

Report to/Rapport au :

**Planning Committee
Comité de l'urbanisme**

and Council / et au Conseil

**September 26, 2012
26 septembre 2012**

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March (5), Stittsville (6), Bay/Baie (7),
College/Collège (8), Rideau-Goulbourn (21),
Kanata South/Kanata-Sud (23)

Ref N°: ACS2012-PAI-PGM-0209

**SUBJECT: WEST URBAN COMMUNITY – WASTEWATER COLLECTION
SYSTEM MASTER SERVICING PLAN STUDY**

**OBJET : RAPPORT D'ÉTUDE SUR LE PLAN DIRECTEUR DE VIABILISATION
DU RÉSEAU DE CANALISATIONS D'EAU USÉE DE LA
COLLECTIVITÉ URBAINE DE L'OUEST**

REPORT RECOMMENDATIONS

That the Planning Committee recommend Council:

- 1. Receive the West Urban Community – Wastewater Collection System Master Servicing Plan Study Report; and**
- 2. Approve the recommendation of the West Urban Community – Wastewater Collection System Master Servicing Plan Study Report to continue with wastewater projects identified in the 2009 Infrastructure Master Plan and add a new Interceptor Sewer to manage wastewater flows between the Stittsville / Fernbank trunk sewers and the Hazeldean and Kanata West Pumping Station.**

RECOMMANDATIONS DU RAPPORT

Que le Comité de l'urbanisme recommande au Conseil :

- 1. de prendre connaissance du Rapport d'étude sur le Plan directeur de viabilisation du réseau de canalisations d'eau usée de la Collectivité urbaine de l'Ouest; et**
- 2. d'approuver la recommandation du Rapport d'étude sur le Plan directeur de viabilisation du réseau de canalisations d'eau usée de la Collectivité urbaine de l'Ouest de poursuivre les projets liés aux eaux usées énumérés dans le Plan directeur de l'infrastructure de 2009 et d'ajouter un nouvel égout intercepteur pour assurer la gestion des eaux usées entre les égouts sanitaires collecteurs de Stittsville et de Fernbank et les stations de pompage de Kanata-Ouest et de Hazeldean.**

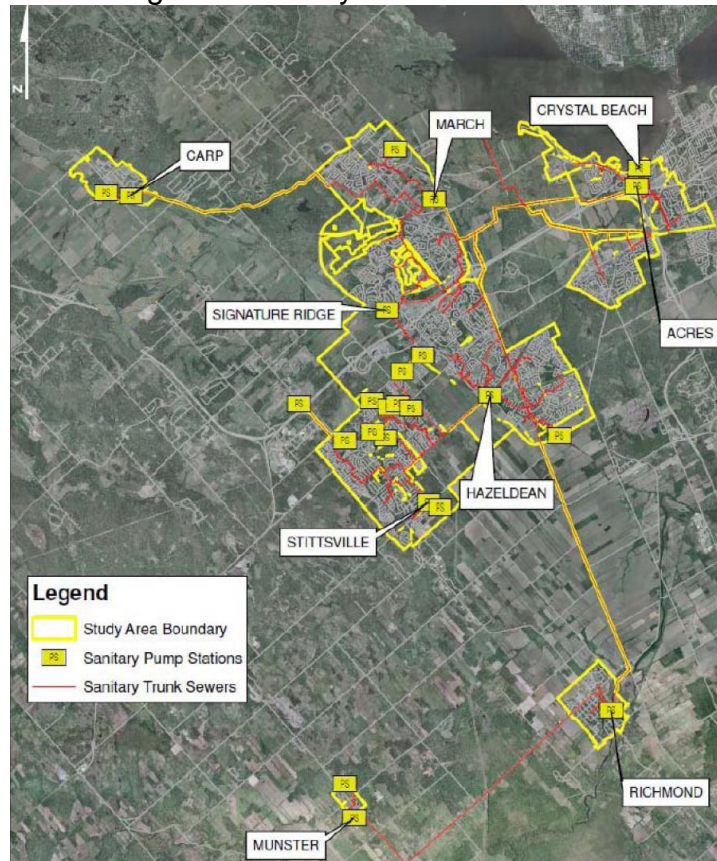
BACKGROUND

This study provided a strategic review of the wastewater collection system for the West Urban Community (WUC). The purpose of the study was to confirm the timing and scope of projects identified in the 2009 Infrastructure Master Plan (IMP) and to identify the preferred approach to resolving potential capacity issues.

The primary study area of this report includes the communities of Stittsville and Kanata (Wards 4, 6, and 23). However, planning of the trunk wastewater system in the WUC also must account for future flows from development planned in Wards 5 (Village of Carp), and 21 (Village of Richmond). Future infill and intensification in Wards 7 (Bay) and 8 (Bells Corners) must also be factored, given that parts of those Wards are serviced by the Acres Road Pumping Station, through which all drainage of the WUC must be conveyed. The study area is shown in Figure 1.

The Infrastructure Master Plan approved by Council in June 2009 identified eight major sanitary sewer system projects that are required to accommodate projected growth in the West Urban Community to the year 2031. A number of the projects were the result of stand-alone infrastructure planning studies, including the Kanata West Master Servicing Study, approved by Council in 2006, and the Fernbank Master Servicing Study, approved by Council in 2009. Subsequent to the approval of the 2009 IMP, the West-end Flood Investigation that was completed in response to the July 24, 2009 flood of the Kanata / Stittsville area identified further upgrade requirements to the Hazeldean Pump Station.

Figure 1 – Study Area for the WUC



The collective implementation costs for the WUC wastewater projects required within the next seven years are approaching \$68.8 M and there is an immediate need to identify the funding requirement, in particular for the Kanata West pump station. This necessitated undertaking a high-level review of wastewater servicing in the West Urban Community in advance of the 2013 Infrastructure Master Plan.

Study Summary

The Planning and Growth Management Department undertook this West Urban Community – Wastewater Collection System Master Servicing Plan Study (WUC-WCSMSPS – see Document 1) to evaluate, through detailed computer modelling, the planning and performance of the WUC wastewater collection system as an integrated system. Opportunities for diversions or other infrastructure work including replacement of pumping stations with gravity trunk sewers that could reduce operation and maintenance (O&M), improve reliability, or provide robustness to the wastewater collection system were also considered.

The following are the key elements of the report:

- Seven options were evaluated, including all gravity systems (no pump stations).
- The servicing options were assessed using conservative wet weather wastewater flow generation, as well as a consideration of their ability to accommodate growth

beyond the current 2031 planning horizon and not impede planned developments.

- The preferred projects identified in the 2009 IMP were still the best solution, with one notable exception: the inclusion of an interceptor sewer between the Fernbank and Stittsville Trunk sewers and the planned Kanata West Pumping Station. The study found that the construction of the interceptor sewer replaces the need for certain upgrades to the Hazeldean Pumping Station and the construction of a third 2.5km forcemain as recommended in the West-end Flood Investigation.
- The interceptor sewer will provide enhanced operational capabilities, resulting in a more balanced distribution of flows between the Hazeldean Pump Station and the proposed Kanata West Pump Station. This ability to divert some or nearly all wastewater from Stittsville and Fernbank will provide additional system robustness. This enhances recommendations in the West-End Flooding Investigation Report. By diverting sewer flows additional residual capacity can be created at either the Hazeldean Pump Station or the future Kanata West Pump Station. This would reduce the potential for overflows or sewer back-up.
- The recommended option had the lowest capital cost and second lowest life-cycle cost, only 2 percent higher than lowest.

DISCUSSION

The current West Urban Community (WUC) wastewater collection network consists of a complex system of pump stations, forcemains and gravity sewers converging to a single pump station at Acres Road. This station pumps wastewater to the Lynwood Collector sewer that ultimately conveys the sewer flows to the Robert O Pickard Environmental Center (ROPEC) for treatment. Several communities such as Carp, Kanata, Stittsville, Munster, Richmond and Bells Corners are serviced by this sanitary sewer collection system. The study area incorporates approximately 8175ha (gross area) upstream of the Acres Road pump station.

Wastewater flows throughout the sanitary sewer system were simulated using a dynamic computer model. A dynamic model considers the variation in time of wastewater inflows. Flows from existing current development and planned future development to year 2031 were generated using conservative parameters. Much of the infrastructure that is to be constructed over the next 10 years involves major trunk sewers and facilities that will be in service long past the Official Plan horizon of 2031. As such, the scope of the study included an evaluation of the performance and flexibility of the major wastewater system to service potential longer-term (50 year) development scenarios. This longer term growth is hypothetical in terms of numbers and location and served to evaluate the performance of planned infrastructure. The growth estimates as used in this study do not constitute preferred growth scenarios for Ottawa.

Existing and potential land use and population statistics were based on information generated by the Department. The long-term area expansion and population growth for

the 2060 capacity requirement scenario is conceptual only, and was prepared with the sole intent of assessing the impact of potential longer-term growth on the performance / robustness of the planned infrastructure that has been identified to meet the requirements of the current 2031 planning horizon. The additional growth was aggregated to four areas and designated as contributing to the March, Signature Ridge, Kanata West and Hazeldean pump stations. The areas are only meant to be a high level approximation of potential capacity requirements beyond the current 2031 planning horizon.

Servicing Strategies

Four servicing solution strategies were identified to meet the 2031 servicing requirements:

1. Servicing Strategy 1: Upgrades proposed in the 2009 IMP including construction of North Kanata Trunk sewer – Phase 2 from March Pump Station to the end of Phase 1 North Kanata Trunk; March Pump Station upgrades (conversion into a low head lift station), replacement and lowering Tri-Township Collector; Signature Ridge Pump Station upgrades; New Kanata West Pump Station including forcemains; Fernbank Trunk sewer to Hazeldean Pump Station.
2. Servicing Strategy 2: A gravity sewer from the location of the proposed Kanata West Pump Station to the North Kanata Trunk Sewer and with a second gravity sewer extending from the Hazeldean Pump Station, which would be taken out of service, to the location of the proposed Kanata West Pump Station.
3. Servicing Strategy 3: A gravity sewer from the Hazeldean Pump Station (which would be taken out of service) to the Lynwood Collector Sewer.
4. Servicing Strategy 4: A new gravity sewer from Hazeldean Pump Station (which would be converted to a low head lift station) to the Lynwood Collector Sewer.

These strategies are independent solutions and after evaluation one preferred strategy would be evaluated further.

Design Parameters

Prior to evaluating strategies it was important to establish design parameters. In wastewater systems planning (not subdivision design), capacity required for developed areas is established by using monitored flows for dry and wet weather conditions. Design values are assigned to growth to establish increased flows for future conditions. In this study two additional cases for design conditions were compared. One case applied monitored data to current and future growth and the other applied design values to existing and future growth. Strategy 1, which is the currently planned program, was used as a basis for making this comparison.

A major flooding incident occurred on July 24, 2009 that resulted in unprecedented volumes of extraneous flows entering the wastewater system that exceeded the present

rated capacity of pump stations and resulted in basement flooding and overflows at several pump stations including the Acres Road pump station. Infrastructure improvements as recommended in the West-End Flooding Investigation, needed to address the flooding issues, were assumed by this Master Plan to be effective in avoiding a similar inflow situation. These improvements included upgrades to the Hazeldean pumps, provision of a sewer overflow structure and reducing the potential for extraneous inflows.

The wet weather extraneous inflow generated by the January 09, 2008 rainfall and snowmelt event was used to establish monitored peak flows for current development (2010). This was a significant recent event that created high extraneous inflows into the sewer and defined the capacity needed to accommodate existing development. The lowest flow generation was obtained from applying monitored parameters to current and future development. The other cases produced similar results and therefore the current practice of using monitored parameters for existing and design values for growth was used for evaluation purposes.

Options Considered

Initial screening of the proposed servicing strategies identified Strategies 1, 2 and 4 as feasible, and Strategy 3 as not feasible due to insufficient vertical fall between the Hazeldean Pump Station and the upper end of the Lynwood Collector Sewer.

Preferred feasible corridors were then identified and seven specific options were formulated around the three strategies. The evaluation and ranking of the servicing options was conducted using categories and criteria previously applied to different City servicing master plans. The evaluation focused mainly on the short-term and long-term reliability, and on the capital costs and the life-cycle cost analysis of the options. Overall, Option 1B derived from the initial servicing Strategy 1 scored the highest and is considered the preferred solution for the WUC wastewater servicing plan.

Option 1B consists of the following infrastructure components:

1. Construction of a 1200 mm diameter North Kanata Trunk – Phase 2 from March Pump Station to the end of Phase 1 of North Kanata Trunk. This permits interception of the Marchwood sewer and allows bypassing the March Pump Station. To be completed in 2014.
2. March Pump Station upgrades (conversion into a low lift station) including decommissioning of the existing forcemain along March Road. To be completed in 2014.
3. Replacement with a lower, larger (to allow for future elimination of the Watts Creek sewer siphon) 1650 mm diameter Tri-Township Collector between Glen Cairn Trunk Sewer and the end of Phase 1 of North Kanata Trunk. To be completed between 2014 – 2017.

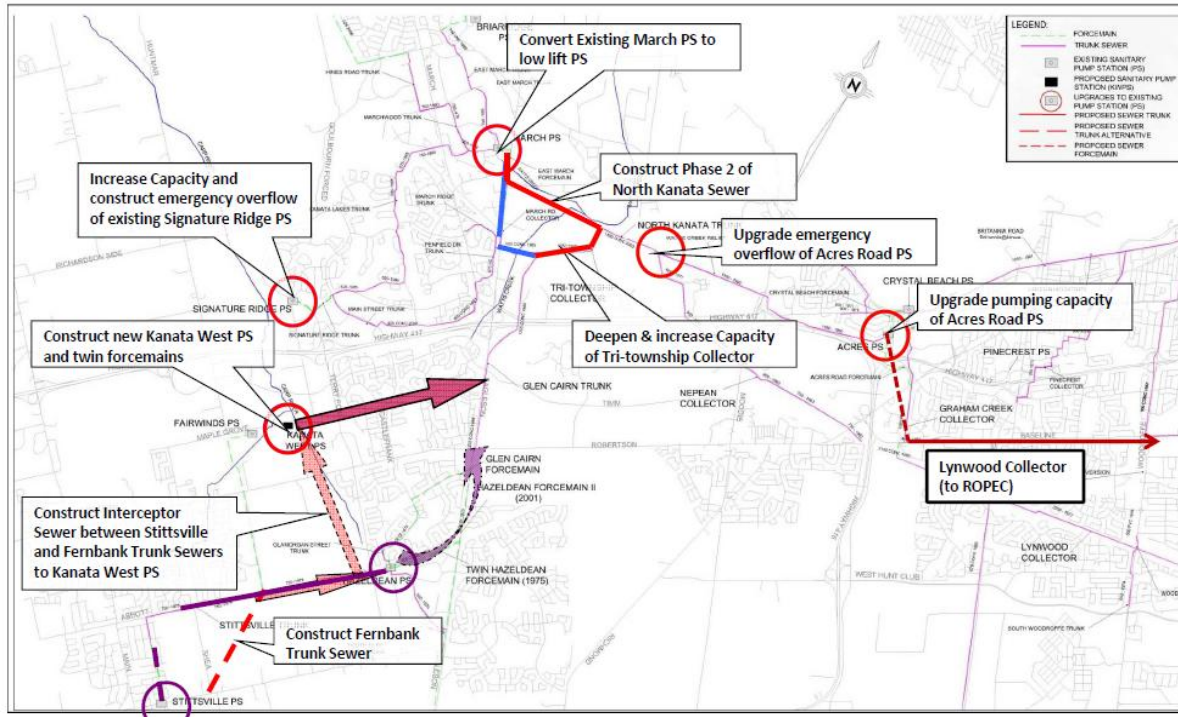
4. Signature Ridge Pump Station upgrades Phase 1 (overflow/wet well) to be completed in 2013 and Phase 2 (twinning of forcemain) by 2017 and to be coordinated with the proposed Campeau Drive expansion.
5. Kanata West Pump Station including forcemains by 2016.
6. Fernbank Trunk sewer to the Hazeldean Pump Station to be completed in 2013.
7. New gravity trunk Interceptor Sewer, and Interceptor Chamber – from the Stittsville / Fernbank Trunk sewers to the Kanata West Pump Station (approximately 3040m long) by 2021. It would be advantageous to do this sooner as it could be integrated with servicing of proposed development. The interceptor sewer will require additional capacity to be built into the Kanata West Pump Station, which is currently being designed.
8. Upgrades to the Acres Road Pump Station pumps and overflow.

The advantages provided by Option 1B compared to the other options considered are:

- It is ready to be implemented, thus, no significant delays for the developments in the WUC are anticipated;
- Building the new interceptor sewer between Stittsville and Fernbank Trunk sewers and Kanata West Pump Station will allow the diversion of sewer flows from Hazeldean Pump Station and will create a better control over the operation of the sewer flows and provide robustness to the system and reliability during pump failure occurrences and extreme wet weather events.
- There is no need for a further capacity upgrade at Hazeldean Pump Station or for the construction of a third forcemain to replace an existing pipe in order to accommodate growth.
- It provides an opportunity for decommissioning several small pump stations located in the Stittsville community (i.e. John Street, Joseph Circle, Amberwood, Fringewood and Fringewood North, etc).
- Lowest capital cost and second lowest life-cycle cost.
- Enhances recommendations in the West-End Flooding Investigation Report. By diverting sewer flows additional residual capacity can be created at either the Hazeldean Pump Station or the future Kanata West Pump Station. This would reduce the potential for overflows or sewer back-up.

Figure 2 - Option 1B as the Preferred Solution.

STRATEGY #1 / OPTION 1B – Preferred Option
WUC Wastewater Master Plan



The capital cost of all the proposed work was estimated by the study to be \$62.9 million which includes a capital cost allowance for contingency, engineering and project management. The projects are proposed to be constructed between 2013 and 2019 and will be primarily funded through development charges. Design work and assessments conducted subsequent to the study has increased the scope of some projects as well as updated some cost estimates. The cost estimate for budgeting is \$68.8 million for which we have \$6.7 million in existing authority.

It is important to note that a number of options were studied, and several had capital cost estimates above \$100M, and as high as \$150M, as outlined in Document 1. This preferred solution not only best meets the servicing needs, but also meets the needs in a cost-effective way.

Implementing the recommended projects will allow for new development to proceed in a timely manner and will reduce risk of potential wastewater overflows to local watercourses, as well as reduce risk of basement flooding.

RURAL IMPLICATIONS

The recommended upgrades to the WUC wastewater system continue to allocate capacity for new residential and ICI development in the Villages of Carp and Richmond since these two villages pump their wastewater to the WUC system.

CONSULTATION

No public consultation was conducted as a part of this study although a commencement notice was published. Public consultation requirements were or will be fulfilled during the required Class Environmental Assessment (Class EA) planning process for the projects identified in the 2009 IMP. The proposed new Stittsville / Fernbank diversion sewer is an A+ Schedule project under Class EA requirements and the public will be notified of the project during the detailed design / construction phase.

COMMENTS BY THE WARD COUNCILLORS

The Ward Councillors are aware of this project.

LEGAL IMPLICATIONS

There are no legal impediments to implementing the recommendations in the report.

RISK MANAGEMENT IMPLICATIONS

The proposed works support development and protect existing residents by minimizing the risk of potential environmental impacts (overflows, basement flooding) for the wastewater collection system.

FINANCIAL IMPLICATIONS

Total estimated costs for the projects required to implement the West Urban Community – Wastewater Collection System Master Servicing Plan are \$68.815 million. Funding of \$6.665 million is available within existing capital budgets. The remaining \$62.15 million will be identified in the 2013 rate-supported capital budget and forecast. The additional authority will be brought forward through the budget process in the respective years required, subject to the availability of funding.

ACCESSIBILITY IMPACTS

There are no accessibility impacts related to this report.

ENVIRONMENTAL IMPLICATIONS

The planning, design, approval, construction and operation of a municipal wastewater system requires the City to comply with a range of Provincial legislation, in particular the *Environmental Assessment Act* and the *Ontario Water Resources Act*. In addition, the City has developed its own Sewer and Wastewater Pump Station Design Guidelines. Through the design and permitting processes, a full range of design considerations are factored into the sizing, location and configuration of wastewater infrastructure to minimize the impact to the natural environment and minimize the health and safety risks to residents that rely on its performance.

One of the key design considerations of the WUC Wastewater Master Plan has been the provision of emergency overflows at the major pump station facilities. The overflows, which would operate in the event of a complete system failure (including emergency back-up power failure) or overloading during an extreme event, have been designed to outlet to existing stormwater management facilities, where feasible (to avoid direct impacts on the natural environment), and have or will be designed to operate prior to basements being affected under extreme operating conditions.

TECHNOLOGY IMPLICATIONS

Information Technology Services will work to identify and prioritize the required business technology capabilities, and establish an affordable and effective work plan to support these new and transformative initiatives, in partnership with the Planning and Growth Department.

TERM OF COUNCIL PRIORITIES

Recommendations in the West Urban Community Wastewater Collection System Master Servicing Study Report are consistent with the approved 2011-2014 Term of Council's Priorities.

The proposed works support the Environmental Stewardship priority by minimizing the risk of potential environmental impacts (overflows, basement flooding) for the wastewater collection system.

The proposed works support the Economic Prosperity priority by providing wastewater servicing to allow for timely new residential, and ICI development in the Western Growth Area.

The proposed works support the Financial Responsibility priority by allowing the collection of development charges, and by enabling the planning of sewer rate budget that will finance public works in timely fashion which would allow core City services, such as wastewater collection to be sustainable now and into the future.

SUPPORTING DOCUMENTATION

Document 1 West Urban Community Wastewater Collection System Master Servicing Study Report, July 2012 (issued separately)

DISPOSITION

The Planning and Growth Management and the Infrastructure Services Departments will be responsible for the design and construction of wastewater infrastructure projects recommended in the West Urban Community Wastewater Collection System Master Servicing Study Report that are funded primarily through Development Charges.