	Historic
BiFw-53	Firth Tavern	Historic
BiFw-56	Rideau Hall Garage	Historic
BiFw-62	Cathcart Square	Historic
BiFw-63	Levi Young House	Historic
BiFw-65	Inlet Bridge Site	Historic
BiFw-66	LeBreton Railyards	Historic
BiFw-67	Passenger Depot	Historic
BiFw-68	LeBreton Flats East	Historic
BiFw-70	Old Booth Street	Historic
BiFw-72	Waterworks Yard Shed	Historic
BiFw-73	McGinnis House	Historic
BiFw-78	Meat Juice	Historic
BiFw-79	LeBreton 2002	Historic
BiFw-87	Victoria Island 1	Pre-contact
BiFw-91	Rockcliffe Portage 1	Pre-contact
BiFw-92	Rockcliffe Portage 2	Pre-contact, Historic
BiFw-102	Devlin Residence	No information

**2.4.3 Prehistoric Period Resources**

Of the 26 registered historic sites five are considered to have Pre-contact components or artifacts. BiFw-11 consisted of a single stone maul found in the Sandy Hill neighborhood. BiFw-91 & 92 consisted of lithic scatters. BiFw-12 had possible pre-contact components, but no pre-contact artifacts or features were noted within the collection record. There is no available information at this time for BiFw-102.

In addition to the archaeological site search, archaeological potential modeling maps of the area were consulted. According to the NCC potential modeling maps, an area of high potential exists for the presence of Prehistoric resources along either side of Rideau River (Laliberté 1998). However, the majority of the proposed Project Area is considered to hold low potential (Figures 12 and 13). The City of Ottawa archaeological potential mapping (Figure 14) identifies the entire Project Area as holding archaeological potential (City of Ottawa 2012).

**2.4.4 Historic Period Resources**

The historical occupation of the Project Area is well documented. The majority of the archaeological sites recorded around the Project Area are Historic in nature (Table 2). A review of the Canadian Register of Historic Places (CRHP 2012), Ontario Historic Places (OHPD 2005), and the Ontario Historical Plaques database was completed (OHP 2012). The results indicated that there are 219 heritage properties in the Canadian Heritage Database, 468 properties in the Ontario Heritage Database, 13 heritage conservation districts (MTC 2012c) and 61 plaques/monuments in the City of Ottawa (OHP 2012). Of the heritage properties, plaques, and districts there are 54 individually designated properties, 4 heritage monuments, and 9 Historic Conservation Districts (HCD) that are within or near the Project Area. In addition, the Rideau Canal is an UNESCO world heritage site. Table 3 lists the Historic properties, districts, and monuments that occur in or within one block of the Project Area.

Table 3 Historic properties, districts, and monuments within one block of the Project Area.

<b>Historic Place</b>	<b>Location</b>	<b>Significance</b>
Rideau Canal UNESCO World Heritage site *†		Started in 1826 and completed in 1832. It is a 202 km canal with a system of 45 locks extending from Ottawa to Kingston. The canal was built to join Montreal to Kingston via the Ottawa River. This route avoided using the St. Lawrence River which was vulnerable to attack from the United States during a time of war (DeVolpi 1964, Nagy 1974).
The Supreme Court Building *	301 Wellington Street	Built 1938-1940, it is the Home of the Supreme Court of Canada and Federal Court. The symbolic prominence of the building has increased over the years with the expansion of the Supreme Court's influence and power. It has become a familiar symbol of the justice system in Canada at its highest level.
Justice Building *	294 Wellington Street	Built 1935-1938, it is closely associated with the development of early 20th century Ottawa and with the evolution of the Wellington Street corridor into a federal government precinct.
Lock Office *	On the Rideau Canal below the Parliament Buildings	Built in 1884 the Office illustrates the military defense strategy for Upper and Lower Canada in the second quarter of the 19th century.
East Memorial Building *	284 Wellington Street	Built 1950-54, the building is one of the best examples marking the beginning of a new stage in Ottawa's development as the Capital of Canada. The building completed the transition of Wellington Street from mixed small-scale residential and commercial use to monumental buildings housing government functions and is an excellent example of Classical-Modern design.

<b>Historic Place</b>	<b>Location</b>	<b>Significance</b>
Confederation Building *	229 Wellington Street	Built 1928-1932, it is Classified as a Federal Heritage Building primarily because of its importance in defining the character of the federal precinct west of Parliament Hill. Its size, siting, and rich architectural detailing have played a key role in extending the vocabulary established by the original Parliament buildings.
Drill Hall *†*	1 Cartier Square	Built 1879-1881, the building is a mixture of Second Empire mansard roofs, Italianate round-arch windows and patterned brick, and a shaped gable. It is the oldest drill hall in Canada still in use as an armory.
St. Brigid's *	314 St. Patrick Street.	Built 1889-1890, St. Brigid's was the First English Catholic Church in Lowertown. This Church has historically served as a parish church for the Irish Catholic working class residents of Lowertown.
St. Andrew's Presbyterian Church *†*	82 Kent Street/272 Wellington Street	Built 1873-1874, it is the oldest Protestant congregation in Ottawa.
Lisgar Collegiate Institute *	29 Lisgar Street	Built in 1872 it is a four storey, Gothic Revival building constructed of grey limestone. Its heritage value is derived from its role as Ottawa's first high school.
Stable/garage Recognized Federal Heritage building *	1 Sussex Drive	Built 1866-1867, it is comprised of three distinct but connected components: the former coach house, the former stables and the former coachman's residence. It is associated with the national historical theme of the establishment of Rideau Hall as the official residence of the Governor General in association with the creation of the Canadian parliamentary system of government. Crucial to the establishment of the official residence and an important component of this 19th century British country-estate, the Stable Building was built to house a key support function and was central to the ceremonial aspects of the Governor General's role.
Parliament Hill, East Block*†	Wellington Street	Built 1859-1865, as office accommodation to prime ministers, governors-general, senior ministers, and the Privy Council, the Parliament Hill - East Block is directly associated with the shaping of Canada's history. Aesthetically, it is the finest example of Ruskinian Gothic Revival in the country.
Philip Dansken Ross 1848-1949 Plaque §	300 Slater Street. The Jean Edmonds Towers (Formerly the Journal Towers).	A plaque dedicated to Philip Dansken Ross who was the managing director and part owner of the Ottawa Journal, founder of the Canadian Press and the Ontario Hockey Association; City councilor from 1902-03; President of the Canadian Daily Newspapers Association, 1920; Served on the Royal Commission on Public Welfare, 1930; and Chairman of the Ottawa Electric Commission from 1944-49.
The Missionary Oblates of Mary Immaculate §	East side of Cumberland Street between Wilbrod Street and Laurier Avenue East	A plaque dedicated to the Missionary Oblates of Mary Immaculate who arrived in Canada from France in 1841 and established parishes and educational institutions.
Commissariat Building §	1 Canal Lane	Built in 1827 it is the oldest structure existing in Ottawa and now houses the Bytown Museum.
University of Ottawa §	Plaque located on Laurier Avenue (between Waller and Cumberland)	Established in 1848 it is the first bilingual university in Ottawa
Donaldson House †*	494 Albert Street	Built ca. 1864, a relatively rare domestic example of the Second Empire style in Ottawa

<b>Historic Place</b>	<b>Location</b>	<b>Significance</b>
Morely Donaldson House †*	504 Albert Street	Built ca. 1864, the use of the building's original stone walls as the base for the Queen Anne Revival structure is unusual within the Ottawa context.
Cheney House †*	176 Bronson Avenue	Built in the early 1870s by Perley and Pattee, lumber mill operators at the Chaudière. It was one of the earliest brick houses in Ottawa.
Ottawa Electric Company Building * †	109 Bank Street	Built in 1934 it was the headquarters of the Ottawa Hydro Electric Company.
<b>Lowertown West Heritage Conservation District (Figure 15) * †</b>		Designated in 1994. The HCD is delineated by the Sussex Street on the west, The Botelar and Bolton Streets to the north, Murray Street to the South and King Edward to the East. In 1802, when the lands were first granted the area was little more than a cedar swamp. The government purchased back the area in 1823 and divided it into Uppertown and Lowertown. In 1827 The swamp was drained and Colonel By surveyed a townsite - Bytown. The Lowertown area quickly became settled by the working class as it was located close to the work shop for the canal. The residential area west of King Edward and north of the Byward Market is known as Lowertown West. Lowertown West is the oldest area of residential settlement in the City of Ottawa and was the civilian centre of the City until the turn of the 20 <sup>th</sup> century. Lowertown West was the site of unrest between different religious and linguistic factions and was the site of the Stony Monday riot in 1849. The District includes a number of early significant institutional buildings and residential buildings that demonstrate the early history of Lowertown (McClelland et al 1993, LACAC 2000).
Rathier House †*	193-195 Cumberland Street	Built ca. 1863, it is an early example of a combined business and residence.
Foisey House †*	188 St. Andrew Street	Built 1859, the modest vernacular structure reflects the conventions of French-Canadian construction in early Lowertown.
Odillion Archambault House †*	221-223 St. Andrew Street	Built 1895, it is a well preserved front gabled house.
<b>Byward Market Heritage Conservation District (Figure 15) * †</b>		Designated in 1991 with 160 properties. The HCD is delineated by St. Patrick Street on the north, George Street on the south, and from MacKenzie Avenue on the west to Dalhousie Street on the east. The district consists mainly of commercial buildings. The Byward Market was formally established during the late 1820s and early 1830s when Colonel By founded Bytown and began work on the Rideau Canal. Since that time, the Market has served as a hub for Ottawa's vital commercial and cultural activities (ACO 2009a, MTC 2012c, Smith 1990)
Residential House †*	350-352 Cumberland Street	Built ca. 1860, it is a typical example of a double residence at this time.
Brule House †*	288-290 St. Patrick Street	Built ca. 1842, it is a typical Lowertown building of the lumber trade era. Building has a connection with the 1849 riots.
St. Brigid's Church †*	314 St. Patrick Street	Built 1889-1890, it was built to serve the Irish Catholic community.
L'Ecole Guigues †*	159 Murray Street	Built 1904-1905 on the site of previous Roman Catholic schools dating back to 1864 and is a monument to the right of Franco-Ontarians to receive education in the French language.

<b>Historic Place</b>	<b>Location</b>	<b>Significance</b>
Brown Tenements * †‡	153-161 York Street	Built ca. 1865 it is the only remaining four unit row dwelling in the area. It is an example of working class residences of the Confederation era in Lowertown.
<b>Sandy Hill West Heritage Conservation District (Figure 15) * †‡</b>		Designated in 1982. Sandy Hill West HCD is delineated by Waller Street to the west, King Edward Avenue to the east, midway between Besserer and Daly Streets to the north and midway between Stewart and Seraphin Streets to the south. Sandy Hill West was developed on a portion of land granted to Quebec City notary, Louis Besserer in 1828. The estate of Louis T. Besserer's, loosely delineated by the Rideau Canal, Rideau Street, the Rideau River, and Somerset Street East, was subdivided in the 1840s for development into what is now known as the neighborhood of Sandy Hill West. From 1840-1880, the area saw little growth until the choice for Ottawa as the capital of Canada in 1857 by Queen Victoria. In the 1880s the area redeveloped to provide smaller single family and multiple unit homes for the middle class (mid-level civil servants, railway employees and merchants) (Smith 1993, CRHP 2012, MTC 2012c).
Union Mission * †‡	47-49 Daly Avenue	Built ca. 1860-62 this three-story double house is a rare surviving example of a vernacular Georgian stone building, and forms an integral part of the Daly Avenue as its westernmost anchor.
Church of St. Alban the Martyr * †‡	125 Daley Street.	Built 1867-1877, This church is associated with architect Thomas Fuller, and many prominent Canadian politicians. Some of the original parishioners to the church included influential politicians and Fathers of Confederation, such as; Sir John A. Macdonald, Sir Francis Hincks, Sir Charles Tupper, Sir Leonard Tilley, Sir Alexander Campbell, Senator John George Bourinot and Sir Henry Strong.
St. Paul's Eastern United Church †‡	473 Cumberland Street	Built 1888-1889, built as St. Paul's Presbyterian Church. An 18 m tower was removed in the early 20 <sup>th</sup> century. Architectural style is Romanesque Revival.
Varin Row †‡	106 – 110 Daly Avenue	Built ca. 1870, it is a good example of an investment development built to house Ottawa's expanding public service following Confederation.
Lyon House †‡	112 Daly Avenue	Built ca. 1850 out of brick which was unusual for the period, for George Byron Lyon, a member of the Legislative Assembly for Russell and a Bytown barrister.
Jarvis House * †‡	65 Stewart Street	Built 1885, it is notable as it is set back from the street and is surrounded by a suburban style yard despite being located in Sandy Hill.
Regan House * †‡	66-68 Stewart Street	Built 1864, it is a pre-Confederation building.
Residential building * †‡	84 Stewart Street	Pre 1874. This building may be the oldest surviving structure in Sandy Hill and may date as early as the 1830s.
Residential building * †‡	86 Stewart Street	Pre-1874. Simple front gabled 2 ½ storey house. It contrasts with 84 Stewart Street located behind it.
Odell House * †‡	180 Waller Street	Built 1883, it is an Ottawa landmark situated at the intersection of Waller and Nicholas streets. Built for Clarence Odell, a local businessman.
St. Paul's Evangelical Lutheran Church * †‡	210 Wilbrod Street	Built 1889, for a German speaking Lutheran congregation.
Cote House * †‡	213 Wilbrod Street	Built ca. 1867 is an example of lingering classicism in Ottawa.

<b>Historic Place</b>	<b>Location</b>	<b>Significance</b>
<b>Centretown Heritage Conservation District</b> (Figure 15) * †*		Designated in 1997 for its commercial characteristics. It is delineated by Gloucester Street to the north, the Queensway to the south, the Rideau Canal to the east and Bronson Avenue to the west. Centretown is defined as Uppertown's residential core. Originally the area was forested, but cleared for farming with the arrival of settlers in the early 1800s, and was the site of the Irish community Corkstown (ca. 1827) (LACAC 2000, Smith 1997, CRHP 2012, MTC 2012c)
Residential House †	5 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	15 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	17 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	19 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	21 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	29 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	33 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	41 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	43 Arlington Avenue	Part of Centretown Heritage Conservation District
Residential House †	45 Arlington Avenue	Part of Centretown Heritage Conservation District
Hollywood Parade †*	103-113 James Street	Built 1892, an upper-middle class a six-unit row.
St. Patrick's Roman Catholic Basilica †*	240 Kent Street	Built 1869 – 1898. Built in stages it was the first English speaking Roman Catholic parish.
St. Patrick's Roman Catholic Basilica Presbytery †*	281 Nepean Street	Built in 1883 it was the priests' residence for St. Patrick Basilica.
First United Church †	397 Kent Street	Built in 1911, it was built for one of Ottawa's oldest congregations.
Quinn's Row †*	245-251 Nepean Street	Built ca. 1889 it is an example of working class row housing.
<b>Bank Street Heritage Conservation District</b> (Figure 15) *		Designated in 2000. Bank Street is considered a special area as it is representative of a Traditional Main street and was Highway 31 that led to Morrisburg Ontario.
132-138 Bank Street †	132-138 Bank Street	Built 1890, the same year the street car tracks were laid along Bank Street and reflects the development of Bank Street as one of the city's most important north-south commercial streets.
<b>New Edinburgh Heritage Conservation District</b> (Figure 15) †		Designated in 2001. New Edinburgh is located on the east side of the Rideau River and delineated by Sussex Drive to Dufferin Road, and from Stanley Avenue to MacKay Street. Thomas MacKay built a grist mill, lumber mill and woolen mill on the Chaudière Falls in the 1820s and used the New Edinburgh area to build a village for his workers, which was incorporated as such in 1867 (Figure 16, DeVolpi 2). It is considered the second oldest community in Ottawa. He built the first jail and brought first rail line into Ottawa to New Edinburgh (Figure 17, Belden 1878, Mason 2011, LACAC 2000, Coutts 2000, CRHP 2012)
Jones House †*	119 Stanley Avenue	Pre-1892. Second Empire style applied on an intimate domestic scale.
Bell House †*	151 Stanley Avenue	Built in 1868 as a medical office for Dr. W.R. Bell. In 1880 a residential addition was built.

Historic Place	Location	Significance
<p><b>Sandy Hill Heritage Conservation District</b> (Figure 15)<sup>*†*</sup></p>		<p>Designated in 1982 with 227 properties. Sandy Hill HCD is a compilation of 5 conservation districts: Stewart Street/Wilbrod Avenue; King Edward Avenue; Sweetland Avenue; Besserer Street/Daly Avenue/Augusta Street/Coburg Street; and Charlotte Street/Wilbrod Avenue/Laurier Avenue/Chapel Street (ACO 2009b, MTC 2012c)</p> <p>Sandy Hill was developed on a portion of land granted to Quebec City notary, Louis Besserer in 1828. Besserer's property was loosely delineated by the Rideau Canal, Rideau Street, the Rideau River, and Somerset Street East. From 1840-1880, the area saw little growth until the choice for Ottawa as the capital of Canada in 1857. By the 1860s, given its location close to Parliament Hill and Sparks Street, Sandy Hill had rapidly developed into a desirable residential area for the growing civil service and emerging upper class. Sandy Hill became home to influential, affluent residents such as politicians, lumber barons, diplomats and other civil servants (ACO 2009b, CRHP 2012).</p>
<p><b>Lorne Street Heritage Conservation District</b> (Figure 15)<sup>†</sup></p>		<p>Designated in 2006 it consists of 32 properties. The HCD is located along Lorne Avenue between Albert Street and Primrose Avenue. It is defined as a homogeneous, well-preserved streetscape, typical of the type of housing built in Ottawa for the working class from 1900 – 1907. Lorne Avenue is separated into upper Lorne Avenue and lower Lorne Avenue by the escarpment Nanny Goat Hill. The buildings on lower Lorne Avenue were destroyed by fire on April 26, 1900, while the area to the south, upper Lorne Avenue, was protected from the fire by the escarpment. The result is that the lower Lorne Avenue streetscape is homogeneous in its architectural character because all of the buildings were built in a similar style within a seven-year period. Upper Lorne Avenue is more heterogeneous in architectural character, containing buildings of varying architectural styles from various periods before and after the fire of 1900. The history of lower Lorne Avenue, located directly adjacent to the LeBreton Flats, it is associated with the development of the LeBreton Flats as an industrial centre and as a residential area for the mill and railway workers who worked there (CRHP 2012, City of Ottawa 2012).</p>
<p><b>Sparks Street Heritage Conservation District</b> (Figure 15)<sup>*†</sup></p>		<p>Designated in 2000. The Sparks Street HCD is located in Ottawa's downtown core between Elgin Street and Bank Street and was designated due to its commercial/institutional characteristics. The Sparks Street area got its start due to the construction of the Rideau Canal. When Governor Dalhousie decided not to build the canal across the LeBreton flats, he chose property then owned by Nicholas Sparks. The construction of the canal and the parliament buildings, put Sparks land at the nucleus of the city, where it became a busy commercial centre. Sparks street was the first street in Ottawa to be paved (Holzman and Tosh 1999).</p>

Historic Place	Location	Significance
<b>The Lebreton Flats</b>		While not a designated HCD, it holds historical interest and has been subjected to a number of archaeological investigations. The Lebreton flats got the name from Captain John LeBreton who purchased the flatlands on the Ottawa river out from under the Earl of Dalhousie, Governor-in-chief of British North America. Governor Dalhousie had intended to develop the area for government wharfs and the entrance to the Rideau Canal. LeBreton offered Dalhousie the flats for six times the purchase price, but Governor Dalhousie decided to purchase a site further down river. The LeBreton flats was the location of the first community on the south side of the river, Richmond's Landing. The area was destroyed during the Great Fire of 1900, and became the location of low income housing buildings. The buildings on LeBreton Flats were expropriated and demolished in the early 1960s (Holzman and Tosh 1999).

Note\* Listed on the Canadian Register of Historic Places (CRHP).

§ Listed on Ontario's Historic Plaques

† Listed on Ontario's Heritage Properties Database (OHPD)

¥ Listed in Ottawa's Local Architectural Conservation Advisory Committee

The Project Area runs through six of the nine Heritage Conservation Districts within the Project vicinity and along six heritage properties (St. Brigid's Church, 350-352 Cumberland, St. Andrew's Presbyterian Church, St. Patrick's Basilica, St. Paul's Eastern United Church, and the Rathier House), and three plaques (Philip Dansken Ross 1848-1949 Plaque, The Missionary Oblates of Mary Immaculate, and the University of Ottawa).

The 1826 map of Bytown shows there was building located on the present grounds of the Supreme Court of Canada (Figure 18, Elliot 1991).

**Cemeteries**

According to Ross (1927), prior to 1828 the dead were buried in Lower Canada, on the north side of the Rideau River. Apparently there was a cemetery on Barrack's Hill, now Parliament Hill, during the time of the Rideau Canal construction (Bytown or Bust 2012). Spurred by the many deaths of the canal workers, a half-acre of land between Elgin and Metcalfe streets in the neighborhood of Sparks and Queen Streets was allocated to the Presbyterians, Anglicans, Roman Catholics and Methodists for use as a graveyard. By 1844, the cemetery had grown and was enclosed by Sparks, Elgin, Albert and Metcalfe Streets. However, this cemetery is not present on Kennedy's 1842 or Austin's 1858 maps of the area (Figures 16 and 19; DeVolpi 1964, Nagy 1974). This cemetery location is on White's 1842 map of Bytown (Figure 20), while there is no reference to this cemetery on Donald Kennedy's 1842 map, there was a hospital at that location (Figure 16).

In addition, Ross (1927) indicates that an 1842 map shows a Roman Catholics cemetery at the south east corner of Rideau and Cumberland Streets. Examination of Donald Kennedy's 1842 map shows that the Roman Catholic cemetery is actually located at the corner of Rideau and Gloucester Streets (Figure 16). However, this same map does not show the cemetery located along Sparks Street.

The review of the historical maps shows no cemeteries located within or immediately alongside the Project Area.

## **2.5 ARCHAEOLOGICAL CONTEXT**

Many archaeological assessments have been conducted within or around the Project Area (Appendix B), and a total of 26 sites have been recorded. According to Golder 2012, the majority of the Project Area has been previously covered by assessments completed by other companies. There are however, two locations, Bordeleau Park and New Edinburgh Park located on either side of the Rideau River that have never been assessed (Golder 2012). These are the same areas that according to the NCC potential modeling maps exhibit high potential for the presence of Prehistoric resources (Laliberté 1998).

The assessment of archaeological potential for the Project Area considered both pre-contact and historic period resources. Archaeological potential modeling for prehistoric era sites is based largely on the identification of landscape features which are either known to have attracted past habitation or land use, or which appear to have potential for attracting human use. These features include: navigable rivers and lakes; confluences of watercourses; smaller sources of potable water; ridges or knolls that overlook areas of resource potential; outcrops of high-quality stone for tool making; and, most importantly, combinations of these features. In general it has been demonstrated that areas within 300 m of watercourses, or other significant bodies of water (ASI 1990; Cox 1989, MTC 2011a), and in particular those areas with multiple water sources (Young et al., 1995) are considered to be of elevated archaeological potential. The closest major topographic feature is the Ottawa River approximately 150 m north of the Project Area (Figure 1).

Patterns of land use by historic Euro-Canadians to some extent mirror those of the prehistoric period. This is not surprising, since the same general needs must be met, i.e., proximity to potable water, access to natural resources, and a level, well drained habitation site. On the other hand, the Euro-Canadian conversion of both fertile and more marginal land for agricultural purposes, the development of non-water travel routes, the exploitation of different resources such as subsurface mineral deposits, and other differences in land use patterns make potential modeling of Euro-Canadian and other non-Aboriginal historic sites somewhat less reliable. Fortunately, these sites are more visible than their prehistoric counterparts, which helps offset this lower level of predictive reliability.

## **3.0 Analysis and Conclusions**

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The Project Area runs through six of the 13 Heritage Conservation Districts within Ottawa and along six heritage properties (St. Brigid's Church, 350-352 Cumberland, St. Andrew's Presbyterian Church, St. Patrick's Basilica, St. Paul's Eastern United Church, and the Rathier House). However, as work for this project is anticipated to take place under the existing street, it is not anticipated that construction activities will directly affect any of the historic buildings adjacent to the Project.

Of the two locations that were identified as having potential for the presence of heritage resources on the NCC potential modeling map, the surface of one will be impacted by development. Within the New Edinburgh Park, a staging area, outlet control chamber and odor control facility are proposed.

Generally, potential exists for the presence of heritage resources within 200-300 m of watercourses, or other significant bodies of water. The majority of the Project Area that falls within 300 m of the Rideau River and the Ottawa River has been densely developed, with the exception of two locations; the proposed isolated chamber to house the raised overflow dam located to the east of the Rideau Canal, and the grounds of the Supreme Court of Canada which shows the presence of a building on historical maps.

Recommendations for further archaeological work had been made for three areas. These recommendations are based on the historic background research, previous archaeological studies, the construction method proposed and the archaeological potential of the area. These areas are:

1. The area within the grounds of the Supreme Court Building that will be disturbed by construction activities. An early map of the area shows the presence of a building. While Geotechnical reports indicate that a short distance away the sediment is composed of fill, a Stage 2 assessment should be conducted to confirm the absence or presence of heritage resources associated with this building. This area is also within close proximity to the Ottawa River and therefore, potential exists for the presence of Pre-Contact period resources.
2. The location of the proposed new chamber to house the raised overflow dam that is located within 100 m of the Ottawa River and between the Bytown Museum (the oldest building in Ottawa), and the Lock Office (1884). The area is within close proximity to the Ottawa River and therefore, potential exists for the presence of Pre-Contact period resources.
3. The area within New Edinburgh Park that will be disturbed by construction activities. This area is considered to hold high potential for the presence of heritage resources, and according to Golder 2012, has never been previously assessed. Review of Fire Insurance Plans (Goad 1888), and historic maps indicates that this area was never developed.

The remainder of the Project Area will either not be impacted due to the underground construction methodology, or is too disturbed to warrant further concerns for the presence of intact heritage resources.

## **4.0 Recommendations**

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The Project Area consists of a total of 6 km of tunnels with associated access shafts, outbuildings and construction laydown areas, and is planned for the downtown core of Ottawa.

**Stage 1 Archaeological Assessment**

Combined Sewage Storage Tunnel, Project Information, Ottawa River Action Plan Project No. 3

The majority of the work will be conducted without disturbing the ground surface. As such, there is little anticipated impact to archaeological resources. However, there are several areas where disturbance to the ground surface is anticipated. Of these, three areas have been identified as holding potential for the presence of heritage resources and are recommended for Stage 2 archaeological assessment. These are:

1. The area within the grounds of the Supreme Court Building that will be disturbed by construction activities (Figure 2).
2. The area of the proposed new chamber to house the raised overflow dam that will be disturbed by construction activities (Figure 4).
3. The area within New Edinburgh Park that will be disturbed by construction activities (Figure 8).

The archaeological potential for the remainder of the Project Area will either not be impacted due to the underground tunneling methodology, does not exhibit potential for the presence of archaeological resources, or is too disturbed to warrant further concerns for the presence of intact heritage resources. It is recommended that these areas be released for construction activities.

Should human remains be discovered the site would be subject to the rules and regulations of The Cemeteries Act R.S. O. 1990 c. C. 4 and the Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33 (when proclaimed in force). The Acts require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

## 5.0 Advice on Compliance with Legislation

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This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the Project Area of a development proposal have been addressed to the satisfaction of the Ministry of Tourism and Culture, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

## **6.0 Closure**

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This report has been prepared for the sole benefit of the City of Ottawa, and may not be used by any third party without the express written consent of Stantec Consulting Ltd and the City. Any use which a third party makes of this report is the responsibility of such third party.

We trust this report meets your current requirements. Please do not hesitate to contact us should you require further information or have additional questions about any facet of this project.

Yours truly,

**STANTEC CONSULTING LTD**

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## 7.0 Figures

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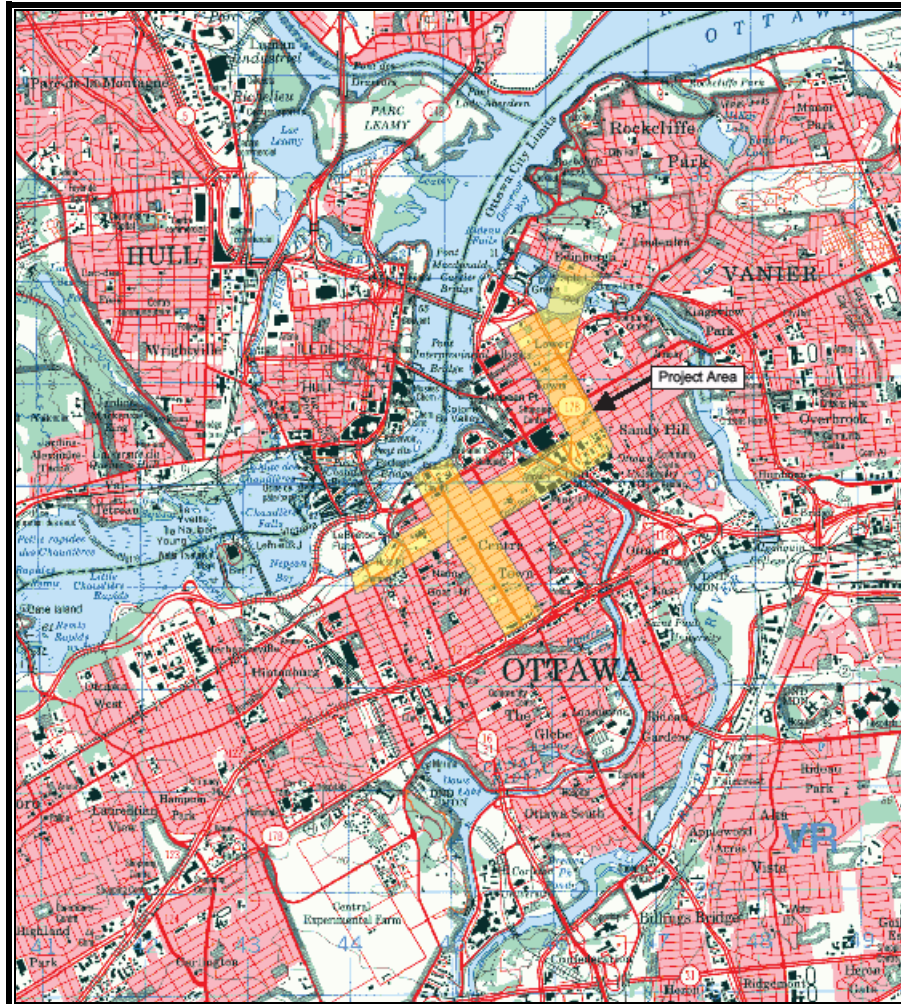


Figure 1: Location of Project Area (NTS 1:50,000 map 31/G Ottawa).



Figure 2: Proposed Project Area.

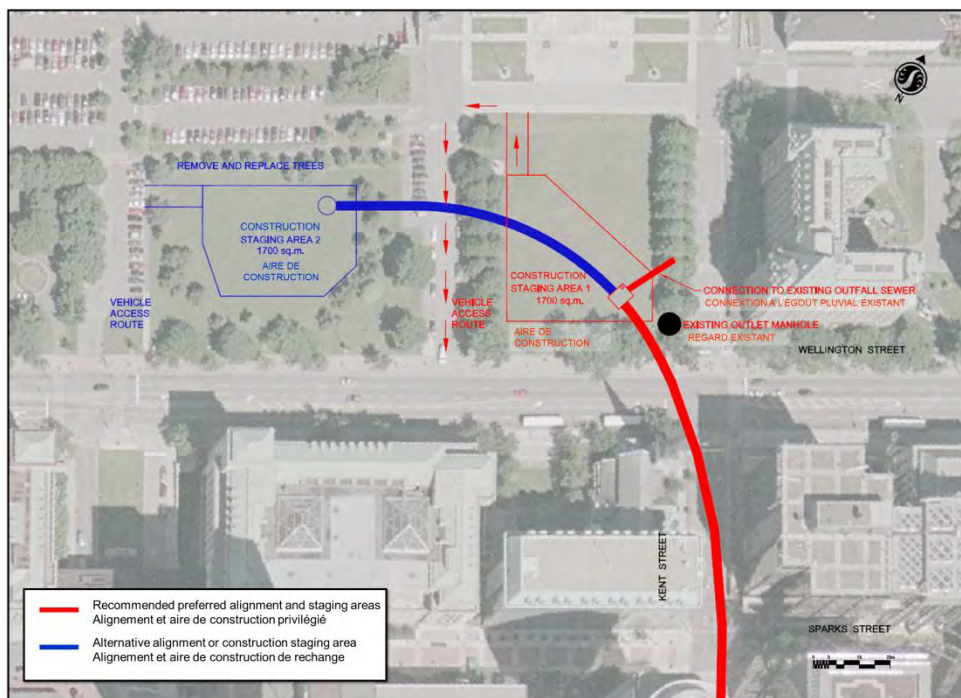


Figure 3: Site 2 Wellington at Kent; site plan of the Project Area showing the preferred alignment and proposed staging areas.



Figure 4: Site 3 Kent at Catherine; site plan of the Project Area showing the preferred alignment and proposed tunnel accesses.

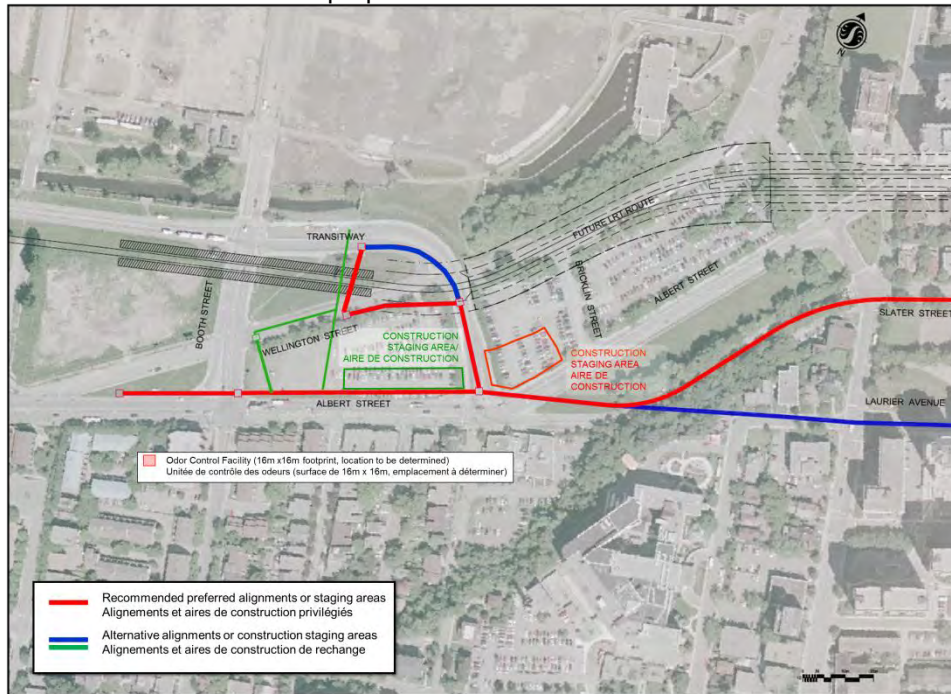


Figure 5: Site 1 LeBreton Flats; Site plan of western end of the Project Area showing proposed staging areas.

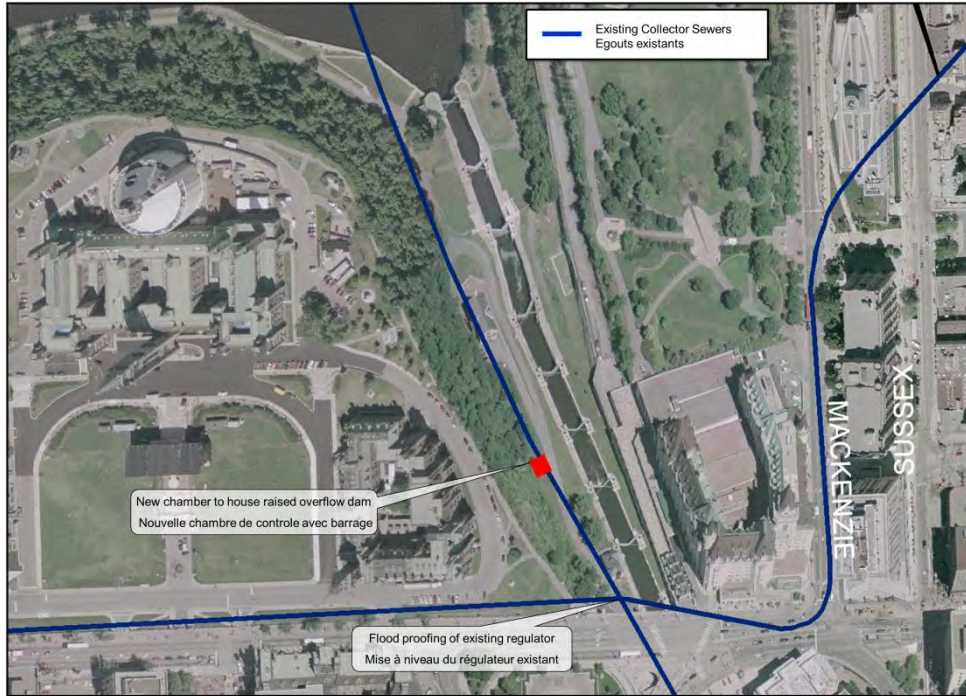


Figure 3: Site 4 Rideau Canal at Wellington; site plan of the Project Area showing the proposed new chamber to house the raised overflow dam.

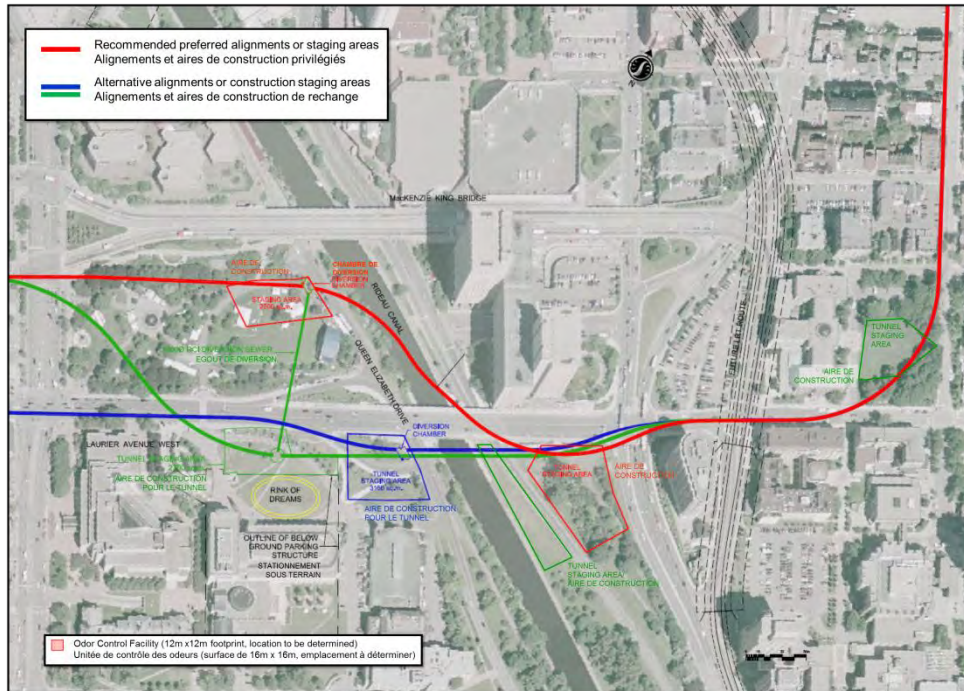


Figure 4: Site 5 Rideau Canal at Laurier; site plan of the Project Area showing the preferred alignment, and proposed staging areas.

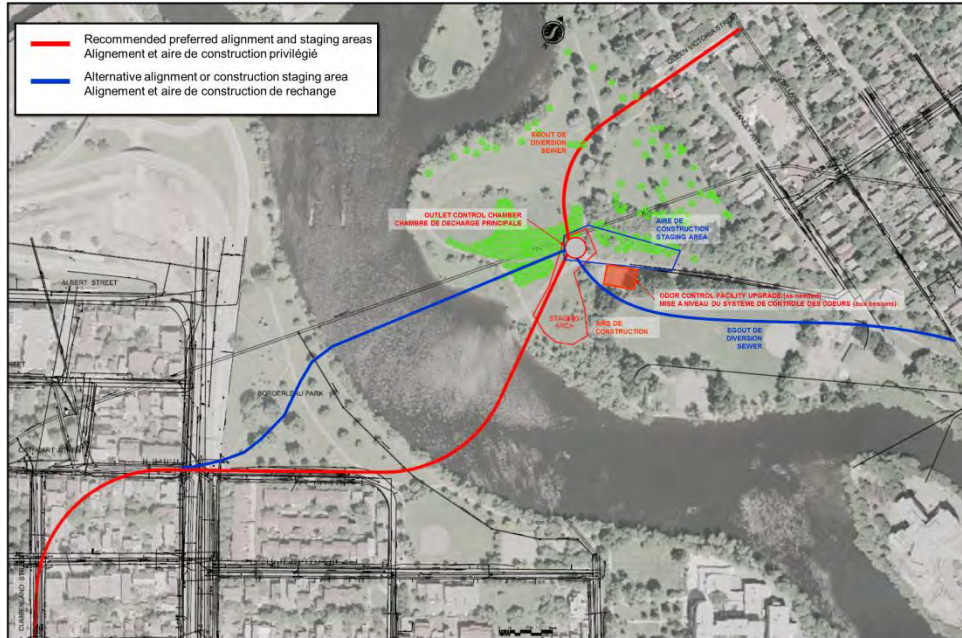


Figure 5: Site 6 River Lane at Keefer; site plan of the Project Area showing the preferred alignment, proposed staging areas and odor control facilities.

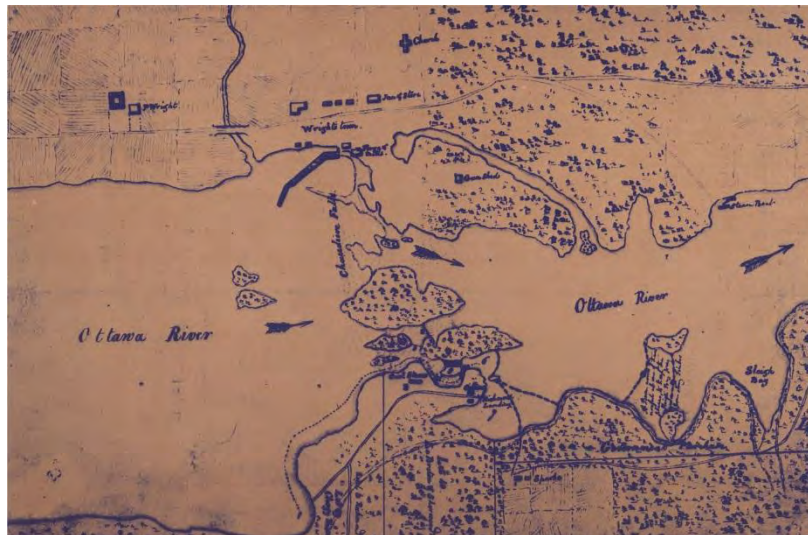


Figure 6: Early map of the Ottawa River ca. 1818-1828 (Nagy 1974)



Figure 7: Colonel By's 1828 map of Bytown showing the original layout of Upper and Lower towns (Nagy 1974).

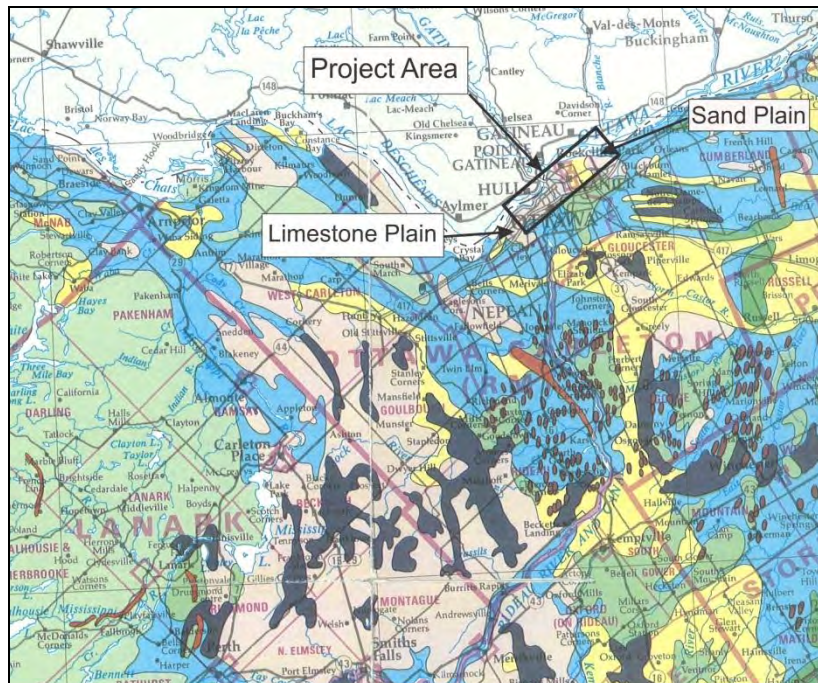


Figure 8: Map showing the general Project Area within the Physiographical Regions of Ontario (adapted from Chapman, L.J., and Putnam, D.F. 1984 Physiography of Southern Ontario, Ontario Geological Survey P.2715 (coloured) Scale 1:600,000.

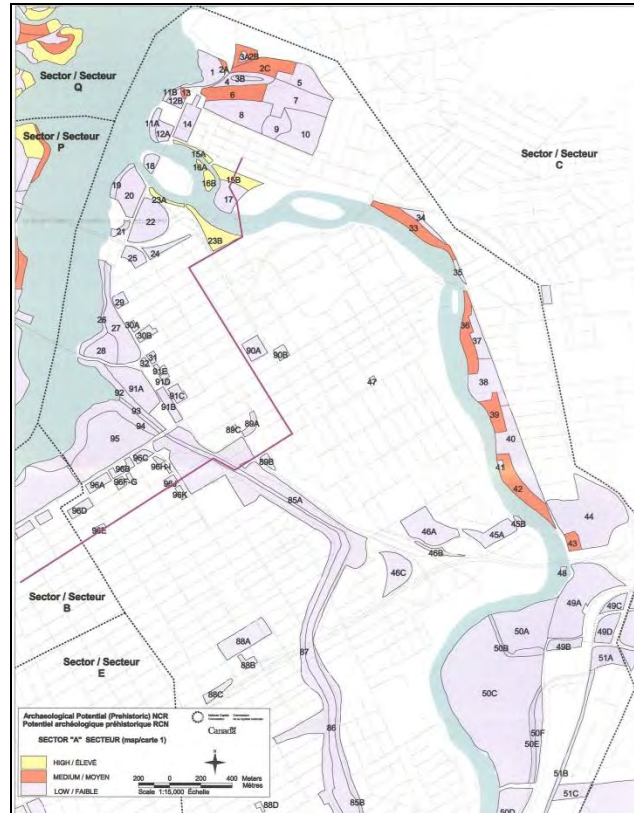


Figure 9: NCC Archaeological Resource potential map of Sector A. Eastern Half of the Project Area (Laliberté 1998)

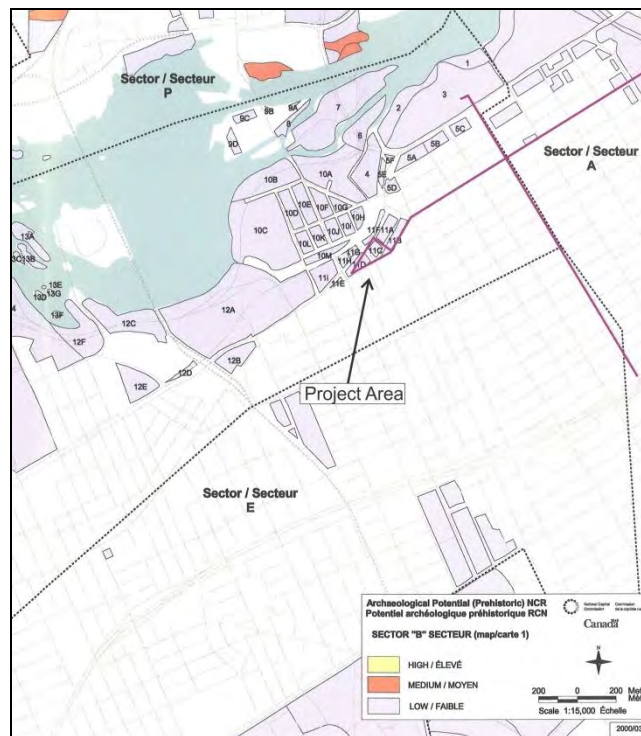


Figure 10: NCC Archaeological Resource potential map of Sector B. Western Half of the Project Area (Laliberté 1998)

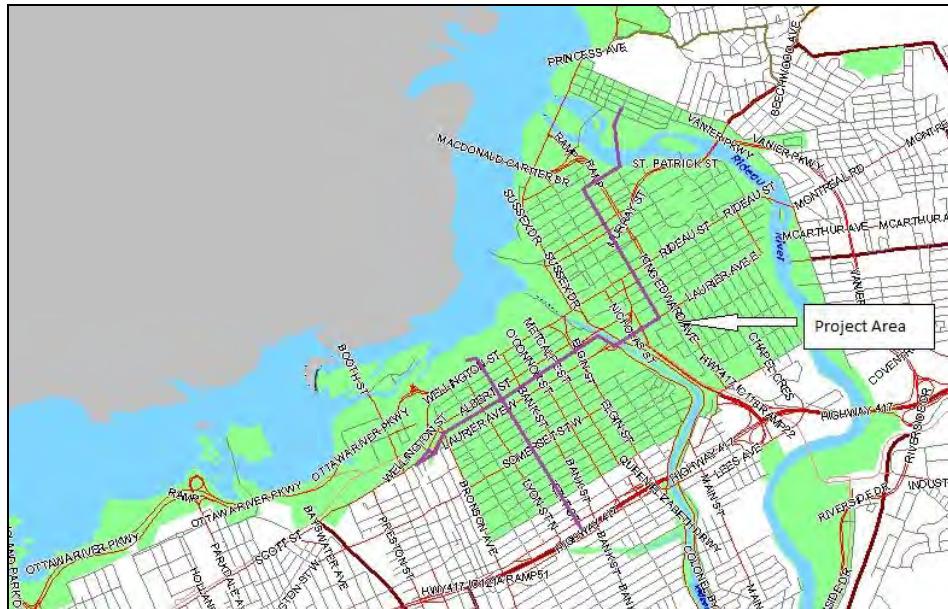


Figure 11: Ottawa archaeological potential model showing the location of the proposed alignment for the project (City of Ottawa 2012)

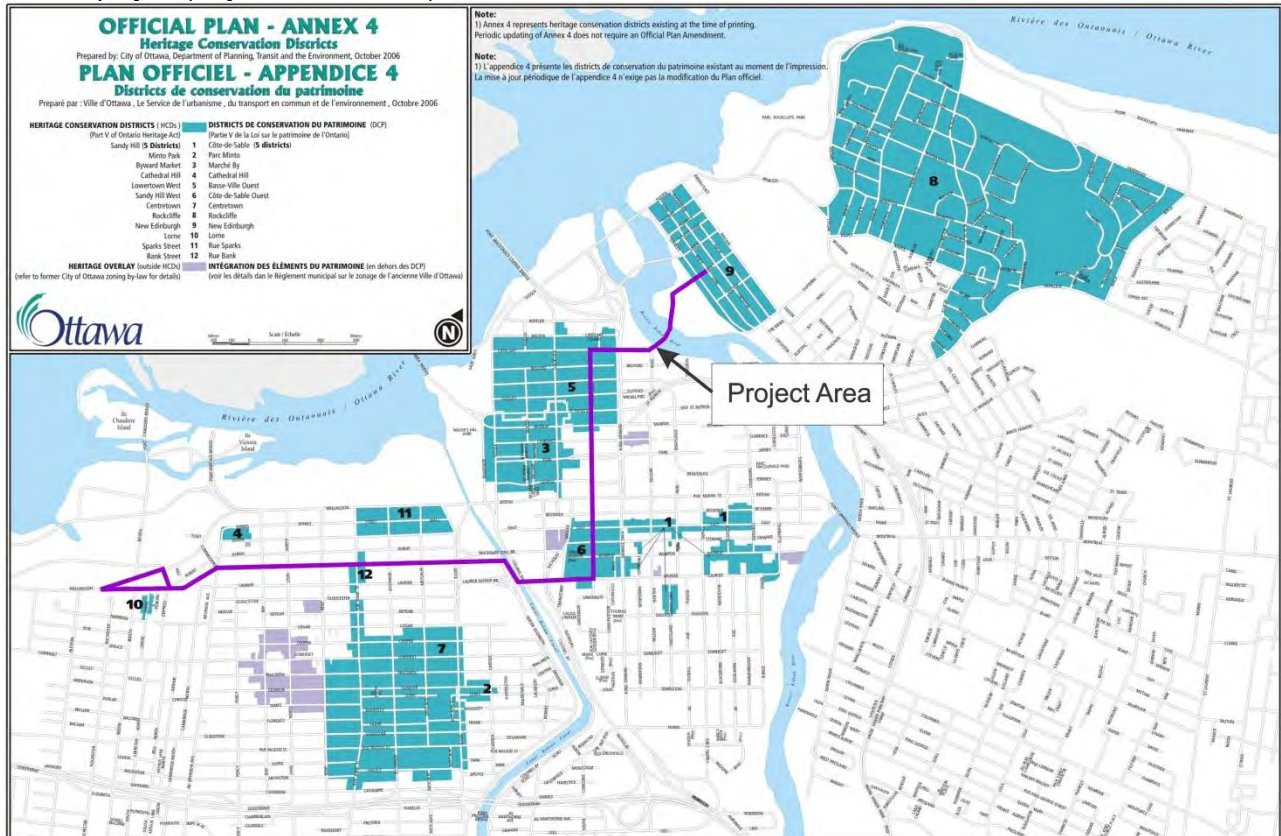


Figure 12: Location of Heritage Conservation Districts within Ottawa and showing the location of the preferred alignment (adapted from the City of Ottawa 2003).

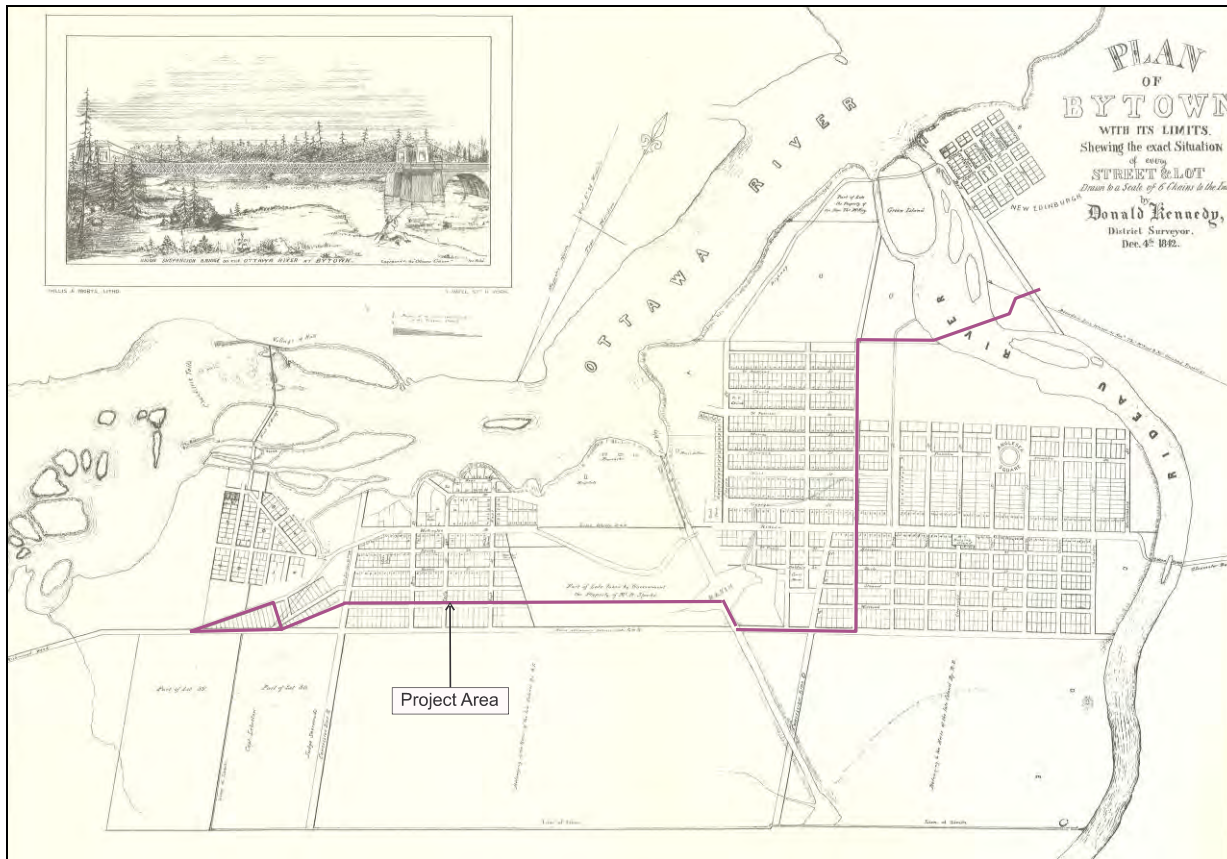


Figure 13: Plan of Bytown by Donald Kennedy Dec. 4, 1842 "Plan of By Town showing the proposed fortifications; Land taken from Mr. Sparks, Lot No. C in Con C also Crown Reserve O (Adapted from DeVolpi 1964). Showing the approximate location of the Project Area.

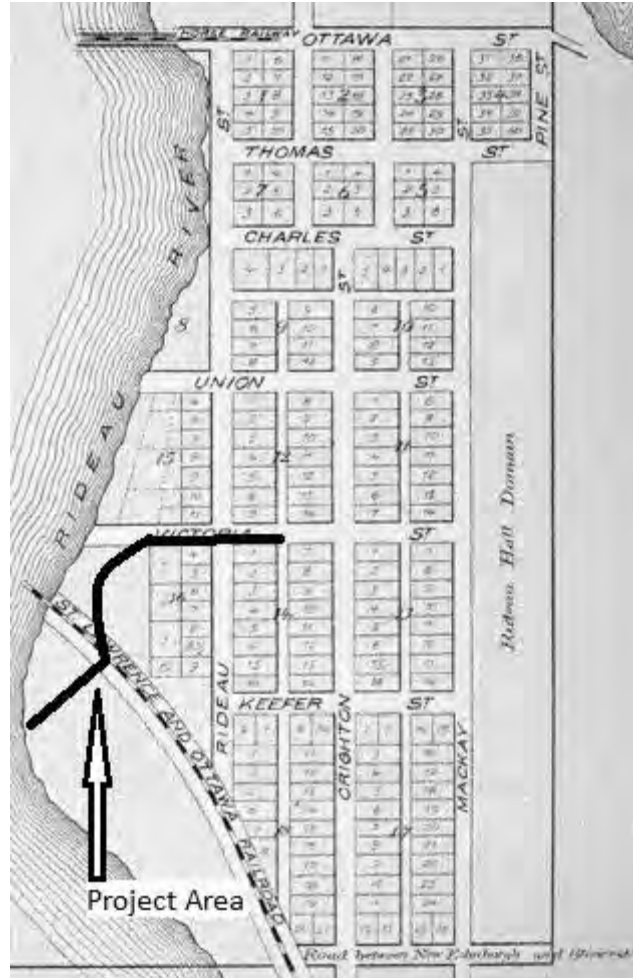


Figure 14: 1878 map of New Edinburgh showing the approximate location of the Project alignment (Belden 1878).

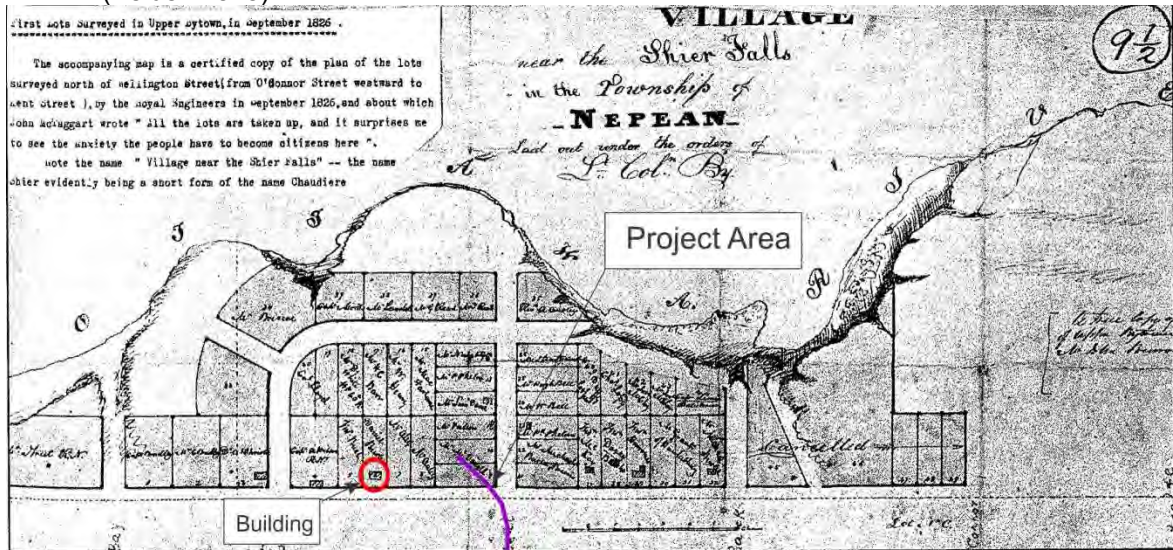


Figure 15: 1826 map of Bytown drawn by Colonel By showing the approximate location of the Project alignment in relation to a building that would be located on the present grounds of the Supreme Court of Canada (Elliot 1991).

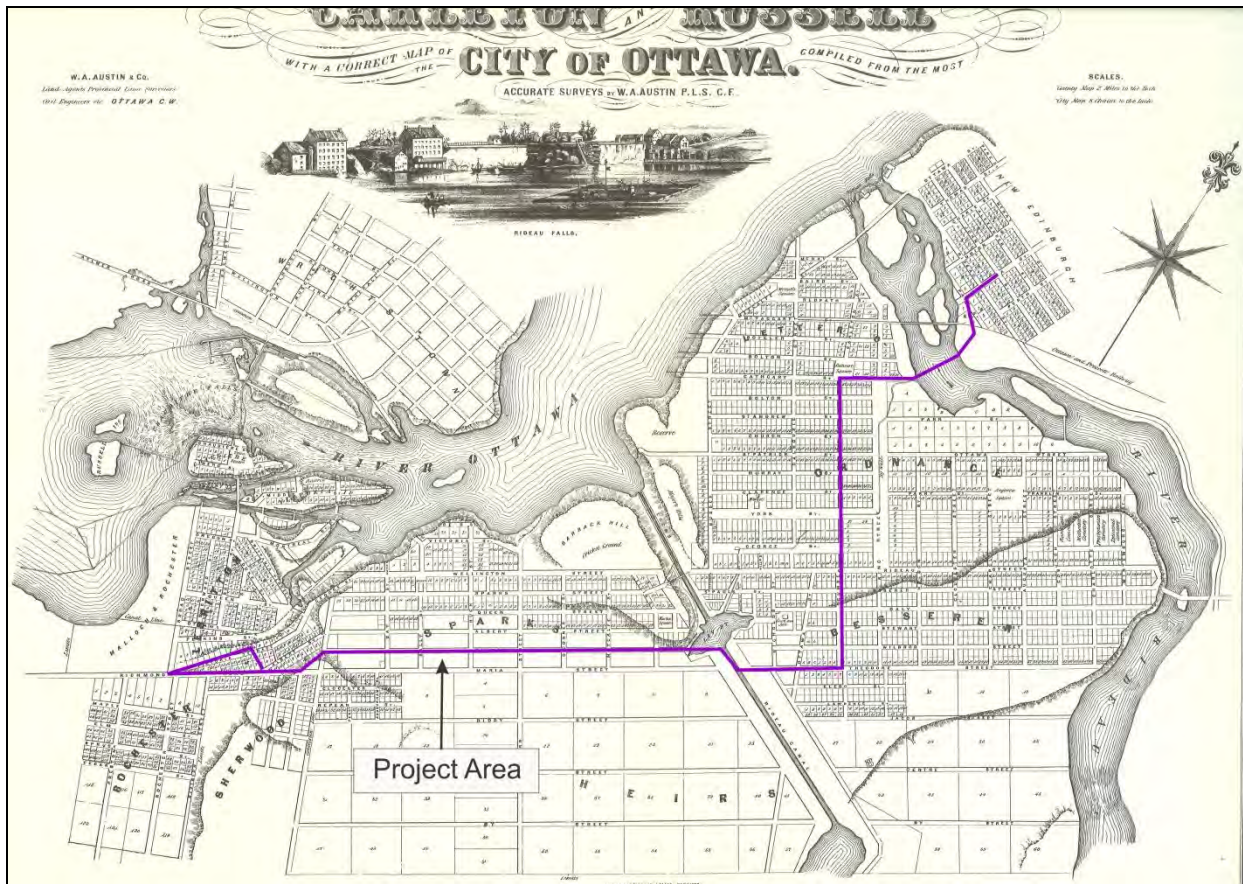


Figure 16: 1858 Ottawa map by W.A. Austin (Adapted from DeVolpi 1964).

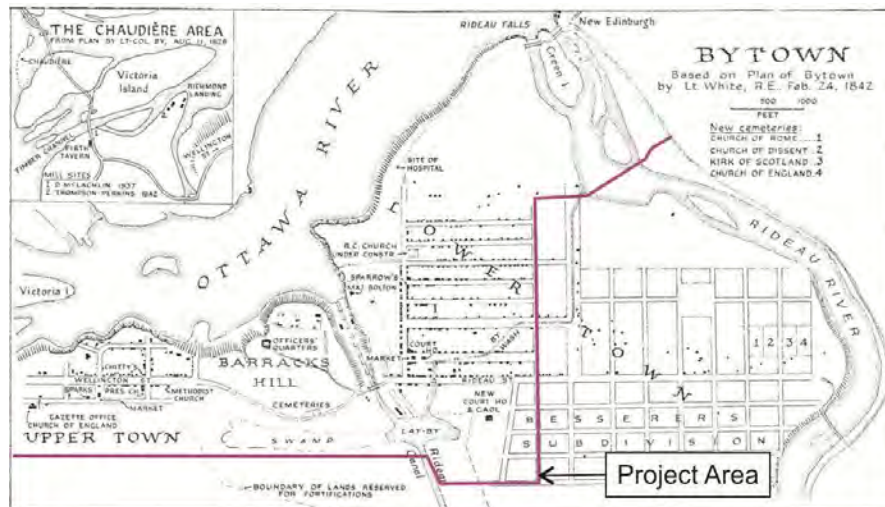


Figure 20: Plan of Bytown by Lieutenant White, R.E Feb. 24, 1842 (Bytown or Burst 2012). Showing the approximate location of the Project Area.

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- Lot 40 Concession A on Ottawa River
- Lot 40 Concession 1 on Ottawa River
- Lot B Front C
- Lot C Front C
- Lot D Front C
- Lot E Front C
- Lot F Front C
- Lot A Broken Front D
- Lot B Broken Front D
- Lot C Broken Front D
- Lot D Broken Front D
- Lot 4 Gore
- Lot 5 Gore

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# **APPENDIX A**

## **Land Registry Information**

MAR 17 1957

NOTICE: This is a copy of the original record as it appears in the original record. It is not a certified copy. It is not a true and correct copy. It is not a true and correct copy.

REGISTRATION NO. 11293  
PLAN CONCESSION NO. 1 OTTAWA FRONT

LCT 39

PLAN Concession No. 1 Ottawa Front

PAGE NO. 1

REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REMARKS
	Potent	27 Feb '55		Crown	James Rochester		156 acres, All.
OT 4621	B & S	12 Jne '50	15 Jne '50	John Rochester	James Rochester		2 acres, Part of lot 39.
OT 11293	Mort	2 Jly '57	4 Jly '57	James Rochester & M.	Richard Austin	\$ 960	2 acres, Part of lot 39.
	Plan	17 Jne '57	4 Feb '58	James Rochester	Proprietor.		
OT 14327	P. of M.	27 Jne '59	28 Jne '59	Richard Austin	James Rochester		2 acres, Part of lot 39 See No. 11213.
OT 14328	Mort	27 Jne '59	28 Jne '59	James Rochester & M.	Richard Austin	\$ 400	2 acres, Part of lot 39
OT 16192	P. of M.	27 Jne '60	27 Jne '60	Richard Austin	James Rochester		2 acres, Part of lot 39 See No. 14328.

MICROFILMED DEC 21 1961

1/1

1/1



Chateau Laurier & part of Major Hill part of Lot B  
Cor. B. Rideau Hill

REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REMARKS	
57251	Lease	Sept 1/11	Sept 1/11	S. C. O. Lease Supply, Dominion Railways and of Great Canada Hotels Limited	Canadian National Hotels Limited	Part lease	Part of section	
58453	Order	Jan 1/11	Jan 2/11	S. C. O. Lease Supply & division of Great Canada Limited	Canadian National Railways & Chateau Laurier Hotel	Part lease	Order discharging 571324, 571400, 571499, 571500, 571816, & discharging 573397	
				See Report 4R-640 as reference plan reports 1 to 9 and 20, 21, 22 See Report 4R-672 as reference plan reports 1 to 3 See Report 4R-706 as reference plan reports 1, 3, 3 See Report 4R-229 as reference plan R. P. Part 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 See Report 4R-102 as reference plan, reports 1, 2, 3, 4, 5, 6, 7, 8, 9, 11				
57383	Mortgage	May 6/15	May 6/15	Canadian National Hotels, Limited & Canadian National Railway Company	National Planning Supply Limited	Part lease	Amount of claim \$6,366.62	
6688	Lease	Dec 11/74	Apr 15/75	The Corporation of the City of Ottawa	National Capital Commission	Ports 6, 9, 21+22 on 4R-640.	Subj to lease - no severance	
57197	Lease	Apr 21/15	Apr 21/15	S. C. O. National Planning Supply Limited	Canadian National Hotels Limited, Canadian National Railway Company, City of Ottawa Mechanical Limited	Part lease		
69305	Mortgage	July 2/15	July 2/15	Canadian National Hotels Limited & Canadian National Railway Company	Raymond F. Clarke	Part lease	Amount of claim \$1,729.50	
57192	Mortgage	July 2/15	July 2/15	Canadian National Hotels Limited	Raymond F. Clarke	Part lease	Amount of claim \$2,775.00	
57125	Lease	Aug 1/15	Aug 1/15	Raymond F. Clarke	Canadian National Hotels Limited, Canadian National Railway Company, City of Ottawa Mechanical Limited	Part lease		

See Deposit NS 17795 (29 May 1981) re: lot B, O.L. re: bidal - in - Council No. P.C. 1981-6/1114	See Deposit SR 5894 (12 August 1981) being a reference plan, being part lot B, O.L. re: parts 10, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36	See Deposit SR 5477 (2 Jan 1980) being a reference plan, being part lot 'B', A.S.L. re: parts 1, 2, 3, 7, 8, 9, 10 of 11. Ref. Instr. 160526, 171826	See Deposit SR 5474 (Jan 3, 1981) being a reference plan, being part lot B above: lot 1-6. re: parts 1, 2, 3, 4, 5 and 6 of SR 5474. Subject to restrictive covenants. See tax affidavit. See Instruments.
See Deposit NS 17795 (29 May 1981) re: lot B, O.L. re: bidal - in - Council No. P.C. 1981-6/1114	See Deposit SR 5894 (12 August 1981) being a reference plan, being part lot B, O.L. re: parts 10, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36	See Deposit SR 5477 (2 Jan 1980) being a reference plan, being part lot 'B', A.S.L. re: parts 1, 2, 3, 7, 8, 9, 10 of 11. Ref. Instr. 160526, 171826	See Deposit SR 5474 (Jan 3, 1981) being a reference plan, being part lot B above: lot 1-6. re: parts 1, 2, 3, 4, 5 and 6 of SR 5474. Subject to restrictive covenants. See tax affidavit. See Instruments.

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REGISTRATION NUMBER	ACQUISITION DATE	GRANTOR	GRANTEE	CONVEYANCE NO.	LAND AND RESERVE
See Deposit NS 17795 (29 May 1981) re: lot B, O.L. re: bidal - in - Council No. P.C. 1981-6/1114	See Deposit SR 5894 (12 August 1981) being a reference plan, being part lot B, O.L. re: parts 10, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36	See Deposit SR 5477 (2 Jan 1980) being a reference plan, being part lot 'B', A.S.L. re: parts 1, 2, 3, 7, 8, 9, 10 of 11. Ref. Instr. 160526, 171826	See Deposit SR 5474 (Jan 3, 1981) being a reference plan, being part lot B above: lot 1-6. re: parts 1, 2, 3, 4, 5 and 6 of SR 5474. Subject to restrictive covenants. See tax affidavit. See Instruments.	1981-6/1114	Part of lot, parts 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19. Ref. Instr. No. 2
5R-6023 R-Plan	28 09 81	Parts 37, 42, 44, 45, 49, 50	re: instr. no. 2, 555943	-	Part being parts 1, 2, 3 re: instr. 526178, 395019, 395013
MICROFILMED 870181981					
4R-953 R-Plan	08 03 74				
entered 25-10-82					

LOT B

CONCESSION C.R.F.

CONTINUED FROM PREVIOUS PAGE

REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION \$	LAND OWNERS
See Deposit NSI 7195 (29 May 1981)				lot B, 2 L	re: council no. P.C. 1981-6/1114		
See Deposit SR 5884 (12 August 1981)				being a reference plan, being part lot B or re: Parts 19, 27, 29, 35, 36, 37, 44, 45, 49, 50	re: mat. no. 2, 552945,		19, 27, 29, 35, 36, 37, 44, 45, 49, 50
SR 6023	R-Plan		28 09 81				Part 401, Parts 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
	MICROFILMED	DEC 16 1981					Part being Parts 1, 2, 3
4R-853	R-Plan		28 03 74				re: insts 526178, 335019
	entered	28-10-82					335018
TR-679A	R-Plan		07 11 82				Pt. re: pts 1 to 7
NS 12348	Grant		21 12 82	Canadian National Railway Co.	Her Majesty The Queen	\$1.00	Pt. re: being pt. 3 on SR-853
SR-6966	R-Plan		20 01 83				Pt. re: pts. 1, 2 & 3
NS 229504	Notice of lease		16 02 84	ZUNDER, Israel ZUNDER, Samuel ZUNDER, Mark, et al Zunder Bros.	Cameron McLaren Inc.		Part 501. Together with right?
NS 241233	Grant	CORRECTED 02/10/85 - DEP. REG. B	31 05 84	Her Majesty The Queen	National Capital Commission		Part. 01
SR-9386	R-Plan		17 10 85				Pt. 01. Re: Pts. 1 & 5. Rec. No. 176826.
N 369114	Grant		16 12 86	H.M. The Queen - "Canada"	National Capital Commission		Pt. 01, being pt 1, 2, 3, 8, 9 & 10 on SR-470. Save & except pty desc'd.
H406456	Grant		02 09 87	H.M. The Queen (Canada)	Canadian National Railway Co.		Part. being pt 2 on SR-853
H406457	Agt		02 09 87	H. M. The King	Canadian National Railway Co.		Part. plan attached

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	AMOUNT	REMARKS
N411343	Court Order		07 10 87	SCO			Dis. Const. Lien 47131 Vacates Cert of Action 47131
N411344	Court Order		07 10 87	SCO			Dis. Const. Lien 47133 Vacates Cert of Action 47133
N411345	Court Order		07 10 87	SCO			Dis. Const. Lien 47134 Vacates Cert of Action 47134
N414624	Agt		02 11 87	The Regional Municipality of Ottawa -Carleton	Canadian National Railway Co.	\$1.00	RR: Encroachment Agt. Pt.  Pt. RE: Pt. 1.
SR-1457	R-Plan		11 12 87				
N 425982	N of Lease		02 02 88	Canadian National Railway Co. Canadian National Hotels Ltd.	Little Wings Co. Ltd.		Pts, being pt 2 & 3 on 42-853. Save & except & reserving as desc'd. As in CR 397148, NS 173418, CR 385019, N 406456 & 526178.
N 425983	N of Lease		02 02 88	Canadian National Railway Co. Canadian National Hotels Ltd.	Little Wings Co. Ltd		Pts, being pt 2 & 3 on 42-853. Save & except & reserving pts desc'd. As in CR 397148, NS 173418, CR 385019, N 406456 & 526178.
SR-11600	R-PLAN		10 02 88				Pt. RE: Pts. 1 to 25 inclusive RE: 385018, 385019, 397148, 526178, & NS 24123.
N431830	Court Order		30 03 88	SCO			Dis. Const. Lien 667333 Vacates Cert of Action 667333
N431831	Court Order		30 03 88	SCO			Dis. Const. Lien No. 673363 Vacates Cert. of Action 673363

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ABSTRACT INDEX

100000 2000

LOT B

CONCESSION

C.R.F.

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REGISTRATION NUMBER	INSTRUMENT	REGISTRATION DATE DAY MONTH YEAR	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REGISTRATION
N432410	Grant	31 04 88 <i>03 11 Apr 88 ML</i>	Canadian National Railway Co.	Canadian Pacific Hotels Corp.	<del>549,000.00</del> 949,000.00	Pt. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 19, 21, 23, 25, 26 on plan SR-11500.
N432431	Grant	31 04 88 <i>03 11 Apr 88 ML</i>	Canadian National Railway Co.	Canadian Pacific Hotels Corp.	\$1.00	Re Plan attached to 5406457.
N432555	Agt	05 04 88	The City of Ottawa	Canadian National Railway Co.		RE: Encroachment Pts. being Pts. 1, 6 & 26 on SR-11500.
N 433084	Const. Lien	18 04 88	Canadian National Railway Co.	Labourers International Union of North America, Local 527, Benefit Trust Funds CARROZZI, Bernardino, Trustee	544,000.00 + Costs Pt. as in N-406456.	<i>9</i>
N452758	Dis	23 08 08	Labourers International Union of North America, Local 527, Benefit Trust Funds CARROZZI, Bernardino, Trustee	Canadian National Railway Co.		Const Lien N433084 <i>9</i>
N480794	A of Encroachment Agt	30 03 89	Canadian National Railway Co.	Canadian Pacific Hotels Corp.		Encroachment Agt No. N432555.
SR-12619	R-Plan	07 04 89				Pt. RE: pts 1 and 2 RE- R02
***** ENTERED 06 07 89 DEP LAND REG **553943 QC ENTERED 05 07 89 DEP LAND REG.	Deposit	27 09 1968 021 01 1969	See Deposit NO. 12171 Canadian Pacific Railway Co.	National Captial Commission		Pt. 01, being pt 101 & 105 on Deposit No. 12171.
N521780	Assignment	90 01 80	Canadian Pacific Hotels Corp.	The Regional Municipality of Ottawa-Carleton		RE: N414524
N522391	Lien	90 02 05		Genille Dienne Inc.	524,000.12	Pt. being pts. 1 to 14 incl. 15, 17, 23, 25 & 26 on SR-11500. <i>9</i>

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TOWNSHIP OF NEPEAN

LOT

C

CONCESSION

C

Release Front

REGISTRATION NO. CASE	INSTRUMENT	DATE OF INSTRUMENT	CONVEYANCE DATE	GRANTOR	GRANTEE	SECTION	LAND AND PARTS
	Patent	18 Sept. '23		Crown	John B. Honey	100 acres	S 1/2
	Patent	17 June '24		Crown	John B. Honey	110 acres	N 1/2
RO54	B. & S.	20 June '26	20 June '26	John B. Honey	Nicholas Sparks	All	
RO96	Lease	9 Feb. '27	1 June '27	Nicholas Sparks	Thomas McKay	All	
RO321	B. & S.	10 May '30	14 May '30	John B. Honey	Nicholas Sparks	All	
RO482	Release	2 Nov '31	2 Feb. '32	Coln. By.	Crown		Prescribed as 3 sq. ch. of this lot.
41571 SEE RELOAD 14126 3722	Patent	11 May '68		Crown	Daniel McLachlan		One Third
323888	Cont.	July 21/54	July 23/54	The Crown	John B. Honey		South 1/2 R: Patent
323889	Cont.	July 21/54	July 23/54	The Crown	John B. Honey		North 1/2 R: Patent
490468	Notice	March 5/65	March 8/65	Corporation of Ottawa	The Certificate of Titles Act		Part unimproved street
	See deposit	R-13					Allowance between lots 32 & 33
703704	Procurement	Feb. 17/76	Feb. 2/77	Her Majesty The Queen represented by Minister of Public Works	The Bell Telephone Company of Canada		North Queen St. part desc. etc.
	See deposit	4R-2253	a reference plan				parts 3, 4, 5, 6, 7, 8, 9, 10 re: 241147.
	See deposit	4R-2254	a reference plan				parts 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 8, 23, 24, 25, 26, 27, 29, 30, 37-44.
RO4187	B. & S.	11 May 1841	12 May 1849	Daniel McLachlan & wife	Nicholas Sparks		A lot C.A.O.?
	(Entered 12 Sept. 1978)						
RO19136	R.D.	22 April 1862	22 April 1862	Sarah Sparks	Nicholas Sparks		Pt. 1 of C.A.O.?
	(Entered 12 Sept. 1978)						
3922	Plan	20 Mar. 1863	24 Mar. 1869	Proprietor	Sparks Estate		Subdivision of Lot C, Con. C.
	(Entered Jan. 30/79)						
80053 - see below							
	SEE DEPOSIT NO. SR-4106 (Feb. 1st. 1929) BEING A REFERENCE PLAN BEING PART OF LOT "C", A.C.L. RE: PART 3						
NS 66513	By-law	5 Sept. 1979	11 Sept. 1979	The Corporation of the City of Ottawa	By-law no. 239-79		Part of lot C. A.O.L. See note
NS 90661	By-law	2 July 1980	10 July 1980	The Corporation of the City of Ottawa	By-law 239-80		Pt. lot C. A.O.L. - see note
CR 80053	Release	26 Dec. 1905	24 Jan. 1907	Nicholas C. Sparks et al.	His Majesty King Edward the Seventh		Part of lot C. A.O.L. See note
	(Entered 5 April 1980)						
	See deposit SR-5557 (26 Feb. 1981) Being a reference plan being part of lot C, A.O.L. re: part 66 (AMENDED UNDER ORDER NO. NS 11353)						
	See deposit SR-5653 (23 April 1981) Being a reference plan being part of lot C, A.O.L. re: parts 4, 5, 6, 7, 8, 9 and 10.						
	re: instrument no. 80053						
	See deposit SR-5671 (24 April 1981) Being a reference plan being part of lot C, A.O.L. re: parts 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.						

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	AMOUNT OR VALUE	LAND AND RELATIONS
NS 115663	Grant		May 1981	Her Majesty the Queen	The Corp. of the City of Ottawa	\$239,525	Part of lot C, O.L. shown as parts 1, 4, 5, 6, 7, 8 and 9 on SR-5653. See tax affidavit. See instrument.
NS 117134	Let of abutment		20 May 1981	Director of Titles Her Majesty the Queen in right of Canada as represented by Minister of Public Works	Her Majesty the Queen		See Deposit SR-5715 (20 May 1981) Being a reference plan. Being parts lot C, (being part of ordinance lands) O.L. re: Part 1, 2. re: 80053. Part lot C described. See Instruments.
NS 119019	Grant		3 June 1981	Her Majesty The Queen	The Corporation of the City of Ottawa	\$386,514.00	Part of lot C. O.L. See tax affidavit. See inst.
NS 119457	Grant		9 June 1981	Her Majesty the Queen	Viking Rideau Corporation	\$16,588	Parts lot C, being parts 1, 2, 3 on SR-5727 & Part 2 on SR-5725. Air space and rights on part 1 on SR-5728. O.L. See inst.
NS 119459	Mortgage		9 June 1981	Viking Rideau Corp. Artich Properties Ltd. between one Corp. Artich Properties Ltd.	Her Majesty the Queen in Right of Canada	\$466,350	Part lot C, O.L. being parts 5, 10, 12 to 22, 24 to 26, 27 & 28 on SR-5671 & parts 1, 2 and 3 on SR-5725. Subject to vacant land described. See inst.
NS 119460	Lease		9 June 1981	Viking Rideau Corporation	Westin Hotel Company Limited. W.I.H. Holdings Ltd.	\$1,999,935	Part of lot C, along with air space, O.L. being parts 1, 2 and 3 on SR-5727. Reversing easement on parts 2 and 3 on SR-5727. See inst.
NS 119461	Agreement		9 June 1981	Her Majesty the Queen in Right of Canada	Westin Hotel Company Limited		Part of lot C, along with air space, O.L. being parts 1, 2 and 3 on SR-5727. Reversing easement on parts 2 and 3 on SR-5727. See inst.

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CONTINUED FROM PRECEDING PAGE

REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	AMOUNT \$	REMARKS
NS119462	Letter of Lease	9 June 1981	9 June 1981	Viking Rideau Corporation	The J. Latour Company Limited	\$6,700. <sup>00</sup>	Air space and rights over lot C, of being part 1 on SR-5725. See Dist.
<del>NS119525</del>	<del>Assignment</del>	<del>10 June 1981</del>	<del>10 June 1981</del>	<del>Viking Rideau Corporation</del>	<del>Her Majesty the Queen</del>		<del>Air space and rights over part lot C, of being part 1 on SR-5725. See Dist.</del>
<del>NS119526</del>	<del>Assignment</del>	<del>10 June 1981</del>	<del>10 June 1981</del>	<del>Viking Rideau Corporation</del>	<del>Her Majesty the Queen</del>		<del>Part of lot C along with air space, of being part 1, 2 and 3 on SR-5725. Remaining 200m<sup>2</sup> on parts 2 and 3 on SR-5725. See Dist.</del>
NS119543	Grant	10 June 1981	10 June 1981	Her Majesty the Queen	Viking Rideau Corporation	\$42,764. <sup>13</sup>	Part lot C, including air space, of being parts 51 to 12, 16, 24, 34, 37 & 40 on SR-5671 and parts land on SR-5725. Also parts 1, 2 and 3 on SR-5725. Also part 1 on SR-5728. Also part 2 on SR-5725. Subject to covenants depicted. See Dist.
NS119544	Mortgage	10 June 1981	10 June 1981	Viking Rideau Corp. Leland Properties Ltd. Leland Inc. Corp. Estates Ltd.	Her Majesty the Queen	\$66,352. <sup>00</sup>	Part lot C, of being parts 5, 10, 12, 22, 24, 35, 37 & 40 on SR-5671, and part 1, 2 on SR-5725. Subject to covenants depicted. See Dist.
	DISCHARGED BY		96-12-06				
NS119545	Lease	10 June 1981	10 June 1981	Viking Rideau Corp.	Regional Municipality of Ottawa-Carleton	\$1. <sup>00</sup>	Part lot C, of including air space, being parts 1, 2 on SR-5715. Subject to covenants depicted. See Dist.
NS119546	Assignment	10 June 1981	10 June 1981	Viking Rideau Corp.	Her Majesty the Queen		Part lot C, including air space, being parts 1, 2 on SR-5715. Subject to covenants depicted. See Dist.

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	ASSIGNMENT DATE	GRANTOR	GRANTEE	REMARKS	LEGAL DESCRIPTION
NS11547	License		10 June 1981	Viking Rideau Corp.	Metropolitan Stores of Canada Ltd.		Part lot C, 01, being parts 5-10, 12-22, 24-35, 37-40 on SR 5671 & Parts 1, 2 on SR 5725. Subject to basement described.
NS11548	License		10 June 1981	Viking Rideau Corp.	Charles Ogilby Limited		See Ind. Part lot C, 01, being parts 5-10, 12-22, 24-35, 37-40 on SR 5671 & Parts 1, 2 on SR 5725. Subject to basement described.
NS11549	Agreement for Sale		10 June 1981	Viking Rideau Corp. Bated Properties Ltd. Litcom Inc. Dup Estates Ltd.	Her Majesty the Queen		See Ind. Part lot C, 01, being parts 5-10, 12-22, 24-35, 37-40 on SR 5671 & Parts 1, 2 on SR 5725. Subject to basement described.
See deposit NS119550			10 June 1981				Re: Part lot C, 01, being parts 1, 2 on SR 5715. Subject to basement described.
NS119634	Site Plan Agreement		11 June 1981	Viking Rideau Corp.	The Corp. of the City of Ottawa	\$1.00	Part lot C, 01, being parts 5-10, 12-22, 24-35, 37-40 on SR 5671 & Parts 1, 2 on SR 5725. Subject to basement described. See Ind.
NS119635	Amendment to Site Plan Agreement		11 June 1981	Viking Rideau Corp.	The Corp. of the City of Ottawa	\$1.00	Part lot C, 01, being parts 5-10, 12-22, 24-35, 37-40 on SR 5671 & Parts 1, 2 on SR 5725. Subject to basement described. See Ind.
NS124600	Notice of Lease		31 OF 21	Viking Rideau Corp.	Litcom Inc., c.o.b. as City Building	Term: 7 years	Part lot C, 01, being parts 5 to 10, 12, 22, 24 & 35, 37 to 40 on SR 5671 and parts 1 and 2 on SR 5725. Subject to basement described. See Ind.

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TOWNSHIP OF NEPEAN

Lot No. x

Concession No. G. 2.7.

NO. OF INSTRUMENT	INSTRUMENT	ISS DATE	DATE OF REGISTRATION	ORIGINATOR	GRANTEE	QUANTITY OF LAND	CONSIDERATION	REMARKS
	Patent	20 May '01		Crown.	Erasm MaQueer.	400 acres	All with Lot D,	
RO 485	D. P.	31 Jan '32	3 Feb '32	Alex. McQueen.	Er. McQueen.	All.		
RO 489	B. A. S.	6 Feb '32	20 Feb '32	Er. McQueen.	Coln By.	All.		
		16 Feb '72		Crown.	Joseph Gilhansen.	Sub-lot 4.		

*See Ejectment 410-2063, a reference plan, re Part 1,*

FOR FURTHER ENTRIES

SEE PAGE 24 IN BOOK C-7

MICROFILMED DEC 16 1981

SEE Book NEPEAN-7 (1995) PP

NOTICE

VI. The land in this abstract index is implemented as of

JUN 24 1996

Under part II of the L.R.R.A., 1994, and all qualified properties are registered under the Land Titles Act pursuant to Sec. 32. All registrations subsequent to this date are recorded in the parcel register set out in Schedule (11.1) of the Land Titles Act.

Conc C, Lot F

TOWNSHIP OF NEPEAN

Lot No. D

Concession No. S. R.F.

No. of Attachment	Instrument	Date	Date of Deed	GRANTOR	GRANTEE	Quantity of Land	Concession	REMARKS
	Patent	20 May '01		Crown.	Grace McQueen.	All.		
RO 485	D. P.	31 Jan '32	3 Feb '32	Alon. M. Green.	Ed. McQueen.	All.		
RO 489	B. A. S.	6 Feb '32	10 Feb '32	Ed. McQueen.	Coln. By.	All.		
	Patent	11 Feb '71		Crown.	Jessie Birkett.	Part. 30 P.		
	patent	20 Feb '71		Crown.	Ed. Lehos.	Sub lot 1, 2, 3, 10		
	Patent	27 Mch '72		Crown.	Thomas McDermott.	Part.		
	Patent	4 Aug '72		Crown.	Charles Hesterston.	Part. 6 P.		
	Patent	2 Jan '85		Crown.	Abraham Pratt.	35.5 Acres		

See Depoat 44-2063 a reference plan, re Part 1, 2, 3, 4, 16, 12, 13

FOR FURTHER ENTRIES

SEE PAGE 24

IN BOOK C-7

MICROFILMED DEC 16 1981

(Wey)

SEE PAGE 24 BOOK NEPEAN-7 (1995) P.P.  
PLEASE SEE CON. 'D' R.F.

ff NOTICE  
This land is the subject of a lease to the Government

conc C, Lot D

1/1

TOWNSHIP OF NEPEAN

Lot No. "F"

Concession No. C R.F.

No. of Instrument	Instrument	In Date	Date of Register	GRANTOR	GRANTEE	Quantity of Land	CONSIDERATION	REMARKS
RO 602	Patent	20 May '01		Crown.	William Fraser.	All.		
RO 603	Partition	14 Nov '31	8 Jan '34	Isabella Fraser.	Alex. McD. Leill.	All.		
RO 603	B. A. B.	8 Aug '33	8 Jan '34	Alex. McDonnell et ux.	Mr. Stewart.	All.		
<del>RO 7078</del>	<del>Mortgage</del>	<del>25 July '42</del>	<del>27 July '42</del>	<del>Mr. Stewart et ux.</del>	<del>Thomas Fraser</del>	<del>All.</del>	<del>£111. 33 5</del>	
<del>RO 13404</del>	<del>D. E.</del>	<del>27 Nov '56</del>	<del>15 Jan '57</del>	<del>Isabella Patton.</del>	<del>Mr. Stewart.</del>	<del>All.</del>	<del>See No. 2570.</del>	
RO 26546	Award	17 July '66	27 Sep '66	McLeod Stewart et al	Gloucester Ed. Co.	Part.		
<del>RO 22857</del>	<del>Mortgage</del>	<del>2 Dec '66</del>	<del>3 Jan '68</del>	<del>Isabella Stewart et al</del>	<del>Robert Reid.</del>	<del>All.</del>	<del>20 acres. \$2000.</del>	
NP 161	B. A. B.	6 Apr '69	8 Apr '69	Francois I. Dase et ux	Francois Curran.	Part 2 1/2 and 2 1/2		of Sublot 23 & 24.
<del>NP 249</del>	<del>Mortgage</del>	<del>12 July '69</del>	<del>23 July '69</del>	<del>O. &amp; G. Road Co.</del>	<del>Margaret Mallock.</del>	<del>Part.</del>	<del>\$5300.</del>	
<del>NP 250</del>	<del>Mortgage</del>	<del>12 July '69</del>	<del>23 July '69</del>	<del>O. &amp; G. Road Co.</del>	<del>Robert H. McGreevy.</del>	<del>Part.</del>	<del>\$585.75</del>	
NP 252	B. A. B.	23 Jan '69	23 July '69	Cath. Stewart et al	O. & G. Road Co.	Part.		
	P. L. A. E.	15 Aug '68	15 Nov '69	From Department of	Secretary of State	Part.		
<del>NP 476</del>	<del>A. of W.</del>	<del>11 Dec '70</del>	<del>5 Jan '71</del>	<del>Robert H. McGreevy</del>	<del>Ed. McCallister et al</del>	<del>Part.</del>	<del>Footings No. 258.</del>	
				by attorney.				
NP 740	Will	20 Nov '56	8 Apr '71	Mr. Stewart.	John Durie et al	All.		
<del>NP 809</del>	<del>D. E.</del>	<del>3 Jan '72</del>	<del>3 Jan '72</del>	<del>Robert Reid.</del>	<del>McLeod Stewart et al</del>	<del>All.</del>	<del>See No. 2527.</del>	
30	P. L. A. E.	29 Nov '71	15 Dec '71	McLeod Stewart.	Proprietor.			R. C. Page 152.
<del>NP 2255</del>	<del>D. E.</del>	<del>16 May '72</del>	<del>16 May '72</del>	<del>Margaret Mallock.</del>	<del>O. &amp; G. Road Co.</del>	<del>Part.</del>	<del>See No. 249. Part 2 1/2 &amp; 2 1/2.</del>	
<del>NP 2277</del>	<del>D. E.</del>	<del>May '72</del>	<del>20 May '72</del>	<del>Ed. McCallister et al</del>	<del>Robert McGreevy.</del>	<del>Part.</del>	<del>See No. 250.</del>	
	Patent	4 Dec '73		Crown.	Thomas Ballantyne.	1 R. 30		to P. Sublot 28 & 29. See Plan for lots.
NP 2553	B. A. B.	1 Nov '74	21 Nov '74	Thos. Ballantyne et	Jos. Ouillette.	Part		Sub-lots 28 & 29. See Plan in EX B. 379.
NP 3243	Release	21 Dec '74	21 Dec '74	McLeod Stewart	Catherine Stewart et	Parts.		
				Cath. Stewart et al	McLeod Stewart.	Parts.		
	P. L. A. E.	20 Nov '77	31 Nov '77	Sub. of Lots 21 of Lot	Y. Con D & Lot Y. Con C. also of Lot 11 of Lot Y. Con D. See page 616			
NP 47031	Deed	3 Oct '95	6 Nov '95	Louis Dubois & V.	Joseph Landrian.	Part.		described. A Right of way. \$500.

Conc C, Lot F

Part of Lot F Concession C. Rideau Front

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REGISTRATION NO.	TYPE	DATE	DATE	GRANTOR	GRANTEE	AMOUNT	DESCRIPTION
116720	B & S	Aug 15 1882	Dec 9, 1912	Canada Atlantic Ry Co.	James Ballantyne	\$1.00	Pt. desc.
<del>179213</del>	<del>Grant</del>	<del>May 26/25</del>	<del>May 29/25</del>	<del>Isa M., Norman F. &amp; Adam</del>	<del>Isa M. Ballantyne</del>	<del>\$1.00</del>	<del>Part desc. etc.</del>
<del>THIS ENTRY RULED OUT IN ERROR.</del>							
184537	Lease	May 1/26	July 14/26	Adam Ballantyne	J. & T. Ballantyne Ltd.		Part desc. etc.
198217	Grant	Sept 19/29	Oct 11/29	Adam Ballantyne et ux, Norman F. Ballantyne	Corporation of Ottawa	\$1.00	Part desc. etc. covenants as thersin
198218	Grant	Sept 19/29	Oct 11/29	Norman F & Adam Ballantyne adms. of Isa M. Ballantyne	Norman F J Adam Ballantyne	\$1.00	Part desc.
198219	Grant	Sept 19/29	Oct 11/29	Adam Ballantyne et ux	Corporation of Ottawa	\$1.00	Part desc. etc. covenants as the rec
200622	Grant	May 15/30	June 6/30	Adam Ballantyne et ux	J & T Ballantyne Ltd.	\$13,000.	Part desc. etc.
<del>200623</del>	<del>Mort</del>	<del>May 15/30</del>	<del>June 6/30</del>	<del>J &amp; T Ballantyne Ltd.</del>	<del>Adam Ballantyne</del>		<del>Part desc. etc. \$9000.00 5% not rec in full</del>
<del>294128</del>	<del>D of M</del>	<del>Mar 29/46</del>	<del>Sept 4/59</del>	<del>Toronto Gen. Trusts Corp</del>	<del>Norman F. Ballantyne Exor.</del>		<del>As in 200523 D of 200623</del>
<del>394354</del>	<del>Mort</del>	<del>Sept 9/59</del>	<del>Sept 10/59</del>	<del>J &amp; T Ballantyne Limited</del>	<del>Wallace Barrington</del>		<del>Part desc. etc. \$30,000. 7 1/2%</del>
435826	Descript	May 27/61	Nov 27/61	National Capital Commission (Expropriation)			Part desc. etc. Sketch attached
<del>435917</del>	<del>D of M</del>	<del>Feb 21/62</del>	<del>Feb 28/62</del>	<del>Wallace Barrington</del>	<del>J &amp; T Ballantyne Ltd.</del>		<del>As in 334354 D of 394354</del>
446175	Q.C.D.	May 29/62	July 11/62	J & T Ballantyne Limited	National Capital Commission	\$119,000.	Part as shown on sketch at- tached etc.
* See Deposit No. 10496 Re: Echo Drive							
528040	Patent	June 12/67	July 18/67	The Crown	National Capital Commission		Part etc.
<del>533913</del>	<del>Mort</del>	<del>Oct 20/67</del>	<del>June 3/67</del>	<del>Biola Mazzotta et ux</del>	<del>Antonia &amp; Bambina Peca as</del>		<del>Part of east half desc. &amp; Es of joint-tenants way \$6,634.51 7 1/2%</del>
584667	Designation Plan	Nov 24/70	Dec 4/70	The Crown	Department of Highways (Ontario)		Whole etc. Designation of Highway by order-in Council O.C. 3320/7. See Plan DHO No-P-3469-45

\* 523164 Preliminary Plan Mar 28/67 Apr 3/67 The Crown Department of Highways Acquisition of a Highway under the Highway Improvement Act, 1922, s. 24(3) (Ontario)

\* AR-Plan Dec 2/76 PART BEING Pgs 1, 2, 3, 4, 5 and 6. RE: INS. 528040 (ENTERED 29/10/86 DEP. REG. 8)

\* See Deposit 4R-2101, a reference plan, re Part 1 to 8 incl. re 528040, 435826, 446175

\* See Deposit 4R-358, a reference plan, re Parts 5, 6, 7, 8, 9, 10, 13, 14 re 528040, 446175, 198219, 198217

\* See Deposit 4R-244 a reference plan, parts 1, 2, 3, 6, 14, 15, 24, 25. 528040

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TOWNSHIP OF NEPEAN

Lot No. A

Concession No. D. P. 1

No. of Instruments	Instrument	Date	Type of Acquire	GRANTOR	GRANTEE	QUANTITY OF LAND	CONVEYANCE	REMARKS
RO2	Patent B. & S.	18 Feb 123	4 May 124	Crown.	Crown.	All.		

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VI  
conc B, Lot A

TOWNSHIP OF NEPEAN

Let No. 3.

Concession No. 3. R.P.

No. of INSTRUMENT	INSTRUMENT	Its Date	DATE REGISTERED	GRANTOR	GRANTEE	QUANTITY OF LAND	CONSIDERATION	REMARKS
2 RO2	B. A. G.	18 Jan '23	4 May '24	Hugh Frost	Crown	All		

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57 Conco D, Lot B

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE DAY MONTH YEAR	GRANTOR	GRANTEE	CONSIDERATION \$	LAND AND REVENUES
NS 205355	Grant		19 08 83	Melgro Development Ltd	EYRE, Dean J. EYRE, Patricia N. JT	\$200,503.	13. Together with R-of-Way over Pt. desc'd. o.L. Consent of Planning Board.
*538 231	By-Law 10-60		07 02 68	In the County Court or the County of Carleton			Part lot C. Changing the name of Rideau St. to Rideau Place.
ENTERED AS AHS 1983-DEP. REG.							
NS 205364	PDM.		25 08 83	Central Trust Co.	Melgro Development Ltd.	-	Mort. NS 189307. Together with R of Way over part of lot, discharged.
NS 205365	PDM.		25 08 83	Central Trust Co.	Melgro Development Ltd.	-	Mort. NS 189307. Together with R of Way over part of lot, discharged.
NS 205366	PDM.		25 08 83	Central Trust Co.	Melgro Development Ltd.	-	Mort. NS 189307. Together with R of Way over part of lot, discharged.
NS 205367	PDM.		25 08 83	Central Trust Co.	Melgro Development Ltd.	-	Mort. NS 189307. Together with R of Way over part of lot, discharged.
NS 205368	PDM.		25 08 83	Central Trust Co.	Melgro Development Ltd.	-	Mort. NS 189307. Together with R of Way over part of lot, discharged.
NS 205369	PDM.		25 08 83	Central Trust Co.	Melgro Development Ltd.	-	Mort. NS 189307. Together with R of Way over part of lot, discharged.
NS 208284	Grant		06 09 83	Melgro Development Co. Ltd.	TSE, Geoffrey N. TSE, Agatha Y.	\$195,000.	Together with R. of Way. O.L. Consent under Planning Act.
NS 208285	Mort.		06 09 83	TSE, Geoffrey N. TSE, Agatha Y.	Central Trust Co.	\$145,000.	As in NS 208284.
Discharged to #NS 363633	Asst. Dep. Land Reg.						
NS 209132	Grant		13 09 83	Melgro Development Ltd.	DAGUM, Camilo DAGUM, Estela M. JT	\$195,000.	Together with r-of-way over pts. 3 and 4 on SR-7061. o.L. Consent of Planning Board.
NS 209133	Mort.		13 09 83	DAGUM, Camilo DAGUM, Estela M.	The Royal Bank of Canada	\$136,500.	As in inst. no. NS 209132.

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\* FOR ENTRIES PREVIOUS TO AUGUST 25, 1942  
 AFFECTING LOT C CAN. D. R.F. AS SHOWN  
 ON REGISTERED PLANS SEE ALSO THE  
 ABSTRACTS FOR THE UN-NUMBERED LOTS.

LOT C CONCESSION D (R.F) PAGE NO. 20

REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REMARKS
	Pat. to	Oct 9 / 28		Crown	Louis T. Bessner		Lot letter C in Com. Letter D. Rideau Front (124 ac)
RO 1628	Pat. A Plan	23 Feb / 40	11 Mar / 40 June 17 / 59	Louis T. Bessner James D. Slater Surveyor	Wm. Stewart Louis T. Bessner		Plan of subdivision of lot C in Com. D.
RO 17337	Will Patent	Feb 15 / 60 7 July 1871	Mar 11 / 61	Louis T. Bessner Crown	Devises as therein Helen F. Rayette		18775
See 328414	Deposit Patent	770. 5254-5255+5256	Dec 23 1878 1954	See Crown	Patent Louis T. Bessner		Lot C in Com. letter D. Rideau
See 538234	By-Law	(See entry on following page)					
MICROFILMED	DEC 18 1881						
NS 155915	Deposit		06 07 82				Part as in NS 155082 & O.I.
NS 155082	Grant		30 05 82	The Islamic Republic of Pakistan	Melgro Development Ltd	\$60,000	Part 40.
	- Entered 05-11-82. Pending Dep. Land Reg. Act						
SR-7061	R-Plan		23 03 83				Pt. 0L re: pts 2,3,4,5 re: NS 155082
NS 184647	Mort			Melgro Development Ltd	The Royal Bank of Canada	\$121,000.00	Part of being pts 2,3,4 & 5 on SR-7061
Discharged by #	NS 206700	Part on Land Reg. Act	01/08/83				Consent under the Planning Board.
NS 189519	Mort		05 07 83	Melgro Development Ltd.	The Royal Bank of Canada	\$360,000.00	1-0L being pts 2,3,4 & 5 on SR-7061.
SR-7320	R-Plan		18 07 83		(ENTERED 23/08/83 DEP. LAND REG. ACT)		Part Re: Part 1, re: OI 78735.
NS 203404	Grant		05 08 83	Melgro Development Ltd.	FALARDEAU, RANSAY, Michelle	\$95,000	Together with R-of-Way 30L Consent under the Planning Act
NS 203405	Mort		05 08 83	FALARDEAU, RANSAY, Michelle	Central Trust Co.	9.5	as in NS 203404
Discharged by #	NS 205717	Part on Land Reg. Act	05/08/83		RANSAY, Claude F.		
NS 203417	Grant		05 08 83	Melgro Development Ltd	D'ARCO, Antoinette	\$175,000	Together with R-of-Way 30L Consent under the Planning Act.
NS 203462	By-Law No. 224-83		03 08 83	The Corp. of the City of Ottawa			Dedicating Pt., being pt. 1 on SR-7320 for highway purposes
NS 205223	Grant		01 08 83	Melgro Development Ltd.	O'CONNOR, Edith A.	\$200	Together with R-of-Way 30L on SR-7061 for Consent under Planning Act.
NS 204608	entered previous page						

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE			GRANTOR	GRANTEE	CONSIDERATION P.C.	LAND AND REMARKS
			DAY	MONTH	YEAR				
CR 23390	Grant	Feb 20 1885	Mar 12	1885	Bank of Montreal & J. Gordon (Ex)	Henry F. Bronson		Undivided 1/2 Part as desc'd.	
CR 23392	P.D.W.	Mar 3 1885	Mar 15	1885	Philip Thompson	James Gordon Ex.		Discharge in part of No. 19786	
CR 24400	Sale	Nov 6 1885	Nov 27	1885	Geo. W. Perkins Ad. Ex. et al	Henry F. Bronson		Part desc'd.	
CR 25181	Deed	Jan 15 1886	May 20	1886	James Gordon Ex. et al	Frederick Gundry	\$475.00	The Undivided 1/3 part - the whole to be divided into 3 equal parts - parts as desc'd. & Others	
CR 25192	Release	Jan 15 1886	May 20	1886	James Gordon (Ex) et al	Bank of Montreal		As therein desc'd. & Con. & Other desc'd	
CR 28179	Deed of Port	Apr 10 1888	April 12	1888	Edward L. Perkins et ux	George W. Perkins et al		Portions	
CR 29264	Deed	Oct 15 1888	Nov 21	1888	Bronson & Weston Executors	Bronson & Weston Lumber Co.		Parts desc'd. except part	
CR 31975	Certificate	Feb 24 1890	Feb 24	1890	H.C. of J. Chancery Division	Adeline L. Armstrong		Desc'd. Con - therein	
CR 32053	V. Order	Feb 25 1890	Mar 11	1890	H.C. of J. Chancery Division	George W. Perkins Ex'r		Part desc'd. Vesting Order	
CR 32055	V. Order	Feb 25 1890	Mar 11	1890	H.C. of J. Chancery Division	George W. Perkins Ex'r		Part desc'd.	
CR 34669	Power of Att'y	Dec 20 1888	April 28	1891	New Brunswick Trading Co. et al	Fred's Gundry		2 Parts as desc'd.	
CR 34676	Conveyance	July 13 1890	April 28	1891	New Brunswick Trading Co. Et al by their Att'y Fred E. Gundry et al	Canada At. Railway Co.	\$14,934.10	Portioned Part desc'd. Sketch Atch'd.	
CR 34671	Conveyance	July 13 1890	April 28	1891	Bronsons & Weston L. Co.	Canada At. Railway Co.			
CR 35849	Conveyance	Oct 27 1891	Nov 3	1891	Bronson & Weston L. Co.	Bank of Montreal	\$7,554.14	Part desc'd. Sketch Atch'd	
CR 35849	Conveyance	Oct 27 1891	"	"	Bank of Montreal	Bronson & Weston L. Co.	\$1.00	Part desc'd.	
CR 35993	Deed	Oct 20 1891	Nov 15	1891	Frederick Gundry	Bank of Montreal	\$1.00	Parts desc'd.	
CR 36784	Deed	April 12 1892	April 14	1892	Bank of Montreal	Bank of Montreal	\$1.00	Parts desc'd. Con. Premises	
CR 38705	Deed	Mar 22 1893	Mar 27	1893	Ottawa Electric St. Ry. Co.	Ottawa Electric St. Ry. Co.	\$112,500.00	Parts desc'd.	
CR 40625	Deed	Nov 30 1893	Jan 9	1894	Ottawa Electric St. Ry. Co.	Bronson & Weston L. Co.		Easements as therein	
CR 40641	Deed	Jan 9 1894	Jan 12	1894	A.L. & M. Armstrong	Chaudiere E. Light & P. Co'y	14,500.00	2 Parts desc'd. Con.	
CR 40936	Mort.	Mar 1 1894	Mar 7	1894	George W. Perkins (in Trust)	Thomas H. Kirby	\$4,600.00	Part desc'd.	
CR 41091	Lease	Mar 19 1894	Mar 27	1894	Bronsons & Westons L. Co'y	William C. Perkins	\$6,500.00	Part desc'd. - at 6%	
CR 41393	Deed	Mar 29 1894	May 2	1894	George W. Perkins (in Trust)	Standard Electric Co'y		Crown Acres	
CR 41646	A of M	June 1 1894	June 1	1894	William C. Perkins	City Corporation	\$2,500.00	Part desc'd.	
CR 41894	Deed	July 6 1894	July 9	1894	Thomas H. Kirby et ux	John Hervey		Part desc'd. See No. 40936	
CR 42057	Convey	July 27 1894	August 7	1894	Chaudiere Electric Light Co'y	William E. Morris	\$5,500.00	Part desc'd.	
CR 42639	Mort	Oct 1 1894	Nov 10	1894	Ottawa Electric Co'y	Ottawa Electric Co'y	\$1.00	Parts desc'd.	
						Trusts Corporation of Ontario		2 Parts desc'd. & Con. Amt. an' therein Not rec in full	

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ET C.	LAND AND REMARKS
CR 2369	M.	July 13 1867	July 16 1867	Hon. M. Cameron et ux	Charles H. Pinhey		Part desc'd.
CR 2396	Sale	Feb 8 1864	July 27 1867	Joseph Hinton et ux	Hon. M. Cameron	\$2,500.00	Part desc'd.
CR 3279	Sale	Jun 19 1868	July 14 1868	Hon. M. Cameron et ux	William R. Wright	\$8,000.00	Part desc'd. & con.
CR 3571	Sale	Oct 27 1868	Nov 2 1868	Lyman Perkins et ux	Albert B. Perkins		Adjacent to 1 & 2 Block "S"
CR 3572	Sale	Oct 30 1868	Nov 2 1868	Albert B. Perkins	Lyman Perkins		" " " " " "
CR 3906	Sale	Mar 13 1869	Mar 16 1869	Alanson H. Baldwin et ux	H.F. & W.C. Bronson et al		Desc'd & Con.
CR 4602	Award	Dec 24 1869	Dec 30 1869	John B. Lewis (Arbitrator)	Baldwin Bronson, Young, et al		Defining line boundary
CR 5618	M.	Mar 3 1871	Mar 4 1871	W.H. Wright et ux	C.S. Building Society		Called Hill Lot
CR 5646	Sale	Mar 15 1871	Mar 17 1871	Lyman Perkins et ux	William R. Wright		Part as desc'd.
CR 631v	Sale	Oct 2 1871	Oct 6 1871	Jones P. Veazie et ux	Levi Young		All his Estate as described & Con.
CR 7239	Release	June 11 1872	June 18 1872	Edward W. Veazie	Levi Young		Releasing All his claim under 2311
CR 7409	Release	Oct 24 1872	Nov 1 1872	Sallie J. Veazie	Levi Young		" " " " " "
CR 8079	Easement	Jan 2 1873	Jan 31 1873	Henry F. Bronson et al & Wives	Corporation of the City of Ottawa		Easement of Discharging Waste Water.
	A of Patent	Nov 12 1859	Feb 1 1873	Crown	Levi Young & P. Thompson		Desc'd. lot
CR 9344	Award	August 9 1873	Sept 24 1873	M.O'Carra & G. Hay	Lyman Perkins		Part desc'd.
CR 9926	Will	April 26 1872	Feb 20 1874	John Bower Lewis	Elizabeth S. Lewis		All his Property
CR 11207	Grant	Oct 23 1874	Oct 24 1874	Lyman Perkins et ux	Corporation City		Part Desc'd & Con.
CR 14790	M	Dec 28 1876	Dec 29 1876	Levi Young et ux	Philip Thompson	\$40,000.00	Undivided 1/3 - Desc'd. & Con. 10%
CR 16188	Deed	July 15 1875	Jan 18 1878	Elizabeth S. Lewis	City Corporation		Triangular Piece of 1 Block N.
CR 19779	P.O.M.	Sept 20 1881	Dec 15 1881	Philip Thompson	Levi Young		Part as Desc'd. B of Part No. 14790
CR 19781	By-Law	Jan 15 1878	Dec 15 1881	City Corporation	By-law No. 429		Part to Widen Bridge Street..
CR 19782	By-Law	Feb 21 1881	Dec 15 1881	City Corporation	By-Law No. 501		Part to Widen Britannia Terrace
CR 19783	Deed	Sept 20 1881	Dec 15 1881	City Corporation	Levi Young et al		Land if any lying to the North of and adjacent the N'y limit of Britannia
							Ter race as therein
CR 19784	Deed	Sept 30 1881	Dec 15 1881	Levi Young et al & Wives	City Corporation		Part to Widen Britannia Terrace
CR 19786	Mortgage	Sept 20 1881	Dec 15 1881	Levi Young et ux	Philip Thompson		As in 19783
CR 19787	Grant	Sept 30 1881	Dec 15 1881	Levi Young et ux	H.F. Bronson et al		Undivided 1/6 to correct an error in 19783
CR 19889	Deed	Dec 1 1881	Feb 5 1882	W.C. Bronson et ux	H.F. Bronson		1/24 of Undivided 1/3 as therein
CR 19890	Deed	Dec 1 1881	Feb 5 1882	W.C. Bronson et ux	Abija Weaton		As set forth & Subject as therein
CR 23388	Grant	Sept 20 1881	Mar 12 1885	P. Thompson & L. Young & Wives	Bank of Montreal		Part desc'd.
CR 23389	Convey	Jan 5 1885	Mar 12 1885	James Gordon ( Ex)	Henry F. Bronson et al	\$20,000.00	As desc'd

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION	LAND AND REMARKS
RO 3666	Deed	Feb 8 1848	Feb 12 1848	Simon Fraser ( Sheriff)	John LeBreton		
RO 3786	Sale	Feb 23 1848	May 16 1848	David Connell	Andrew Main		Under Writs by lands - A. Keefer
RO 3859	Will	Mar 4 1845	July 5 1848	John LeBreton	His Executors in Trust		Called Billons & Stacey Lot desc'd.
RO 3860	Will	July 23 1847	July 5 1848	John LeBreton	His Five Heires		All His Property
RO 4455	Sale	Feb 22 1850	Feb 22 1850	Ausustus Keefer et ux	John B Lewis		All His Property
RO 4852	Sale	Jan 9 1851	Jan 16 1851	Kn. & Mary Elliot	Joseph Hinton		Called Clergy lot Cor. 25.0.0. E
RO 4856	Will	Dec 18 1845	Feb 8 1851	L.P. Sherwood	Henry E Apo, Sherwood et al		Called Johnston's Hill
RO 4922	Quit Claim	Sept 9 1850	Feb 26 1851	John Barsay	James Johnston		All Property Not divided & C.
RO 5256	Sale	June 30 1851	July 17 1851	John & Mary Barsay	Joseph Hinton		All Property Not divided & C.
RO 5315	Quit Claim	August 4 1851	Sept 8 1851	Ann Connell	Andrew Main		" " " " "
RO 5385	Sale	Oct 16 1851	Oct 18 1851	Rev S.S. Strong	John B. Lewis		Called Billons & Stacey Lot
RO 5427	Sale	Nov 13 1851	Nov 13 1851	Andrew Main et ux	Geoffrey Berry		Called Clergy Lot
RO 5810	Sale	June 22 1852	June 23 1852	Geoffrey Berry et ux	Philip Thompson		Called the Billons & Stacey Lot
RO 6174	Quit Claim	Feb 11 1853	Feb 12 1853	Jane Johnston ( Widow)	Joseph Hinton		Called Billons & Stacey Lot
RO 6729	Sale	April 3 1837	May 7 1853	John LeBreton	George Patterson		Part of Hill Lot
RO 6283	Sale	Nov 23 1838	Mar 24 1853	George Patterson	James Johnston		" " " " "
RO 6470	Sale	April 18 1835	June 16 1853	John LeBreton	James Johnston		Part of Hill Lot
RO 6673	Tax Deed	Sept 16 1852	Sept 16 1853	Henry & E. Maunt et al	John Woodill		Called Johnstons Hill
RO 6778	Sale	Aug 3 1853	Oct 6 1853	Henry & Samuel Sherwood et al	George Sherwood		As in No. 18 - Devises of John LeBreton
RO 8819	Asst.	Mar 2 1855	July 27 1855	Daniel McLaughlin et al	J.S. Read & Levi Young		All The Sherwood Estate
RO 9676	Sale	April 10 1856	April 17 1856	Rev. S.S. Strong et al	Hammitt Hill		Crown - 1 acres & Con.
RO 11792	Sale	Dec 29 1857	Jan 2 1858	James S. Read et ux	Philip Thompson		As Desc'd.
RO 15373	Asst of M	Feb 20 1860	Feb 20 1860	Rev S.S. Strong ( Exors.)	John B Lewis		Assignment of 8820
RO 17205	Sale	Feb 9 1861	Feb 9 1861	Levi Young et ux	James P. Veazie & L. Young		Asst of 3146
RO 18503	Sale	Sept 1 1861	Dec 3 1861	L. Young & J.P. Veazie & Mives	Philip Thompson		Undivided 1/2 Called McLaughlins 5 acre lot
RO 18504	Bond	Sept 1 1861	Dec 3 1861	Philip Thompson	L. Young & J.P. Veazie		" " " " " & Con
RO 18564	Sale	August 12 1862	August 12 1862	Hon. George Sherwood et ux	Philip Thompson		" " " " " & Con.
RO 23032	Bond	Aug 28 1863	Sept 3 1863	Philip Thompson	Levi Young & J.P. Veazie		Part desc'd. Except lot sold to LeBreton
CR 364	Bond	Sept 3 1864	3 Sept 1864	Philip Thompson	L. Young & J.P. Veazie		" " " " "
CR 1375	Sale	Feb 22 1866	Feb 23 1866	Philip Thompson et ux	Levi Young & J.P. Veazie		Desc'd & Con
CR 1489	Sale	Dec 5 1865	May 3 1866	Joseph Hinton et ux	Hon. M. Cameron		Undivided 1/2 of all desc'd.
CR 1738	Sale	Sept 23 1866	Sept 28 1866	Philip Thompson et ux	Alanson H. Baldwin	\$2,100.00	Part Desc'd
CR 1893	Sale	Nov 19 1866	Nov 20 1866	Alanson H. Baldwin et ux	Henry F. Bronson et al		Undivided 1/2 desc'd. & Con.
CR 2279	Sale	May 29 1867	May 30 1867	Lyman Perkins et ux	A.H. Baldwin, H.F. Bronson		Undivided 1/2 of Undivided 1/2
					L. Young		All except Part desc'd.
							" " " " "

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REMARKS
	Patent	25 Feb 1809	<del>25 Feb 1809</del>	Crown	Robert Randall		
RO 10	S. Writ	11 Dec 1820	20 Dec 1820	Sherriff Stewart	John LeBreton		All lot 40
RO 11	B & S	12 Dec 1820	20 Dec 1820	John LeBreton	Lewis P Sherwood		All lot 40
RO 16	Sale	18 Jan 1821	18 August 1821	Sheriff Stewart	John LeBreton		Undivided 1/2
RO 17	Sale	May 19 1824	Jan 7 1825	John LeBreton	S. Stacey & G.L. Billons		All lot 40
RO 18	Sale	Sept 22 1823	Jan 12 1825	Lewis P Sherwood	John LeBreton		Part Desc'd - Billons & Stacey Lot
RO 21	Lease & Release	20 Feb 1821	8 May 1821	John LeBreton	Lewis P. Sherwood		Desc'd as 1/2 acre
RO 48	Sale	Oct 22 1824	March 22 1826	John LeBreton	Lewis P. Sherwood		Undivided Half
RO 57	Sale	3 July 1826	18 July 1826	Samuel Stacey	G.L. Billons		3/4 acre as desc'd
RO 74	Q.C.D.	5 July 1822	8 July 1827	John LeBreton	Lewis P. Sherwood		Undivided Lot - Billons & Stacey Lot.
				Lewis P. Sherwood	John LeBreton		Part lot no. 40 as desc'd 1/2
RO 158	Deed of Part	July 5 1827	August 27 1828	Lewis P Sherwood	John LeBreton		Undivided 1/2 of 40 acres. Not Conveyed to Sherwood
RO 226	Sale	July 24 1829	July 24 1829	G.L. Billons	Henry Stacey	\$2,500.00	Undivided 1/2
RO 261	Sale	Feb 25 1829	Jan 13 1830	Lewis P. Sherwood et ux	King George the Fourth		As desc'd called Crown 1 acre
RO 370	Sale	Feb 7 1831	Feb 12 1831	Henry Stacey	Henry Church	\$2,500.00	Whole desc'd L
RO 377	Sale	Feb 12 1831	Feb 22 1831	Henry Church	Matthew Cannell		
RO 912	Will	Mar 2 1829	July 11 1836	Robert Randall	No devisees mentioned		No Lands desc'd.
RO 1223	Asst	Sept 3 1835	Oct 30 1837	John & Daniel Lorraine	Daniel McLachlin		Whole - 1.0 Acres - called Crown
RO 1558	Mortgage	June 3 1840	June 8 1840	Trustees of Episcopal Church	John LeBreton		Called Clergy - Lot Desc'd.
RO 1569	Sale	June 2 1840	June 15 1840	John LeBreton	Trustees of the Episcopal Church		Con 150.0.0 h
RO 1817	Mort	Nov 27 1841	Dec 1 1841	Daniel McLachlin	Robert Wood & R. I. Grey		Whole Called Crown 1. 0 Acre
RO 2720	Sale	March 4 1845	Oct 30 1845	John LeBreton et ux	Rev S.S. Strong		Called Clergy Lot Desc'd.
RO 2746	Sale	Nov 24 1845	Nov 25 1845	John LeBreton et ux	Augustus Keefer		As Desc'd. Con - 100.0.0. h
RO 2129	Sale	May 4 1846	May 5 1846	John LeBreton et ux	Lyman Perkins		Called Lot on Face of the Hill Desc'd.
RO 2930	Sale	April 18 1846	May 5 1846	John LeBreton et ux	Lyman Perkins		Lot Adjacent to 1 & 2 in Block "L" Desc'd.
RO 2973	Sale	June 6 1846	June 9 1846	John LeBreton et ux	Lyman Perkins		Part desc'd.
RO 2975	Sale	June 5 1846	June 10 1846	John LeBreton et ux	Daniel McLachlin		Called McLachlins 3 Acre lot - Desc'd.
	Plan	April 23 1845	June 18 1846	Donald Kennedy Surveyor	John LeBreton		Plan of Pt. 40 Con. A.
RO 2986	Sale	June 18 1846	June 20 1846	John LeBreton et ux	Lyman Perkins		Called Gully Lot Desc'd.
RO 3146	Mort	Nov 7 1846	Nov 11 1846	Augustus Keefer	John LeBreton		As in 2746 Desc'd.
RO 3424	Sale	June 17 1847	June 17 1847	Augustus Keefer et ux	John L Wilkinnon		As in 2746 Desc'd. And other lots.
RO 3603	Mort	Dec 28 1847	Dec 29 1847	Daniel McLachlin	Wood & Potry		Called Crown 1 acre.

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GL 8025 ---	Deed	17 06 87	FRENCH, Thomas P. & wife	R.C.E. Corp.	\$3,000	Pt. Of.
GL 8110 ---	Deed	06 09 87	CUMMINGS Robert & wife	AUSTIN, W.A.		Pt. 5 & 6
GL 8160 ---	Lis Pendent	11 10 87	TALBOT, Horace	D.I.L & S. Co'y		Pt.
GL 8190 ---	Cert	25 10 87	D.I.L. & S. Co.	TALBOT, Horace		Pt.
GL 8641 ---	Mort.	09 10 88	R.C.E. Co. of Ottawa	WARNOCK, James	\$7,600	Pt.
GL 8652 ---	Deed	20 10 88	TALBOT, Horace & wife	COOKE, Jules		Pt.
101 ---	Plan	24 10 88	CLARK, Thomas M.	Trustee		Pt.
GL 8785 ---	Mort.	26 01 89	SNOW, John F.	SNOW, A.J.R.	\$334	Pt. 8 53/100 arces
GL 8999 ---	QCD	05 06 89	SNOW, John F. et al	CODD, Caroline		Pt. 8 62/100 arces
GL 9000 ---	Deed	05 06 89	CODD, Caroline	CODD, Charles E.		Pt. 8 62/100 arces
GL 9281 ---	Will	03 03 90	SNOW, John A.	SNOW, John F. et al Exr.		Pt.
GL 9312 ---	Deed	19 03 90	SNOW, Horace C. & wife	KING, William F.		Pt. 8 arces less 1 arces
GL 9398 ---	Deed	30 04 90	JACQUES, M.M.	JACQUES, Thomas		Pt. 1/3 arces
GL 9399 ---	Deed	30 04 90	JACQUES, M.M.	JACQUES, Louis		Pt. 1/3 arces
GL 9400 ---	Deed	30 04 90	JACQUES, M.M.	JACQUES, Cleophas		Pt. 1/3 arces
GL 9483 ---	Deed	13 06 90	FRASER, Elizabeth et al	R.C.E. Corp.		pt.

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GL 5190 ---	B & S	17 11 80	CODD, Caroline	SNOW, John A.		Pt. desc'd.
GL 5233 ---	Grant	21 12 80	MCHUGH, Felix A.	O'REILLY, John		Pt. desc'd.
GL 5880 ---	Grant	06 06 82	LAPORTE, Victor et ux	JACQUES, Marie M.	\$400	Pt. desc'd.
GL 5881 ---	Mort.	06 06 82	JACQUES, Marie M.	LAPORTE, Victor	\$350	Pt. desc'd.
GL 6025 ---	Grant	31 10 82	CARMEN, Julia CARMEN, G.A.	QUIN, Mary	\$625	Pt. desc'd.
GL 6277 ---	AM	11 05 83	EGLESON, Peter A.	McGAE, John J.		Pt. desc'd.
GL 6353 ---	Grant	06 08 83	CODD, Sarah et al	AUSTIN, William A.	\$900	Pt. desc'd.
GL 6358 ---	AM	08 08 83	McGAE, John J.	CROTHY, Maria		Pt. desc'd.
GL 7093 ---	Grant	29 05 85	QUIN, Mary et al	VALIGUET, Ulrie		Pt. desc'd.
GL 7241 ---	Grant	06 10 85	CODD, Elizabeth CODD, Alfred	FALBOT, Horace	\$1,200	Pt. desc'd.
70	Plan	14 04 86	McKay Estate			Pt. desc'd.
92	Plan	14 04 86	McKay Estate			Pt. desc'd.
GL 7520 ---	QCD	19 04 86	O'REILLY, John et al	FRENCH, T.P.		Pt. desc'd.
GL 7614 ---	Cert	13 07 86	Court of Chancery	Estate of MacKAY, Thomas et al		Pt. desc'd.
GL 7761 ---	Grant	19 11 86	KEEFER, Thomas C.	CUMMINGS, Robert		Pt. desc'd.

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GL 2753	Mort.	13 11 75	O'MEARA, P. et ux.	FRENCH, Thomas T.	\$2,000	104 Pt. desc'd.
GL 3335	Will	07 12 75	BRADLEY, Clements	BRADLEY, B.B. et al		Pt. desc'd.
GL 3402	Mort.	22 12 76	SATCHELL, F. SATCHELL, C. et ux	Trust & Loan Co.	\$9,000	84 Pt. desc'd.
GL 3439	AM	16 01 77	Estate of BRADLEY, Clements	EGLISON, P.A.		Pt. desc'd.
GL 3542	Mort.	10 03 77	SATCHELL, F. et ux et al	Trust & Loan Co.	\$5,000	84 Pt. desc'd.
GL 3800	Power of Attorney	01 03 77	FRENCH, Thomas P.	NOEL, H.V.		Pt. desc'd.
GL 4047	Grant	30 01 77	FRENCH, Thomas P.	McHUGH, F.A.		Pt. desc'd.
GL 4056	Mort.	02 02 78	McHUGH, F.A.	FRENCH, Thomas P.	\$2,000	103 Pt. desc'd.
GL 4057	AM	02 02 78	FRENCH, Thomas P.	Metro. Loan & Savings Co.		Pt. desc'd.
GL 4251	Mort.	01 06 78	BRADLEY, B.B.	N.B.C.I. Co. Ltd.	\$5,000	84 Pt. desc'd.
GL 4271	Mort.	18 01 78	BRADLEY, B.B.	Garland Mutchmor & Co.	\$3,933.54	Pt. desc'd.
GL 4294	Release	11 07 78	BRADLEY, Julia	BRADLEY, B.B.		Pt. desc'd.
GL 4308	AM	22 07 78	FRENCH, Thomas P.	Metro. Loan & Savings Co.		Pt. desc'd.
GL 4947	Mort.	30 01 80	CLARKE, Jessie CLARKE, Thomas	Merchants Bank et al	\$1,500	undivided 1/2 interest
GL 5148	Grant	17 09 80	N.B.C.I. Co. Ltd.	EASTWOOD, D.S.		Pt. desc'd.
GL 5149	Grant	17 09 80	EASTWOOD, D.S. et ux	CUMMINGS, Robert	\$6,000	Pt. desc'd.

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GL 40 ---	B & S	08 10 68	PINHEY, Charles H. et ux	SATCHELL, Charles et al	£ 1250	Pt. desc'd.
GL 170 ---	B & S	24 04 69	BRADLEY, Clements et ux	BRADLEY, R.A. et al		Pt. desc'd.
GL 407 ---	Part Deed	21 03 70	BRADLEY, Frederick A.	BRADLEY, Richard		Pt. lot 5
GL 407 ---	Part Deed	21 03 70	BRADLEY, R.A. et al	BRADLEY, F.T. et al		Pt. desc'd.
GL 823 ---	B & S	08 09 71	BRADLEY, R.A.	R.C. Corporation	\$8,000	Pt. desc'd.
GL 1267 ---	Grant	10 12 72	BRADLEY, F.T. et ux	McFARLANE, William	\$4,000	Pt. desc'd.
GL 1288 ---	Grant	08 01 73	McFARLANE, William et ux	WILSON, Elizabeth	\$2,000	Pt. desc'd.
GL 1305 ---	Grant	23 01 73	BRADLEY, Clements	SNOW, John A.	\$1,000	Pt. desc'd.
GL 1532 ---	B & S	11 09 73	WILSON, Z. et ux et al	BRADLEY, Clements	\$600	Pt. desc'd.
47 ---	Plan	15 09 73	McFarlane & Wilson			Pt.
GL 1608 ---	B & S	25 09 73	BRADLEY, Clements	LAPORTE, Victor	\$1,500	Pt. desc'd.
GL 2192 ---	B & S	17 11 74	BRADLEY, F.T. et ux	BRADLEY, Clements	\$2,600	Pt. desc'd.
GL 2193 ---	B & S	17 11 74	BRADLEY, Clements	O'NEARA, Patrick	\$4,636	Pt. desc'd.
GL 2194 ---	Mort.	18 11 74	O'NEARA, P. et ux	BRADLEY, Clements	\$1,600	7% Pt. desc'd.
GL 2519 ---	Grant	02 07 75	BRADLEY, Clements	WILSON, Elizabeth	\$300	Pt. desc'd.
56 ---	Plan	05 10 75	McKay Estate			Pt. desc'd.

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RO 20305	Mort.	07 02 63	YIELDING, Agar et ux	RANKIN, Arthur	E 200	Pt. desc'd.
---						
RO 23028	Trust Deed	04 09 63	McKAY, Thomas	McKAY, Ann		Pt. desc'd.
---						
RO 23670	Grant	05 02 64	Municipality of Gloucester	BRADLEY, Clements		Pt. desc'd. Rd. Allow.
---						
RO 23927	Mort.	04 04 64	YIELDING, Agar et ux	PINHEY, Charles H.	E 235	Pt. desc'd.
---						
RO 24287	B & S	25 07 64	YIELDING, Agar & wife	McKAY, Ann et al		Pt. desc'd.
---						
RO 24592	Mort.	03 12 64	YIELDING, Agar et ux	Bank of Montreal	\$6,277.92	7% Pt. desc'd.
---						
RO 24605	Mort.	16 12 64	YIELDING, Agar	MAUNSELL, Fanny	E 1000	12% Pt. desc'd.
---						
RO 25440	Grant	01 09 65	KEEFER, Thomas C. et al	McKAY, Ann		Pt. desc'd.
---						
RO 25520	B & S	18 09 65	YIELDING, Agar et ux	B & P Railroad Co.		Pt. desc'd.
---						
RO 25763	AM	06 12 65	RANKIN, Arthur	Bank of Montreal		Pt. desc'd.
---						
RO 25915	Will	29 01 65	McKAY, Thomas	KEEFER, T.C. LEWIS, J.B.		Pt. desc'd.
---						
RO 26177	Grant	14 04 66	BRADLEY, Clements	BRADLEY, Mary J.		Pt. desc'd.
---						
RO 26206	B & S	23 04 66	BRADLEY, Clements et ux	WILSON, Elizabeth		Pt. desc'd.
---						
RO 26251	Grant	04 05 66	McKAY, Ann	KEEFER, T.C. LEWIS, J.B.		Pt. desc'd.
---						
GL 3C	Cert.	08 10 68	Court of Chancery	PINHEY, Charles H.		Pt. desc'd.
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---	R of Patent	21 06 24	Crown	BRADLEY, William B.		All
RO 810	B & S	19 09 27	BRADLEY, William B.	BRADLEY, Clements		All
RO 886	B & S	18 02 29	BRADLEY, Clements	OLMSTEAD, Gideon OLMSTEAD, Zenus	£ 100	N.E.
RO 2940	B & S	19 09 39	OLMSTEAD, Gideon OLMSTEAD, Zenus & wives	BRADLEY, Clements	£ 125	N.E. 55 acres
RO 2941	B & S	19 09 39	OLMSTEAD, Zenus	OLMSTEAD, Gideon	£ 100	Pt. desc'd.
RO 2261	B & S	30 04 44	BRADLEY, Clements	OLMSTEAD, Gideon		Pt. desc'd.
RO 2315	B & S	25 07 44	BRADLEY, Clements et ux	McKAY, Thomas		Pt. desc'd.
RO 2709	B & S	10 10 45	OLMSTEAD, Gideon et ux	McKAY, Thomas	£ 250	N.W.pt 100 acres
RO 2964	B & S	06 06 46	OLMSTEAD, Gideon et ux	BRADLEY, Clements		Pt. desc'd.
RO 2965	B & S	06 06 46	BRADLEY, Clements et ux	YIELDING, Agar	£ 150	Pt. desc'd.
RO 5195	Will	02 06 51	BRADLEY, William B.	BRADLEY, George Clements		Pt. desc'd.
RO 9607	Will	03 04 55	McKAY, Thomas	Wife & Children		Pt. desc'd.
RO 13485	Assgnt.	21 01 59	McKAY, Alex et al	McKINNON, James et al		Pt.
RO 18309	Mort.	16 10 61	YIELDING, Agar et ux	LEARMONTH, George	\$1,600	Pt. S. & OL

FORM RO-3-TM

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FRONT PART LOT 4.

CONCESSION J. GORE

Continued from page 7-2 of this Book

GRANT NO.	GRANTOR	RECEIPT DATE	GRANTEE	GRANTOR	GRANTEE	REMARKS
34186	Caution	4 June 1927	7 June 1927	Admin <sup>r</sup> Estate of R. B. Bradley	Re Est. of R. B. Bradley	Part lot 4. S. O.K.
34575	Caution	25 May 1928	2 June 1928	Admin <sup>r</sup> Estate of R. B. Bradley	Re Est. of R. B. Bradley	Part lot 4. S. O.K. See inst
34935	Caution	29 May 1929	1 June 1929	Admin <sup>r</sup> Estate of R. B. Bradley	Re Estate of R. B. Bradley	Part lot 4. S. O.K. See inst
35214	Caution	29 May 1929	30 May 1929	Admin <sup>r</sup> Estate of R. B. Bradley	Re Estate of R. B. Bradley	Part lot 4. S. O.K. See inst
5649	Tax Arrears Cert.	3 July 1936	7 July 1936	Dept of Municipal Affairs Act	Town of Castorville	Part lots 4+5. (See inst)
5655	Tax Arrears Cert.	3 July 1936	7 July 1936	Dept of Municipal Affairs Act	Town of Castorville	Part lots 4+5. (Bradley Estate 6.3 acres) See inst

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Lot 4 Gore

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC	LAND AND REMARKS
17989	Deed Annulity	15 Aug 1904	17 Aug 1904	Thos. Jacques	Marie M. Jacques	\$1 <sup>00</sup>	4A. Part lot 4. Annulity \$18 <sup>00</sup> for life see inst
GL 19591	G.C.D.	30 Dec 1905	31 July 1907	N.B.C. Im. Co. Ltd	Robert Cummings	Prem + \$1 <sup>00</sup>	Part lots 4, 5 + 6 desc'd. see inst.
GL 19592	B+S.	27 July 1907	31 July 1907	Robert Cummings & W.	Rich'd B. Bradley Overton W. Bradley	\$20,000	Parts lots 4, 5 + 6, Part Original R.d. allowance & O.K. see attached plan see inst
GL 19641	B+S.	21 Aug 1907	22 Aug 1907	Robert Cummings & W.	Emie M. Charleson	Nat loan \$1 <sup>00</sup>	Parts lots 4, 5 + 6 desc'd. 1.A plan attached see inst
GL 19644	B+S.	21 Aug 1907	23 Aug 1907	Robert Cummings & W.	Helen B. Charleson	Nat loan \$1 <sup>00</sup>	Part lot 4 desc'd, plan attached see inst
246	Plan	19 Oct 1907	9 Dec 1907	R. B. Bradley O. W. Bradley	Proprietors	\$1 <sup>00</sup>	Parts lots 4, 5 + 6 all for road. see inst
GL 20279	Cert	19 Feb 1908	14 Aug 1908	W. L. Scott Local Master of Titles at Ottawa)	Thos C. Keefer		Part A.O.K. Application under Land Titles Act. see inst.
GL 23002	B+S.	7 Oct 1910	7 Oct 1910	P. Grandmaître & OS	The R.C. & Corp'n	\$95 <sup>00</sup>	4A. Part lot 4 desc'd. A.O.K. subj to taxes 9C. see inst
GL 23036	B+S.	17 Oct 1910	21 Oct 1910	Thos. S. Kirby & W.	The T. Sidney Kirby Corp Ltd.	\$1 <sup>00</sup> + other consideration, 1 <sup>56</sup> / <sub>100</sub> A.	Part lot 4 desc'd. see inst
GL 25266	B+S.	27 Sept 1912	15 Oct 1912	Thos Tremblay	Isa. B. Charrett Arthur Sauthier	\$6000 <sup>00</sup>	Part lot 4 desc'd. 6.A see inst
GL 25295	B+S.	16 Oct 1912	22 Oct 1912	Isa. B. Charrett & OS Arthur Sauthier & W. Thos Tremblay	The Roman Catholic Episcopal Corp'n. of Ottawa	\$8100 <sup>00</sup>	Part lot 4 desc'd. 6.A. see inst
V 665	Collection R of D.	26 Dec 1916	27 Dec 1916	Alice M. L. Bradley	Test of R. B. Bradley		All A.O.K. see inst
GL 29917	Caution	24 July 1919	28 July 1919	The Tor. Sen. T. Corp <sup>s</sup> Admrs. Rich'd B. Bradley.	Re Estate of Richard B. Bradley		Part lot 4. A.O.K. Notice that it may be necessary to sell. see inst.
V 1477	Caution	9 July 1920	31 July 1920	The Tor. Sen. T. Corp <sup>s</sup> Admrs. R.A. Bradley	Re Estate of Richard B. Bradley		Part lot 4. A.O.K. Notice that it may be necessary to sell see inst
GL 32767	Caution	26 June 1924	26 June 1924	The Tor. Sen. T. Corp <sup>s</sup>	Re Estate of Richard B. Bradley		Part lot 4. A.O.K. see inst
V 3491	M. Lien	5 Aug 1924	5 Aug 1924	Gatineau Co. & Co	The R.C.E. Corp <sup>s</sup> of Ottawa et al		Part lot 4. A.O.K. see inst.
GL 32278	Caution	5 June 1925	18 June 1925	The Tor. Sen. T. Corp <sup>s</sup>	Re Est. of R. B. Bradley		All A.O.K. see inst.
GL 32780	Caution	2 June 1926	10 June 1926	The T. S. T. Corp <sup>s</sup>	Re Est. of R. B. Bradley		Part lot 4. A.O.K. see inst

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INSTRUMENT NO.	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REMARKS
2022	DEED CONF.	6. Aug 1874	10 Aug 1874	Thos. C. Keefer et al	Thos. Blackburn		Parts see last
2023	Deed.	10 Aug 1874	10 Aug 1874	Thos Blackburn et up.	Oliver Durocher		Part see last.
2133	Conveyance	3. Nov 1874	19. Oct 1874	Edward MacKay	J. M <sup>c</sup> Laren et al		Part see last.
2332	Conveyance	2 Mar 1875	11 Mar 1875	Rev. W <sup>m</sup> Mac Laren et al	James M <sup>c</sup> Laren		Part see last.
2341	B+S.	19. Mar 1875	20 Mar 1875	James Young	James Hope		Part see last.
2342	Mtge	19 Mar 1875	20 Mar 1875	James Hope et up	James Young	\$5000 <sup>00</sup>	Part see last.
	Plan	5 Oct 1875	5 Oct 1875	M <sup>c</sup> Kay Estate	Proprietor		Parts of lots 4 & 5. see last
2304	B+S.	19. July 1877	7. Aug 1877	Thos. C. Keefer et al	Cath. O'Reilly		Villa lot no 15. of Pt. lots 3 & 4.
5955	V. Order	14. Sept 1877	21 Sept 1877	Court of Chancery	M. L & S. Company		2A, 3R. 8P. see last
4391	Deed	3 Oct 1878	3. Oct 1877	Oliver Durocher et up	M. L & S. Company		Part. 9A. 3R. 32P. see last
4485	Conveyance	29 Apr 1878	24 Dec 1878	T. C. Keefer et al.	Albert French		Part see last
4549	B+S.	27. Feb 1879	28 Feb 1879	Thos. O'Reilly et up	Francis O'Reilly		Part see last
5377	Deed	17. Mar 1879	21 Apr 1881	Thos C. Keefer et al	Thos. Reynolds		Villa lot #15 of Pt. lots 3 & 4 see last
5418	Deed.	30 Nov 1881	24 Dec 1881	Hugh Davidson et up	Wm. Graham		Pt lot 4. 1A. 17. P. see last
5426	Deed	30 Nov 1881	28 Dec 1881	Wm. Graham	David Matheson		Part as desc'd. see last
6141	Mtge	16. Jan 1883	25 Jan 1883	Mary Graham et al	M. L & S. Company	\$3000 <sup>00</sup>	Part as desc'd. see last
6313	Deed	11 June 1883	13 June 1883	Robt Blackburn et up	James Mac Laren		Undivided 1/2 but Part lot 4. see last
6508	Deed.	31 Dec 1883	3 Jan 1884	James Mac Laren et up	Wm. M <sup>c</sup> Clymont		Undivided 1/2 but Part lot 4. see last
7246	Agree <sup>ment</sup>	9. Oct 1885	9. Oct 1885	James Hope	James Young		Villas lot #12. Pt lot 4. desc'd. see last
	Plan	12 Oct 1885	30 Nov 1885	M. L & S. Co'y.	Proprietors		Part
	Plan	8 Apr 1886	14 Apr 1886	Mac Kay Estate	Proprietors		Parts lot 4.
7614	Cert	9. July 1886	13. July 1886	Court of Chancery	C. Mac Kay et al		Parts lot 4. see last
7761	Deed	17. Nov 1886	19. Nov 1886	Thos C Keefer.	R. Cummings		Part lot 4. see last
7884	Conveyance	17. Nov 1885	31. Mar 1887	Thos. C Reynolds et al	St. L. & O. Ry Co.		Part see last
7954	Deed	7. May 1887	7. May 1887	David Matheson	John Cherry		Part see last
7955	Mtge	7 May 1887	7 May 1887	John Cherry	James Young	\$400 <sup>00</sup>	Part see last.
101	Plan	3 Nov 1887	24 Dec 1888	T. M. Clark	Trustee		Part see last.
15025	B+S.	21. Apr 1900	21. Apr 1900	R.C. Co Corporation	La. Camp. de Marie	\$1850 <sup>00</sup>	Parts lots 4 & 5 desc'd. see last
16538	B+S.	7. Aug 1901	7. Aug 1901	Robert Cummings & W.	Thos. Jacques	\$725 <sup>00</sup>	Part lot 4. 4A. see last
16805	B+S.	13 Mar 1902	14 Mar 1902	Stephen Wilkins & W.	Thos. S. Kirby	\$500 <sup>00</sup>	Part lot 4. 1, 100 <sup>56</sup> A. Subj as
17368	B+S.	3. May 1904	5 May 1904	Robert Cummings & W.	Edouard Dufour	\$2000 <sup>00</sup>	to tapes & c. see last
							Part lot 4 desc'd. B. O' & Ref W. see last

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REGISTRATION NUMBER	INSTRUMENT	DATE OF INSTRUMENT	REGISTRATION DATE	GRANTOR	GRANTEE	CONSIDERATION ETC.	LAND AND REMARKS
RO 1147	Patent	27 May 1799		Crown	Hon. John Munro		With front part of lot 3. 400 acres.
RO 9687	B+S	28 Jan 1831	7 Feb 1831	Henry Munro	Thomas M <sup>c</sup> Kay		All see last
RO 13485	Will	8 Sept 1855	3 Apr 1831	Hon Thomas M <sup>c</sup> Kay	wife + children		All see last
RO 14276	Assign <sup>t</sup>	31 July 1857	21 Jan 1859	Ellep. M <sup>c</sup> Kay et al	John M <sup>c</sup> Kinson et al		All see last
RO 19459	Mtge	25 June 1861	30 May 1862	Jno & Thos. M <sup>c</sup> Kay	Thomas C. Keefer	\$14,000	Part see last
	Deed	7 July 1862	10 July 1862	Thomas M <sup>c</sup> Kay	Julia E M <sup>c</sup> Kay		Part see last
	Confirmation						
RO 19851	Ind. Mtge	30 July 1862	31 July 1862	Ann + Thos. M <sup>c</sup> Kay	Thomas C Keefer	\$25,000 <sup>00</sup>	Part see last
RO 23028	Trust	3 Sept 1863	4 Sept 1863	Thomas M <sup>c</sup> Kay	Ann M <sup>c</sup> Kay		see last
RO 24658	B+S.	19 Dec 1864	6 Jan 1865	Ann M <sup>c</sup> Kay + T.C. Keefer	Thomas M <sup>c</sup> Kay		Part see last
RO 25440	Release	31 July 1865	1 Sept 1865	Thos. C. Keefer et al	Ann M <sup>c</sup> Kay		Part see last
RO 25443	Seal	2 Aug 1865	2 Sept 1865	Thos + Ann M <sup>c</sup> Kay	H. M. Queen Victoria		Part see last
RO 25445	Mtge	5 Aug 1865	2 Sept 1865	Ann M <sup>c</sup> Kay + Thos. M <sup>c</sup> Kay	Thos C. Keefer		Part see last
RO 25915	Will	6 Nov 1865	29 Jan 1866	Thos M <sup>c</sup> Kay	T.C. Keefer + J.B. Lewis		Part see last
RO 26251	Conveyance	16 Apr 1866	4 May 1866	Ann. M <sup>c</sup> Kay	T.C Keefer + J.B Lewis		see last
RO 26424	Conveyance	4 July 1866	17 July 1866	J. S. Keefer	Jas + Jno M <sup>c</sup> Laren		Part see last
				J. B Lewis et al	et al		see last
RO 26478	Conveyance	27 July 1866	10 Aug 1866	Thomas C. Keefer et al	Edward Mac Kay		Part see last
GL 7086	Conveyance	28 July 1868	14 Dec 1868	T.C. Keefer	Queen Victoria		Part 77 1/2 acres.
				J.B Lewis et al			see last
GL 545	B+S.	24 Sept. 1870	18 Oct 1870	Thos. C. Keefer et al	Robert Surtess		Part see last
GL 1063	B+S.	29 Apr 1872	17 May 1872	Thos C. Keefer et al	James Blackburn		Part see last
GL 1698	Mtge	19 June 1872	19 June 1872	James Blackburn et al	M. B+S. Society	\$5000 <sup>00</sup>	Part see last
GL 1146	B+S.	19 Aug 1872	24 Aug 1872	Robert Surtess et al	Mary Graham		Part see last
GL 1180	B+S.	29 Apr 1872	1 Oct 1872	Thos. C. Keefer et al	James Young		Part see last
GL 1259	Conveyance	29 Apr 1872	7 Dec 1872	Thos. C. Keefer et al	Robert Curry		Part see last
GL 1260	Mtge	20 Nov 1872	7 Dec 1872	Robert Curry et al	Thos. C. Keefer et al	\$855 <sup>00</sup>	4A. 3.R. 9.P. see last
GL 1261	Mtge	3 Dec 1872	7 Dec 1872	Robert Curry et al	Mutual B. Society	\$1000 <sup>00</sup>	4A. 3.R. 9.P. see last
GL 1288	Deed	9 Dec 1872	8 Jan 1873	W <sup>m</sup> M <sup>c</sup> Farlane et al	Edyth Wilson		Part see last
	Plan		13 Sept 1873	Messrs. M <sup>c</sup> Farlane	+ Wilson		Part see last
GL 1811	B+S	11 Mar 1874	23 Mar 1874	T. C. Keefer et al	Geo. H. Preston		Part see last
GL 1812	Mtge	23 Mar 1874	23 Mar 1874	Geo. H. Preston et al	Thos. C. Keefer	\$2475 <sup>00</sup>	Part see last
GL 1813	Mtge	20 June 1874	23 July 1874	Geo. H. Preston et al	M. B+S. Society	\$5000 <sup>00</sup>	Part see last
GL 2000	Deed	20 June 1874	23 July 1874	T. C. Keefer (advise)	H. Davidson		Parts 374 see last
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# **APPENDIX B**

## **List of Archaeology Reports**

## Previous Archaeological Studies Conducted Along and Adjacent to the Project Area

1. Stage 1 Archaeological Assessment of the Ottawa Light Rail Transit City of Ottawa, 2012. Golder Associates.
2. Stage 2 Archaeological Assessment East Tunnel Replacement Project, 2011. Golder Associates.
3. Stage 1 Archaeological Assessment, East Tunnel Replacement Project, Parliament Hill, Geographic Township of Nepean, Carleton County, City of Ottawa, 2010. Golder Associates.
4. Stage 1 Archaeological Assessment of the Ottawa Light Rail Queen Street Alignment, City of Ottawa, Ontario, 2011. Golder Associates.
5. Stage 1 Archaeological Assessment of the Maintenance and Storage Facility Site and the MSF Cut and Cover Access Tunnel OLRT Project Lots 11 and 12, Junction Gore City of Ottawa, 2011. Golder Associates.
6. Archaeological Assessment of the Ottawa Light Rail Rideau Street Re - Alignment, City of Ottawa, Ontario, 2011. Golder Associates.
7. The Corner of Wellington and Bank, 1992. Cataraqui Archaeological Research Foundation.
8. Parliament Hill: Water Line Installation, 1993. Monitoring and stage 3 Cataraqui Archaeological Research Foundation
9. Parliament Hill: Lower parking lot drainage improvements, 1993. Monitoring Cataraqui Archaeological Research Foundation.
10. Parliament Hill West: New Federal Court Building Site, 1993. Cataraqui Archaeological Research Foundation.
11. Parliament Hill: Replacement of Catch Basin Near Southwest Corner of East Block, 1993. Cataraqui Archaeological Research Foundation.
12. Parliament Hill: Area for the Queen Elizabeth Statue, 1992. Cataraqui Archaeological Research Foundation.
13. Parliament Hill: Centre Block, 6th Floor Attic Area, 1997. Heritage Quest Inc.
14. Parliament Hill West: Federal Court Annex, 1999. Heritage Quest Inc.
15. Parliament Hill: Federal Court Annex, 1998. Heritage Quest Inc.

**Stage 1 Archaeological Assessment**

Combined Sewage Storage Tunnel, Project Information, Ottawa River Action Plan Project No. 3

16. Parliament Hill West: New Federal Court Building Site, 1993. Heritage Quest Inc.
17. Federal Court House Site, 1997. Heritage Quest Inc.
18. Parliament Hill CBUS Soil Stripping, 1998. Heritage Quest Inc.
19. Parliament Hill: CBUS Building Site ,1996. Heritage Quest Inc.
20. Parliament Hill: CBUS Building Blast Sites 1 and 2, 1997. Heritage Quest Inc.
21. Parliament Hill: CBUS Building Site, 1997 Heritage Quest Inc. & Peter Sattelberger.
22. Parliament Hill: CBUS Duct Bank Installation Bank from the Victoria Mound to Wellington Street, 1998. Heritage Quest Inc.
23. Parliament Hill: CBUS Building Site Noise Test Units, 199. Heritage Quest Inc.
24. Parliament Hill: Lover's Walk Removal, 1998. Heritage Quest Inc.
25. Parliament Hill: West Terrace, 1995. Heritage Quest Inc.
26. Parliament Hill: West Terrace Bore Hole Monitoring, 1996. Heritage Quest Inc.
27. Parliament Hill: Boring Around the Peace Tower, 1996. Heritage Quest Inc.
28. Parliament Hill: Centre Block Foundation Study, 1995. Heritage Quest Inc.
29. Parliament Hill: Southeast Corner of Centre Block, 2000. Heritage Quest Inc.
30. Parliament Hill: Government Workshops/ Supreme Court Building and the Seven Entrance Gates in Perimeter Wall, 1997. Heritage Quest & Mount McGovern Heritage Archaeological Associates
31. Parliament Hill: Government Workshops/Old Supreme Court Building, 1998. Heritage Quest & Mount McGovern Heritage Archaeological Associates
32. Parliament Hill: Trench Excavation Near the Government Workshops/Old Supreme Court Parking Lot, 1998. Heritage Quest Inc.
33. Parliament Hill: Cavity Feature Northeast of the Parliamentary Library, 1997 Heritage Quest Inc.
34. Parliament Hill: Bank Street Valley, 2003. Heritage Quest Inc.
35. Parliament Hill: Southeast Corner of Centre Block
36. Parliament Hill 1999 HQ99-38 Monitoring Jeff Earl Heritage Quest Inc.
37. Parliament Hill: Centre Block Senate Entrance Near the Peace Tower, 1998. Heritage Quest Inc.

**Stage 1 Archaeological Assessment**

Combined Sewage Storage Tunnel, Project Information, Ottawa River Action Plan Project No. 3

38. Parliament Hill: North Library Ventilation Tunnel, 1995. Heritage Quest Inc.
39. Parliament Hill: Bank street Building site zones A, C, E and F, 2004. Heritage Archaeological Associates
40. Parliament Hill: Archaeological Monitoring of Foundation Excavations, East Block, Ottawa, 2002. Parks Canada
41. Parliament Hill: Elgin Gate, 2007. Parks Canada
42. Parliamentary Precinct: Monitoring the Elgin Street Gates, 2007. Parks Canada
43. Parliament Hill: foreground of the Centre Block, 2006. Parks Canada
44. Parliament Hill: investigations Under the Peace Tower, 2005. Parks Canada
45. Parliamentary Precinct: Restoration of the Elgin Street Gate, 2007. Parks Canada
46. Parliament Hill: southeast Tower of West Block, 2005. Parks Canada
47. Parliament Hill: construction at the parliamentary Library, 2002. Parks Canada
48. Parliament Hill: Perimeter of the West Block, 2006. Parks Canada
49. Parliament Hill: Senate Entrance, n.d. Parks Canada
50. Parliament Hill: East Block Northwest Tower, 2006. Heritage Quest Inc.
51. Parliament Hill: C4 Ventilation Tunnel Rear of Library, 1996. Heritage Quest Inc.
52. Parliament Hill: (C2) Library Ventilation Tunnel, Heritage Quest Inc.
53. Supreme Court West Parking Lot, 2002. Mount McGovern Co. Ltd.
54. Federal Judicial Building Site Borehole logging, 2003. Parks Canada
55. Federal Judicial Precinct: Cliff Street Park, 2007. Parks Canada
56. Justice/Confederation Infill Site, 2005. Parks Canada
57. Rideau Canal, Plaza Bridge at the Ottawa Locks, 1996. Parks Canada
58. National War Memorial Crypt, 2002. Parks Canada
59. Portrait Gallery of Canada, 2005. Parks Canada
60. National Portrait Gallery: Borehole Logging, 2003. Parks Canada
61. Confederation Building Generator Installation, 2007. Parks Canada

**Stage 1 Archaeological Assessment**

Combined Sewage Storage Tunnel, Project Information, Ottawa River Action Plan Project No. 3

62. 301-335 Wellington Street, Lots 4, 5, 6 & 7 Federal Court Site, St. Laurent Square, 2002. Heritage Quest Inc.
63. Bank Street Building Borehole logging, n.d. Parks Canada
64. Colonel By's House, Major's hill Park, 1972,1973. Parks Canada
65. Rideau Canal Pedestrian Crossing 2001 Heritage Quest Inc.
66. Rideau Canal Pedestrian Crossing 2003 Heritage Quest Inc.
67. Rideau Canal: Plaza Bridge, Ottawa Locks, 2000. Ontario Archaeological Services
68. Rideau Canal: Entrance Valley Commissariat Building Exterior Stairway, 1988. Parks Canada
69. Rideau Canal: Entrance Valley Landscape, 1984. Parks Canada
70. Rideau Canal lock Office Excavation at Entrance Valley, 1988. Parks Canada
71. Pedestrian Bridge Crossing of Rideau Canal Between Somerset and Frank Streets, 2000. Heritage Quest Inc.
72. Rideau River Collector Project, 2002. Heritage Quest Inc.
73. LeBreton Flats: Stage 1 Archaeological Assessment (Excluding Blocks X and W) and Stage 2 Archaeological Assessment (Blocks V. L. M. N. O. K. J. I), 2004. Ken Swayze.
74. St. Famille Separate School, LeBreton Flats, 2008. Golder Associates
75. LeBreton, Bayview, the Islands and Brewery Creek Archaeological Site Identification Strategy, 1991. Ontario Archaeological Services
76. LeBreton Flats: Blocks J, K, M, N and O, 2006. McGovern Heritage Archaeological Associates
77. LeBreton Flats: Former Waterworks Workshop and Storage Shed, 2006. McGovern Heritage Archaeological Associates
78. LeBreton Flats: Water Works, 2003. Heritage Quest Inc.
79. LeBreton Flats Aqua Duct , 2002. Heritage Quest Inc.
80. LeBreton Flats: Lloyd Street Area, 2004. Jacques Whitford Environment Limited
81. LeBreton Flats: Cathcart Square, 2005. Jacques Whitford Environment Limited
82. LeBreton Flats: Blocks P, Q and R, 2004. Jacques Whitford Environment Limited
83. LeBreton Flats: Natural Sands Area, 2004. Jacques Whitford Environment Limited

**Stage 1 Archaeological Assessment**

Combined Sewage Storage Tunnel, Project Information, Ottawa River Action Plan Project No. 3

84. LeBreton Flats: Blocks M, O, P, U, T, X, and W, Including Firth Tavern (BiFw-53), LeBreton Flats Railyards (BiFw-66), Passenger Depot (BiFw-67), LeBreton Flats East(BiFw-68) and Old Booth Street (BiFw-70), 2006. Monitoring Jacques Whitford Environment Limited
85. LeBreton Flats: Firths Tavern (BiFw-53), 2005. Jacques Whitford Environment Limited
86. LeBreton Flats: McGinnis house (BiFw-73), 2005. Jacques Whitford Environment Limited
87. LeBreton Flats: 13 and 15 Ottawa Street (BiFw-78), 2006. Jacques Whitford Environment Limited
88. LeBreton Flats: James Skead Estate, Ottawa, 2002. Mayer Heritage Consultants Inc.
89. LeBreton Flats: Duke Street Including Occidental Hotel Site, BiFw-58 and the Tin Smith Site, BiFw-60 2003 McGovern Heritage Archaeological Associates
90. LeBreton Flats: Inlet Bridge Crossing (Including the Inlet Bridge Site, BiFw-65), 2003. McGovern Heritage Archaeological Associates
91. LeBreton Flats: Railway Lands (Block M), 2007. McGovern Heritage Archaeological Associates
92. LeBreton Flats: Railway Lands, 2005. Heritage Quest Inc.
93. LeBreton Flats: Tin Smith Shop - Duke Street, 2005. Heritage Quest Inc.
94. LeBreton Flats: Phase One Subdivision, 2001. Heritage Quest Inc.
95. LeBreton Flats: Block L, 2007. Heritage Quest Inc./ McGovern Heritage Archaeological Associates
96. LeBreton Flats Blocks J, K, M, N & O, 2005. Heritage Quest Inc.
97. LeBreton Flats: Ottawa Street, 2005. Heritage Quest Inc.
98. LeBreton Flats: War Museum site, 2002. Heritage Quest Inc.
99. LeBreton Flats: Aubrey Row House, 2003. Heritage Quest Inc.
100. LeBreton Flats, 2007. Heritage Quest Inc.
101. LeBreton Flats: Duke Street, Occidental H. L 40 C. A, 2002. Heritage Quest Inc.
102. North-South Ottawa Light Rail, 2009. Golder Associates
103. Hurdman Station Modifications, 2010. Golder Associates