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| <p>2. COMPREHENSIVE ASSET MANAGEMENT PROGRAM UPDATE –<br/>WATER AND SEWER RATE SUPPORTED PROGRAMS</p> <p>MISE À JOUR SUR LE PROGRAMME DE GESTION INTÉGRALE DES ACTIFS<br/>– PROGRAMMES FINANCÉS À PARTIR DES REDEVANCES<br/>D'EAU ET D'ÉGOUTS</p> |
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**REFERRED TO COUNCIL:**

**That Council consider the following:**

**REPORT RECOMMENDATIONS:**

**That the Environment and Climate Protection Committee recommend Council:**

- 1. Receive the update on the City's Comprehensive Asset Management Program (CAM) as it relates to programs funded by sewer and water revenues;**
- 2. Approve the next steps for the Comprehensive Asset Management Program as identified in this report.**

**RENGOYÉE AU CONSEIL :**

**Que le Conseil examine la question suivante :**

**RECOMMANDATIONS DU RAPPORT :**

**Que le Comité de l'environnement et de la protection climatique recommande au Conseil :**

- 1. de prendre acte de la mise à jour sur le Programme de gestion intégrale des actifs (GIA) en ce qui concerne les programmes financés par les recettes des services d'eau et d'égout;**
- 2. d'approuver les prochaines étapes décrites dans le présent rapport pour le Programme de gestion intégrale des actifs.**

DOCUMENTATION/DOCUMENTATION

1. Director's Report, Infrastructure Services, Planning, Infrastructure and Economic Development Department, dated 11 September 2017 (ACS2017-PIE-IS-0010)

Rapport du Directeur, Service de l'infrastructure, Direction générale de la planification, de l'infrastructure et du développement économique, daté le 11 septembre 2017 (ACS2017-PIE-IS-0010)

2. Please note: This item was considered in conjunction with ECPC Council Report 15, Item No. 1, Long Range Financial Plan V – Water, Wastewater and Stormwater Supported Programs (ACS2017-CSD-FIN-0023). Please refer to that item to view an extract of Draft Minute.

Prière de noter : Ce point a été étudié en même temps que le point n° 1 du rapport 15 du CEPC au Conseil, Plan financier à long terme V – Programmes relatifs à l'eau, aux eaux usées et aux eaux pluviales financés par les tarifs (ACS2017-CSD-FIN-0023). Veuillez vous reporter à ce point pour voir un extrait du procès-verbal préliminaire.

**Report to  
Rapport au:**

**Environment and Climate Protection Committee  
Comité de l'environnement et de la protection climatique  
19 September 2017 / 19 septembre 2017**

**and Council  
et au Conseil  
27 September 2017 / 27 septembre 2017**

**Submitted on September 11, 2017  
Soumis le 11 septembre 2017**

**Submitted by  
Soumis par:  
Alain Gonthier,  
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**Infrastructure Services / Services de la planification  
Planning, Infrastructure and Economic Development Department / Direction  
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**Ward: CITY WIDE / À L'ÉCHELLE DE LA VILLE      File Number: ACS2017-PIE-IS-0010**

**SUBJECT: Comprehensive Asset Management Program Update – Water and  
Sewer Rate Supported Programs**

**OBJET: Mise à jour sur le Programme de gestion intégrale des actifs – programmes financés à partir des redevances d'eau et d'égouts**

## **REPORT RECOMMENDATIONS**

**That the Environment and Climate Protection Committee recommend Council:**

- 1. Receive the update on the City's Comprehensive Asset Management Program (CAM) as it relates to programs funded by sewer and water revenues;**
- 2. Approve the next steps for the Comprehensive Asset Management Program as identified in this report.**

## **RECOMMANDATIONS DU RAPPORT**

**Que le Comité de l'environnement et de la protection climatique recommande au Conseil :**

- 1. de prendre acte de la mise à jour sur le Programme de gestion intégrale des actifs (GIA) en ce qui concerne les programmes financés par les recettes des services d'eau et d'égout;**
- 2. d'approuver les prochaines étapes décrites dans le présent rapport pour le Programme de gestion intégrale des actifs.**

## **EXECUTIVE SUMMARY**

The City of Ottawa maintains nearly \$42 billion (in 2017 dollars) in existing infrastructure assets and every year the City acquires new infrastructure through new development or replaces existing infrastructure with an approximate replacement value of \$150 million. Rate supported assets represents approximately half of this estimated replacement value.

This infrastructure is needed to allow the City to deliver residents, businesses and visitors with services that are essential to quality of life and economic growth. Because of the importance of these services to quality of life and economic growth – from roads, sidewalks, pathways and public transit to safe drinking water to recreation and culture to social services and long-term housing to libraries, emergency services, public health

and nearly every other government service people use every day – the assets required to deliver them needs to remain reliable, safe and in a state of good repair.

Like many cities in Canada, the City of Ottawa (and the 12 former municipalities it now includes) experienced tremendous growth over a relatively short period of time between the 1950's and 1980's. The infrastructure built over that period of time requires thoughtful, targeted investments in renewal, rehabilitation and replacement in a way that balances service levels, risk and affordability. Municipal infrastructure assets are vital to health of the national economy. Part of the struggle for most large cities, including Ottawa, is the lack of long-term and predictable funding available to complement municipal resources. There is also a need for clarity about level of service expectations, risk tolerance and their implications to the delivery asset management programs as well as the financial requirements necessary to support the assets. Imbedded in that process is a requirement to further understand the longer term needs driven by growth, redevelopment, deterioration and changing legislated requirements on the complex interconnected systems composed of linear, treatment and process assets. The outcome of these initiatives will bring needed refinement to the assets requirements, timing of the resource needs and potential non-financial strategies that need to be used to balance with available funding.

### **Assumption and Analysis**

The City of Ottawa is considered a municipal leader in asset management practices and long-range financial planning. Successive City Councils have taken a number of actions to proactively ensure the long-term integrity of the City's infrastructure. Beginning in 2002, with the first Long-Range Financial Plan, followed by the Integrated Asset Management Strategy in 2003, the Capital Standards Review for Public Works Infrastructure in 2004, and the Comprehensive Asset Management Program (CAM) in 2012. Councils have taken the necessary steps to ensure they and the public have a deeper understanding of the City's infrastructure needs, so proper planning can inform Council's investments in maintenance, renewal and replacement as part of each long-range financial plan and every annual budget.

CAM involves applying planning, finance, engineering, maintenance and operations lenses to support decision making related to the creation of new assets and the rehabilitation or disposal of existing ones. Decisions required to effectively manage

assets over their entire life may result in policy or standard operating procedure changes to operational regimes. The outcome of the systematic approach results in decisions that maximize benefits, reduce risks, and reduce costs while continuing to provide safe and reliable levels of service to community users in a socially, culturally, environmental and economically conscious manner.

The October 2012 Comprehensive Asset Management (CAM) Program ([City of Ottawa Comprehensive Asset Management Program](#)) was presented jointly with the Long Range Financial Plan for tax funded programs in order to provide context between the state of the assets and the levels of investment required to continue to deliver services by maintaining those assets in a state of good repair. The 2012 report also presented Council with the CAM Policy, the CAM Strategy and the City's 2012 State of Assets Report (SOAR). In June 2017, the Long-Range Financial Plan V-Tax Supported Capital (LRFP V) was presented to Council. In conjunction with that report, Council was provided with a Comprehensive Asset Management Program update (ACS2017-PIE-IS-0002) that outlines:

- Accomplishments to date under the CAM program;
- The 2017 State of the Asset Report (SOAR);
- The Strategic Asset Management Plan;

Those elements are not repeated here but they are equally relevant to provide context for the rate supported assets that are the subject of this report.

The focus of this report is a summary of the management approach specific to the assets supporting drinking water, storm water management, waste water collection and treatment as well as recommendations necessary to allow the undertaking of initiatives that will bring needed refinement to the asset financial requirements, timing of the resource needs and potential non-financial strategies that need to be used to balance with available funding.

The 2017 State of the Asset Report (SOAR) confirms City-owned assets are safe. The condition of the City assets has remained relatively stable - in fair to good condition. Some assets remain in poor and very poor condition, but staff are aware of these assets and they are tracked, assessed and managed on a risk-to-service-basis. The City

continues to apply recognised asset management practices to maintain the whole range of rate funded assets in a state of good repair and the City's foundational asset management practices have been put in place in order to address the next set of challenges in the rehabilitation, renewal and replacement of the City's infrastructure.

The most significant and on-going challenge is to manage the upcoming wave of renewal needs in a way that reduces the sudden rise in works required to keep assets safe and functioning, which in turn reduces the risk of service impacts or interruptions. The City has and will continue to put in place risk-based financial and non-financial strategies to address areas of concern. This report identifies the initiatives necessary for the way forward.

The way forward includes:

- Continuing to enhance the CAM program governance and implementations (Capital Project Value Assessments to link investments to Level of Service outcomes, Service based AMP's, integrating lifecycle costing into asset based decision making, Data and system improvements, etc. ...).
- Document 'as is' Levels of Service for core Service areas, evaluate asset needs and timing of implementation against the documented and communicated level of service expectations.
- Assess outcome of Phase 2 of Federal funding programs and the Provincial asset management regulation.
- Undertake non-financial strategy assessments and document benefits and recommendations for consideration (ex. service rationalization, asset rationalization, renewal strategy effectiveness analysis, adjusting renewal approaches, ensuring consistent application of policies affecting effectiveness of renewal programs). A review of the LDWM inspection program will be included in the assessment with proposed alternative to ensure a successful and sustainable program.
- Update the Strategic Asset Management Plan based on results of these undertakings.

## **Financial Implications**

The Long Range Financial Plan V for Water, Wastewater and Stormwater Supported has identified current requirements representing an average of \$310 million per year (in 2017\$), which includes renewal, growth and strategic initiatives. The “net” City rate Capital Investment requirement is an average of \$260 million per year (in 2017\$) once external revenue sources, including but not limited to development charges, are excluded.

This investment rate provides for the capital reinvestment needs identified over the course of 2016/2017 for the current 10-year forecast. The initiatives recommended in this report will help further refine the requirements and any funding gap that is required to be addressed and the Rate Structure recently approved by Council provides more predictable and stable funding for the assets over the longer term.

## **Public Consultation/Input**

The development of SOAR included working sessions and consultation with multiple business lines across each City department. The CAM steering committee has representation from all departments and has overseen the development of all CAM initiatives and the LRFP update.

As part of annual capital program review meetings with Ward Councillor's, a program background and supportive information was provided.

## **Summary**

The recommendations of this report will ensure Ottawa remains a leading organization in asset management practice and, most importantly, continues to promote a comprehensive and sustainable approach to protecting the infrastructure that delivers City services.

## **RÉSUMÉ**

La Ville d'Ottawa entretient ses infrastructures actuelles, dont la valeur atteint près de 42 milliards de dollars (en dollars de 2017), et, chaque année, elle en acquiert de nouvelles lors de nouveaux aménagements et en remplace à raison d'environ



150 millions de dollars en coûts de remplacement. Les biens financés par les tarifs représentent environ la moitié de cette valeur de remplacement estimée.

La Ville a besoin de ces infrastructures pour offrir aux résidents, aux entreprises et aux visiteurs des services essentiels à la qualité de vie et à la croissance économique. Vu l'importance de ces services – pensons aux routes, trottoirs, sentiers et transports en commun, à la salubrité de l'eau potable, aux loisirs et à la culture, aux services sociaux, aux logements à long terme, aux bibliothèques, aux services d'urgence, à la santé publique et à essentiellement tout autre service public utilisé au quotidien –, la fiabilité, la sécurité et le bon état des actifs sont fondamentaux.

À l'instar de nombreuses villes canadiennes, Ottawa (et les 12 anciennes municipalités qui la composent) a connu une croissance fulgurante en relativement peu de temps entre les années 1950 et les années 1980. Les infrastructures construites durant cette période doivent faire l'objet d'investissements ciblés et réfléchis aux fins de renouvellement, de remise en état et de remplacement tenant compte à la fois du niveau de service, des risques et de l'abordabilité. Les infrastructures municipales sont essentielles à la santé économique du pays. Or, la bête noire de la plupart des grandes villes, dont Ottawa, est constituée en partie par le manque de financement prévisible à long terme pour compléter les ressources municipales. Par ailleurs, il faut clarifier les attentes à l'égard des niveaux de service, de la tolérance au risque et de l'incidence de ces deux éléments sur l'exécution des programmes de gestion des actifs ainsi que sur les crédits nécessaires pour entretenir ceux-ci. Pour ce faire, il faut mieux comprendre les besoins à long terme suscités par la croissance, les réaménagements, les détériorations et les transformations dictées par les changements législatifs sur les systèmes complexes et interdépendants composés des infrastructures linéaires et des infrastructures d'épuration. Lorsque ce sera fait, on pourra mieux définir les besoins d'actifs, le calendrier des ressources requises et les éventuelles stratégies non financières qui permettraient de composer avec les fonds disponibles.

### **Hypothèses et analyse**

La Ville d'Ottawa est considérée comme un chef de file municipal en matière de pratiques de gestion des biens et de planification financière à long terme. Au fil des années, les conseils municipaux ont pris différentes mesures pour garantir de façon

proactive l'intégrité à long terme des infrastructures municipales. Avec le premier Plan financier à long terme, en 2002, la stratégie de gestion intégrée des biens, en 2003, l'examen des normes de capital en ce qui a trait à l'infrastructure des travaux publics, en 2004, et le Programme de gestion intégrale des actifs (GIA), en 2012, les différentes administrations se sont assurées qu'elles, de même que le public, avaient une meilleure compréhension des besoins en infrastructure, afin de prévoir dans chacun des plans financiers à long terme et des budgets annuels les investissements appropriés dans l'entretien, la remise en état et le remplacement.

La GIA signifie que les décisions relatives aux nouveaux actifs et à la remise en état ou à l'élimination des actifs actuels tiennent compte de divers aspects : planification, cadre financier, ingénierie, entretien et opérations. Afin de prendre les décisions nécessaires pour gérer efficacement les actifs leur vie durant, il pourrait être nécessaire d'apporter des modifications aux politiques ou aux procédures opérationnelles normalisées. Cette approche systématique donne lieu à des décisions qui maximisent les avantages et réduisent les risques ainsi que les coûts tout en fournissant aux usagers des niveaux de service sécuritaires et fiables, le tout dans une optique de viabilité sociale, culturelle, environnementale et économique.

Le [Programme de gestion intégrale des actifs](#) d'octobre 2012 a été présenté en même temps que le Plan financier à long terme pour les programmes financés par les taxes afin d'établir le lien entre l'état des actifs et le niveau d'investissement requis pour continuer à fournir les services et à garder les actifs en bon état. Le rapport de 2012 présentait aussi au Conseil la politique et la stratégie relatives à la GIA, ainsi que le Bilan des actifs de 2012 de la Ville. En juin de cette année, le Plan financier à long terme V (PFLT V) a été présenté au Conseil. Ce document était accompagné d'une mise à jour du Programme de gestion intégrale des actifs (ACS2017-PIE-IS-0002) comprenant ce qui suit :

- Réalisations à ce jour dans le cadre du programme de GIA;
- Bilan des actifs de 2017;
- Plan stratégique de gestion des actifs.

Nous ne reprenons pas le contenu de ces documents ici, mais ces éléments sont tout aussi utiles pour expliquer la situation relative aux biens financés par les tarifs qui font l'objet du présent rapport. Dans le présent rapport, nous faisons plutôt un résumé de la méthode de gestion propre aux actifs liés à l'eau potable, à la gestion des eaux pluviales et à la collecte et au traitement des eaux usées, de même que des recommandations quant aux mesures à prendre pour permettre la mise en branle d'initiatives qui permettront de mieux comprendre les besoins financiers, le calendrier des ressources requises et les éventuelles stratégies non financières qui permettraient de composer avec les fonds disponibles.

L'état des actifs de la Ville est relativement stable, soit acceptable ou bon. Certains biens sont dans un état mauvais ou très mauvais, mais le personnel est au courant, et ces biens sont surveillés, évalués et gérés en fonction du risque pour le service. La Ville continue d'appliquer des pratiques de gestion des biens reconnues pour conserver en bon état tous les biens financés par des tarifs, et des pratiques de base en matière de gestion des biens ont été mises en place à la Ville en préparation pour les défis à venir en lien avec la remise en état, le renouvellement et le remplacement des infrastructures municipales.

Le défi le plus important et le plus tenace à prévoir est la gestion de l'explosion attendue des besoins de renouvellement : il faudra limiter la quantité de travaux requis pour garder les infrastructures sécuritaires et fonctionnelles, et, ainsi, réduire le risque de perturbation ou d'interruption des services. La Ville continue de mettre en place des stratégies (financières ou non) en fonction des risques pour aborder les points à améliorer, et le présent rapport fait état des initiatives qui permettront de mieux comprendre les besoins d'actifs, le calendrier des ressources requises et les éventuelles stratégies non financières qui permettraient de composer avec les fonds disponibles.

Le présent rapport recommande un certain nombre d'initiatives qui seront mises en œuvre d'ici 2020. En voici quelques-unes :

- Continuer d'améliorer la gouvernance et la mise en œuvre du Programme de GIA (évaluer la valeur des projets d'immobilisations pour faire le lien entre les investissements et les résultats relatifs aux niveaux de service, concevoir une

GIA axée sur les services, intégrer les coûts liés au cycle de vie au processus décisionnel fondé sur les actifs, améliorer les données et le système, etc.);

- Consigner les niveaux de service « réels » dans les grands secteurs et évaluer les besoins d'actifs et le calendrier de mise en œuvre par rapport aux attentes consignées et énoncées;
- Évaluer les résultats relatifs à la deuxième phase des programmes de financement fédéral et à la réglementation de l'Ontario en matière de gestion des biens;
- Entreprendre l'évaluation des stratégies autres que financières et recenser les avantages et les recommandations à envisager (p. ex. : rationalisation des services et des actifs, analyse de l'efficacité de la stratégie de renouvellement, ajustement des méthodes de renouvellement, application cohérente des politiques ayant une incidence sur l'efficacité des programmes de renouvellement). Un examen du programme d'inspection LDWM fera partie de l'évaluation et comportera une solution pour assurer le succès et la viabilité du programme.
- Mettre à jour le Plan stratégique de gestion des actifs sur la base des résultats de ces mesures.

### **Répercussions financières**

Le Plan financier à long terme V sur les équipements relatifs à l'eau potable, aux eaux usées et aux eaux pluviales qui sont financés fait état des besoins actuels, qui se chiffrent en moyenne à 310 millions de dollars par année (en dollars de 2017), y compris pour les initiatives de renouvellement et de développement et les initiatives stratégiques. Les besoins « nets » de la ville en immobilisations financées par les tarifs se chiffrent en moyenne à 260 millions par année (en dollars de 2017) après exclusion des sources de revenus externes, des redevances d'aménagement, etc. Ce taux d'investissement couvre les besoins de réinvestissements en immobilisations établis pour 2016-2017 dans le cadre des prévisions décennales actuelles. Les initiatives recommandées dans le rapport aideront à mieux définir les besoins et les manques à gagner à régler; quant à la structure tarifaire récemment approuvée par le Conseil, elle prévoit un financement plus prévisible et plus stable à long terme.

## **Consultations publiques et commentaires**

Des séances de travail et des consultations avec des intervenants de différents secteurs d'activités des directions générales de la Ville ont été menées dans le cadre de l'élaboration du Bilan des actifs. Le comité directeur de la GIA, composé de représentants de toutes les directions générales, a vu à l'élaboration de toutes les initiatives liées à la GIA ainsi que de la mise à jour du PFLT.

Un document sur le contexte du programme et des documents à l'appui ont été produits dans la foulée des réunions d'examen annuel des programmes d'immobilisation avec les conseillers de quartiers.

## **Sommaire**

Les recommandations formulées dans le présent rapport permettront à Ottawa de rester un chef de file en matière de pratiques de gestion des biens et, plus important encore, de continuer à mettre de l'avant une approche globale et durable pour protéger les infrastructures nécessaires à la prestation des services municipaux.

## **BACKGROUND**

The City of Ottawa maintains nearly \$42 billion in existing infrastructure assets. Rate funded assets account for approximately half of that amount and the approach in managing those assets is consistent with other assets funded by tax or transit funds.

Much of the City's rate funded assets were (and still are) designed and built to last several decades – drainage culverts, treatment facilities, stormwater ponds, remote stations, and buried pipes are designed to last for 40, 80 and 100 years or more. The infrastructure built in the decades after the second world war are starting to show signs of deterioration and will continue to require thoughtful, targeted investments in renewal, rehabilitation and replacement in a way that balances service levels, risk and affordability.

On June 14, 2017 Council approved the Long Range Financial Plan (Tax) V. At that time, Council also received, under a separate report, an update on the Comprehensive Asset Management program at the City ([ACS2017-PIE-IS-0002](#)).

This report is intended to compliment the LRFP V (Rate) in similar fashion as the June report did for the Tax LRFP. With the Tax LRFP, Council was provided with the following documents, focused on providing context. These context documents are also applicable to rate funded assets (ACS2017-PIE-IS-0002):

- An update on the accomplishments to date under the CAM program;
- The 2017 State of the Asset Report (SOAR);
- The Strategic Asset Management Plan;

The focus of this report is an update on the management approach of assets supporting the delivery of services for drinking water production and distribution, storm water management, and the waste water collection and treatment.

## **DISCUSSION**

The City's Comprehensive Asset Management program (CAM), as adopted by City Council in October 2012, is designed to ensure that staff strive to apply "the right intervention, on the right asset, at the right time" in a manner that considers affordability and risk.

As the municipal infrastructure inventory continues to expand and to age, the most significant and on-going challenge with regards to maintaining our assets in a state of good repair is to adequately prepare for the upcoming wave of renewal needs in addition to sustaining level of service expectations and incorporating requirements based on legislative changes. This upcoming wave, created by the large volume of construction in the post-war era, will need to be managed in a way that reduces the risk of service impacts or interruptions, reduces the sudden rise in unplanned works required to keep assets safe and functioning, and prevents an increase in reactive interventions.

The 2017 State of the Asset Report (SOAR) confirms City-owned assets are safe. The condition of the City assets has remained relatively stable - in Fair to Good condition, as shown in Figure 1. Some assets remain in poor and very poor condition, but staff are aware of these assets and they are tracked, assessed and managed on a risk-to-service-basis.

Figure 1 – State of Assets Report (SOAR) summary

Service	2017 Status				
	Asset Replacement Value	Overall Average Asset Condition Rating	% of Assets in Poor to Very Poor Condition	% of Assets in Fair Condition	% of Assets in Good to Very Good Condition
Water	\$ 7,465 M	Good-Fair	4 %	17 %	79 %
Wastewater	\$ 7,193 M	Fair-Good	11 %	37 %	52 %
Stormwater	\$ 6,296 M	Good-Fair	7 %	25 %	68 %
Solid Waste	\$ 59 M	Good-VG	6 %	11 %	82 %
Transit	\$ 1,890 M	Fair-Good	6 %	65 %	29 %
Transportation	\$ 12,612 M	Fair	29 %	46 %	25 %
Parks, Rec and Culture	\$ 2,231 M	Fair	51 %	31 %	18 %
Libraries	\$ 126 M	Good	46 %	16 %	38 %
Social Services	\$ 3,032 M	Good-Fair	5 %	27 %	69 %
Fire	\$ 291 M	Fair	49 %	30 %	21 %
Paramedic	\$ 19 M	Good	10 %	18 %	71 %
Bylaw	\$ 13 M	Fair	72 %	13 %	15 %
Police	\$ 148 M	Fair	58 %	23 %	20 %
Corporate Services	\$ 251 M	Fair-Poor	42 %	49 %	9 %
Information Technology	\$ 59 M	Fair	35 %	15 %	50 %
<b>Overall Summary</b>	<b>\$ 41,686 M</b>	<b>Fair-Good</b>	<b>17 % (\$7.0B)</b>	<b>34 % (\$14.4B)</b>	<b>49 % (\$20.3B)</b>
<b>Very Good</b> - Fit for the future. Well maintained, good condition, new or recently rehabilitated.					
<b>Good</b> - Adequate for now. Acceptable, generally approaching mid stage of expected service life					
<b>Fair</b> - Requires attention. Signs of deterioration, some elements exhibit deficiencies.					
<b>Poor</b> - Increasing potential of affecting service. Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration.					
<b>Very Poor</b> - Unfit for sustained service. Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable.					

The focus of this report is to articulate the activities and the approaches that are applied daily by staff to maintain rate-funded assets in a state of good repair. Also itemised are some of the challenges that we are facing and actions that need to be undertaken to continue to improve asset management practices and public-facing outcomes.

The City continues to apply recognised asset management practices to maintain the whole range of rate funded assets in a state of good repair. These are founded on integrated asset planning practices, risk-based assessments and prioritization, and service-centric decision making.

Continued investments of \$3.1 billion (\$2.6 billion net rate after other revenues and development charges) over the next 10 years, as identified in the Rate LRFP V, are needed to closely align to the capital reinvestment needs identified over the course of 2016/2017. These investments will support the implementation of necessary life cycle interventions and programs that ensure delivery of core services to residents on an on-going basis.

## **1 – Existing and emerging practices**

### Wastewater

The wastewater assets provide for the collection and treatment of all wastewater used across the City (with the exception of wastewater conveyed to private systems). The City's sole wastewater treatment plant (Robert O. Pickard Environmental Centre - ROPEC) was initially constructed in 1962 and has undergone two expansions (1971-1975 and 1988-1993). The current wastewater treatment facility has a capacity of 545 million litres/day and processed 394 million litres/day in 2016 (average flow).

In order to support the complex nature of the interconnected system composed of multiple assets, several programs have been developed to provide preventative, predictive and corrective maintenance to ensure continuous service provision. Maintenance activities are reviewed quarterly to allow new information to feed back into the maintenance activities and operations. The City uses Enterprise Systems to monitor and schedule maintenance activities at the component/equipment level (SAP for ROPEC and the Wastewater Pump Stations and Maximo for the linear assets).

Investigations into performance, failure modes and requirements of the equipment continue to provide information to optimize interventions or direct the required action on the equipment most benefiting from the maintenance activity. In some cases, specific equipment will be run to failure as a strategy because of the low risk and cost effectiveness to do so.

Condition assessment priority lists at the ROPEC plant have recently been completed and a recent project for the pump stations has provided an updated inventory of the equipment within the stations. This information is allowing for updates and changes to preventative maintenance schedules and frequencies for the equipment and has identified a listing of requirements for more detailed inspection.



Also, there are a number of maintenance programs established on the wastewater collection system. The work activities are tracked and reviewed in an effort to continually change and improve. Some of these changes have resulted in operational budget savings that are reinvested into other operational activities. Similarly, ongoing inspection, monitoring and cleaning of linear pipe sections has provided staff with information supportive of deferring some sewer rehabilitation.

The inspection and rehabilitation programs for the collection and conveyance system are established using a risk-based and evidence-based approach. This approach considers the likelihood of a failure and its impact to the community, to the environment and the cost to the City. The approach also considers various failure modes, including structural failure, odour failure and conveyance capacity failure.

Pipe sections that pose a higher risk are inspected more frequently (varies from two to 10 years) and pipes that pose a lower risk are inspected less frequently (varies from 10 to 20 years). Pipes are inspected and structural condition validated for prioritization of renewal candidates as well as to ensure that the appropriate intervention is being applied.

The technology to inspect buried sanitary mains varies based on the properties of the pipe. Generally, a visual inspection is completed with closed-circuit television (CCTV) and inspection results are generated using industry recognised assessment protocols.

In large-diameter and/or high-flow pipes, it may be necessary to use more sophisticated equipment, such as multi-sensor robotics or floats equipped with CCTV, Sonar and Lidar. The visual inspections assess the structural integrity of the pipes. The hydraulic capacity is in turn assessed through hydraulic modeling and flow monitoring.

Hydraulic modeling of the network (or subsets of the network) is typically carried out to understand why some areas are more prone to flooding and help determine feasible alternatives to mitigate the risk of hydraulic failure. When determining the type of intervention required, staff will, at minimum, consider the physical condition and the hydraulic properties of the pipe.

Capacity needs are also modeled to ensure that growth across the City can be accommodated by existing systems or identify necessary upgrades as needed to capture and convey the wastewater to be treated. The comprehensive review of

demand on the system and trunk capacity needs is undertaken periodically and reported periodically through the Infrastructure Master Plan (IMP).

### Stormwater

The stormwater management assets provide for the safe conveyance of rain and meltwater runoff throughout the City to protect roads, buildings and local waterways from flooding and erosion. Since the mid 1990s, stormwater from new development are also treated by removing certain contaminants to mitigate water quality impacts to both receiving water bodies and groundwater.

In recent years, staff have completed numerous testing and monitoring exercises of the surface water quality across the City. The results for the period 2000 to 2014 indicate the water quality within the major corridors is very positive. The results within the smaller surface water corridors are not fairing so well and this highlights the need to advance the City's Stormwater Retrofit programs. With this extensive baseline data, staff can now confidently shift their efforts to other maintenance activities within the stormwater programs.

In addition, staff will undertake a gapping exercise. Stormwater management crosses many work units and disciplines. The end result of the exercise will provide clarity regarding roles and responsibilities for the many elements of stormwater management.

Staff within the Stormwater Management area will also shift their focus to inspection, maintenance and rehabilitation of the existing facilities. Through the targeted sampling, staff will be able to scope retrofits and improvements to the existing facilities to make basin specific water quality improvements. A more proactive approach to stormwater management will take place involving major facility cleanouts and rehabilitation.

With regards to the buried pipe system, the inspection frequency and approach for storm sewers is essentially the same as that of the sanitary sewers with a couple of differences. Storm systems by nature are exposed to climate elements. As such, impacts to the system's inlets and outlets (i.e. catch basins, pond outlets structures, ditch inlets, and outfalls) tend to vary significantly. Weathering and deterioration are hard to predict and both maintenance and life cycle needs can vary significantly within a relatively small time period or small geographical area.

For those storm sewers that operate, under normal circumstances, in a fully submerged state, their inspection is carried out by commercial divers. For large diameter storm sewers (approximate diameter  $\geq 1.5$  metre), they are visually inspected by a structural engineer.

Over the last 15 years, renewals to the sanitary and storm sewer networks have been completed in several neighbourhoods that had experienced flooding in previous years. Since the renewals, none of these neighbourhoods have experienced system wide flooding occurrences as they had in the past. This emphasises the benefit and the need to continue to fund performance improvement capital renewal programs.

Another significant component of the storm water and run-off water management component is the culvert and ditch system. The inspection program for the culverts is determined using a risk-based approach. The inspection program dictates which culverts to prioritise for inspection and the results of the inspection identify the needs for the renewal program.

The City undertakes roughly 600 to 800 inspections per year which translate to an approximate inspection cycle of five to 10 years. Unlike storm and sanitary sewers, drainage culverts are buried but exposed at the extremities. This allows the public and road patrols to readily report issues and problems.

In most cases, culverts up to a diameter of 1.5 metres tend to be corrugated steel pipes because they offer the best life cycle value (low initial costs, low maintenance costs, 30 to 40 years of service). Where conditions warrant (high acidity or corrosive environment), concrete or special materials (e.g., aluminum coated, high density polyethylene - HDPE) are used to achieve the desired expected life.

### Drinking Water

The drinking water assets provides for the purification and distribution of safe, potable water to residents and businesses across the City. The majority of the City's potable water is treated by the City's two plants using identical processes. The plants were constructed in 1931 (Lemieux Island) and 1961 (Britannia) but have undergone numerous expansions and upgrades over the years.

A continuous improvement philosophy is applied to the operation and maintenance activities during the quarterly reviews of key performance indicators. These reviews

ensure that all elements of the maintenance system are performing at established targets. The City uses enterprise systems (SAP for the plants, well systems, pump stations and storage facilities, and Maximo for the linear assets) to monitor and schedule maintenance activities at the component/equipment level.

Beyond the quarterly review, staff have weekly Operations/Maintenance meetings to discuss and troubleshoot issues at the component or process level. This is where the programs that have been developed for preventative, predictive and corrective maintenance are assessed and adjusted as needed. Maintenance activity is prioritised based on priority ratings maintained in the enterprise system.

There are a number of maintenance programs established on the water distribution system and all are subject to ongoing improvement. A recent review to the cathodic protection program, supported by empirical field data enable some deferral to the replacement of sacrificial anodes.

Other maintenance activities that staff are undertaking include the application of corrosion protection within valve chambers to help ensure the existing components do not fail prematurely and operate as intended during an emergency event. Also, the City has a robust valve exercise program for both large and small valves. This program helps ensure that during a watermain failure, the valves used to contain the break function as intended to limit the outage and impact to neighboring properties associated with the failure.

As with the other rate-supported assets, the watermains also rely on a risk-based assessment to support prioritisation and coordination of future renewal works. For smaller watermains, there is no inspection program but renewal needs are identified using historically tracked data. Occurrences of breaks, water quality issues, and frozen services are taken into consideration in the context of pipe material, pipe age, field observations and risk to determine the priority and the type of intervention.

Following the 2011 local failure of a large-diameter watermain on Woodroffe Avenue, the City launched the Large Diameter Watermain (LDWM) condition assessment program. Since then, the City has continued to move forward with the large-diameter condition assessment program. The main benefit of this program is the ability to proactively assess and identify deficiencies that can be corrected in a planned and controlled manner. In many cases distress is localized, so it is possible to rehabilitate

the pipe by replacing a few short sections, as opposed to replacing several long segments. This results in a less-invasive more cost-effective approach to watermain management.

Each inspection provides unique information that guide the selection of the most appropriate intervention (repair, rehabilitation, or replacement) but completion of the comprehensive condition assessment will take several years to complete. All 230 kilometres of the large mains were prioritised using a risk-based approach to target the higher risk pipes to be inspected first. The inspection of these assets is operationally challenging and resource intensive. Since the LDWM program was launched, approximately 10 per cent of the system has been assessed for condition, and 15 per cent has been assessed for leaks. These inspections have directly led to localised repairs at five locations across the City, locations that may not have been targeted for rehabilitation otherwise and that could have impacted several thousand residences and businesses had they failed.

An emerging issue that needs to be addressed is that the re-inspection cycle on these critical assets is relatively long; approximately 35 years based on current inspection rates. In contrast, the minimum re-inspection cycle on trunk sewer assets is 20 years. The inspection program for the large diameter watermains as it exists now has been established to minimize potential impacts to the public during probable peak demand periods. The conservative approach leaves only a small window to conduct the needed work.

The system is designed to be redundant during the low-demand winter months. Inspections, urgent repairs and recommissioning the pipe is accordingly completed between October and April. Tools and processes have been developed to expedite repairs but this still only leaves a six- to eight-week window per year for actual inspection. A limited number of shut-downs can occur concurrently without negatively impacting level of service or inducing an unacceptable level of risk to the system. The Large Diameter Watermain inspections need to be coordinated with other maintenance, rehabilitation and construction activities that are taking place within the water system (treatment plants, pumping stations and distribution system).

Without expanding the window of opportunity to inspect, it may not be possible to increase inspection rates. Conversely, expanding the inspection season could result in

some service impacts if shutdowns for repair extend into the higher-demand summer months (e.g. potential need for outdoor water restrictions depending on the results of the inspection). The benefit is that it would reduce the risk of failure, as well as improve the frequency of inspection and re-inspection.

Beyond physical condition inspection, the capacity needs of the system are also modeled to ensure that growth across the City occurs in areas that have the trunk capacity to supply drinking water. The comprehensive review of demands on the system and trunk capacity needs is undertaken and reported periodically through the Infrastructure Master Plan.

## **2 – Future needs and uncertainties**

The City maintains a deterioration model that reproduces intervention strategies on the linear pipe networks based on deterioration prediction. That model reproduces renewal and rehabilitation works over the entire network for a period of 100-years. Modelled deterioration is only a portion of the requirements needed to sustain the assets supporting expected levels of service.

New guidelines and changing legislation, system redundancy initiatives to maintain levels of services and capacity improvements, intensification, growth and redevelopment impacts are all variables that impact future needs. These are incorporated by considering staff knowledge and available information making the exercise more than simply aging assets and inventory growth.

While LRFP V has a 10-year window some of the items that can potentially represent significant investments will be required outside of that window. At this point in time, the value of the works and their timing are not well defined but their future impacts need to be kept in consideration and there is a need to further review and analyze the potential implication of items such as:

- a) Changes in provincial stormwater management guidelines and their implementation requirements.
- b) Changes to the provincial standards that will require new treatment processes at the water purification plants that will require significant capital investments and will be followed several years later by necessary changes at ROPEC to ensure that the wastewater is properly treated before returning water to the Ottawa river.

- c) Continued investments to support projects necessary to improve levels of service, to the extent possible, in older neighborhoods prone to flooding.
- d) Implications of sustained growth and upgrades/expansions for water purification, stormwater and wastewater treatment facilities.
- e) The need to consider large critical infrastructure redundancy and risk mitigation relocations for items such as providing redundancy to the Interceptor Outfall Sewer (possibly as an extension of the Combined Sewage Storage Tunnel /- CSST) to ROPEC or relocation of portions of the Carling Avenue Watermain to a less challenging corridor.

The recommendations in the report will be bring needed refinement to the future needs and uncertainties, timing of the needs and potential non-financial strategies that need to be used to balance with available funding.

### **3 – Long Range Financial Plan and Strategic Asset Management Plan (SAMP)**

On June 14, 2017, Council received the City's first Strategic Asset Management Plan (SAMP) (ACS2017-PIE-IS-0002) which ensures that the City is compliant with the provincial legislation making it mandatory for municipalities to produces these plans starting in 2018.

The SAMP is based on existing strategic directions, policies and a compilation of existing documentation. It is intended to be a living document that will be updated whenever key Council objectives and/or legislation changes, or when the approach through which those objectives are converted to asset management objectives changes. As it is further described in the SAMP, the City intends on developing individual asset management plans (AMPs) for each of the asset intensive services provided by the City. The service specific AMPs will then inform the overall corporate SAMP document.

The document presented to Council earlier this summer is now set to be reviewed to include the outcomes of the Transit, Tax, and Rate supported LRFPs. Accordingly, following the approval of the Rate LRFPP the financial strategy section of SAMP will be updated to reflect the new financial strategies.

A review of the funding levels necessary to support rate funded assets in state of good repair was completed over the course of 2016-2017. The Long Range Financial Plan V for water, wastewater and stormwater supported has identified a financial strategy to fund the equivalent to \$310 million per year (in 2017\$) and a “net” City rate Capital Investment requirement equivalent to \$260 million per year (in 2017\$). That investment rate is necessary to reach the capital reinvestment needs for rate supported assets over time. Ramping up financing to meet the intended outcomes is a reasonable and practical approach.

### **Summary discussion**

As it was pointed out in the June 2017 CAM update to Council (ACS2017-PIE-IS-0002), funding will always have limits and there is the underlying fact that infrastructure renewal needs will continue to increase in the future.

As they deteriorate, these assets are competing for funding for upkeep and renewal. Coupled with service expectations, new or changing guidelines, regulations, and their implementation, the way forward cannot simply rely on a financial solution.

While predictable and long term federal and provincial partner funding is one component, it is incumbent upon the City, as steward of municipal assets, to clearly document level of service expectations as well as their implications to our assets, to undertake necessary studies and analysis to better understand long term requirements and, to seek out means, other than funding alone, to manage assets in a sustainable way.

Staff are recommending Council approve the undertaking of the following initiatives by 2020 in order to bring forward an updated statement of requirements, as well as financial and non financial approaches for Council’s consideration.

These initiatives include:

1. Continuing to enhance the CAM program governance and implementations (Capital Project Value Assessments to link investments to Level of Service outcomes, Service based AMP’s, integrating lifecycle costing into asset based decision making, Data and system improvements, etc. ...).



2. Document 'as is' Levels of Service for core Service areas, evaluate asset needs and timing of implementation against the documented and communicated level of service expectations.
3. Assess outcome of Phase 2 of Federal funding programs and the Provincial asset management regulation.
4. Undertake non-financial strategy assessments and document benefits and recommendations for consideration (ex. service rationalization, asset rationalization, renewal strategy effectiveness analysis, adjusting renewal approaches, ensuring consistent application of policies affecting effectiveness of renewal programs). A review of the LDWM inspection program will be included in the assessment with proposed alternative to ensure a successful and sustainable program.
5. Update the Strategic Asset Management Plan based on results of these undertakings.

Although assets are funded from different funding sources, and the long range financial plans and budgets are prepared and presented separately, the services provided to residents rely on multiple assets that are fundamentally interconnected. As such, the recommendations being put forward by staff for rate supported assets are consistent with those approved by Council for tax supported assets.

These initiatives will ensure that the City continues to advance its Comprehensive Asset Management Program and continue to meet legislated reporting requirements. These initiatives will focus on the development of robust levels of service, non-financial strategies, lifecycle strategies, and other evidence-based decision support tools and processes.

## **RURAL IMPLICATIONS**

The City's comprehensive asset management program and practices apply equally to all areas of the City regardless of their urban, suburban or rural environment. The recommendations of this report supports City assets that provide service to all areas.

## **CONSULTATION**

The CAM steering committee has representation from all departments and has overseen the development of all CAM initiatives and the LRFP update.

As part of annual capital program review meetings with Ward Councillor's, a program background and supportive information was provided.

## **COMMENTS BY THE WARD COUNCILLORS**

This is a city-wide report – not applicable.

## **LEGAL IMPLICATIONS**

There are no legal impediments to approving the recommendations in this report.

## **RISK MANAGEMENT IMPLICATIONS**

Risk management implications are contained in the report and consistent with those articulated in the 2012 report “COMPREHENSIVE ASSET MANAGEMENT PROGRAM” - ACS2012-PAI-INF-0007 ([2012 Report - Comprehensive Asset Management Program](#)).

Since 2012 there has been significant effort in implementing a robust and repeatable way of quantifying the risk to a service based on the properties and location of the supporting assets. The process identifies the assets most at risk of impacting the community or the environment, to better inform staff of assets that require more immediate attention (whether through inspection, maintenance, renewal or simply collection and validation of required asset information).

An example of this approach is the Large Diameter Watermain program (LDWM). The objective of the LDWM Program is to identify areas of distress and repair them before they fail. The risk of not inspecting LDWM frequently enough is that pipes in high distress could fail before they are identified through condition assessment. Pipeline assets are out of sight, out of mind, but not out of risk. A further application of this approach is used as part of the City's risk-based policy for consideration of applications for development above in-ground City-owned infrastructure.

## **ASSET MANAGEMENT IMPLICATIONS**

This report provides an update on the City's Comprehensive Asset Management (CAM) Program ([City of Ottawa Comprehensive Asset Management Program](#)). The program provides for a customer-focused, forward looking, and systematic approach to managing city assets that support service delivery. The implementation of the CAM program results in timely decisions that minimize lifecycle costs and ensure the long-term affordability of assets. The recommendations of this report will ensure key initiatives supporting these objectives continue to be undertaken and brought to Council for consideration as required.

## **FINANCIAL IMPLICATIONS**

The financial implication associated with this report are documented as part of the LRFP V – Rate supported Capital report (ACS2017-CSD-FIN0017). Council has identified the completion of the Long Range Financial Plan (LRFP) for rate supported services as a priority for each term of Council. The LRFP report identifies the funding strategies that can be put in place to provide for the renewal of the City's asset base to keep them in a state of good repair.

## **ACCESSIBILITY IMPACTS**

There are no accessibility impacts associated with this report.

## **ENVIRONMENTAL IMPLICATIONS**

Funding associated with rate supported assets has a direct implications to the City's ongoing environmental stewardship and the overall water environment.

## **TERM OF COUNCIL PRIORITIES**

The CAM program integrates with the Corporate Planning Framework, the long range financial planning and annual budget processes as well as master planning initiatives to complement the City's strategic objectives. CAM has been identified as part the City's Strategic Plan (SI 58).

## **SUPPORTING DOCUMENTATION**

There are no supporting documents.

## **DISPOSITION**

Working with its cross departmental partners, Infrastructure Services will continue to progress with CAM initiatives itemised in this report. Further refinement will continue in all of these initiatives, linking investment decisions to the service impact on residents, businesses and visitors. The adoption of the CAM Policy by Council and the endorsement of the CAM Strategy has put into place recognised asset management practices and has positioned the City well to address new and emerging requirements. The recommendations of this report will ensure Ottawa remains a leading organization in asset management practice and, more importantly, develops comprehensive and sustainable approaches to the delivery of services.