SUBJECT: 2021 Asset Management Plan

TO: Environment, Infrastructure & Community Services Cttee.

FROM: Engineering Services Department

Report Number: ES-47-21

Wards Affected: All

File Numbers: 701.04

Date to Committee: November 15, 2021

Date to Council: November 23, 2021

Recommendation:

Approve the City's 2021 Asset Management Plan attached as Appendix A to engineering services department report ES-47-21

PURPOSE:

To obtain approval of the City's 2021 Asset Management Plan (AMP), which establishes compliance with Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure ahead of the next regulatory deadline of July 1, 2022.

The purpose is also to provide an overview of the AMP that reports on the state of the City's assets, service levels, strategies and long-term infrastructure requirements. Report F-34-21, on the same agenda, addresses the implementation strategy for meeting the financial needs of those requirements.

Vision to Focus Alignment:

- Support sustainable infrastructure and a resilient environment

Executive Summary:

Burlington's asset management planning process plays a key role in enabling the organization to realize value from assets as organizational objectives are pursued. The Asset Management Plan (AMP) and related Asset Management Financing Plan (AMFP) are long-term plans and strategies that are developed to provide information to City

staff, Council and the public, in order to make informed decisions about the City's infrastructure.

Completing the 5-year update to the City of Burlington's AMP was a significant undertaking. It involved a comprehensive review and assessment of the City's asset information and strategies in order to develop a document that combined state of the infrastructure, service levels, risk, lifecycle strategies and long-term investment needs.

The AMP has been finalized in accordance with Ontario Regulation 588/17, Asset Management Planning for Municipal Infrastructure and is in alignment with the City's Asset Management Policy, which outlines the core principles and corporate commitment to asset management planning.

Corporate asset management information and processes are constantly evolving. The numerous factors driving changes to the results and outcomes from 2016 to 2021 have been documented and discussed, including impacts that are reflected in the annual investment need, backlog calculation and long-term strategies. Moving forward, staff will continue to refine asset management strategies and data. Throughout the development of the AMP several continuous improvement opportunities have been identified that will enhance future plan documents and guide the advancement of asset management at the City of Burlington in line with best practices.

Background and Discussion:

The City of Burlington's infrastructure systems support a range of municipal services that enable residents, businesses and visitors to live, work and play in our City. The City currently owns and manages over $5 billion worth of tangible capital assets based on replacement value. As these assets age, investments will be required to maintain them in a state of good repair and ultimately replace the assets at the end of their service life.

The primary goal of management and staff who support the Asset Management service area is to maximize the value of the City's assets and understand the balance between risk, performance and cost. The service conducts various activities that guide the process of making the best possible decisions regarding the building, operating, maintaining, renewing, replacing and disposing of infrastructure assets. One of those activities is the development of an AMP.

2016 Asset Management Plan

The City's first AMP was completed by staff in 2016. Prior to that point, asset management information, data and reporting capabilities had yet not reached an advanced level. As a result, Council was only provided updates on the state of the City's more financially significant assets, with a focus on roadways and facilities. The 2016 AMP was the first attempt at reporting on the City's infrastructure in a single document.

On April 17, 2017, Council received the city's 2016 Asset Management Plan (report CW-22-17). This plan was used to subsequently support the approval of the 2016 Asset Management Financing Plan (report F-12-17) on May 15, 2017.

Ontario Regulation 588/17

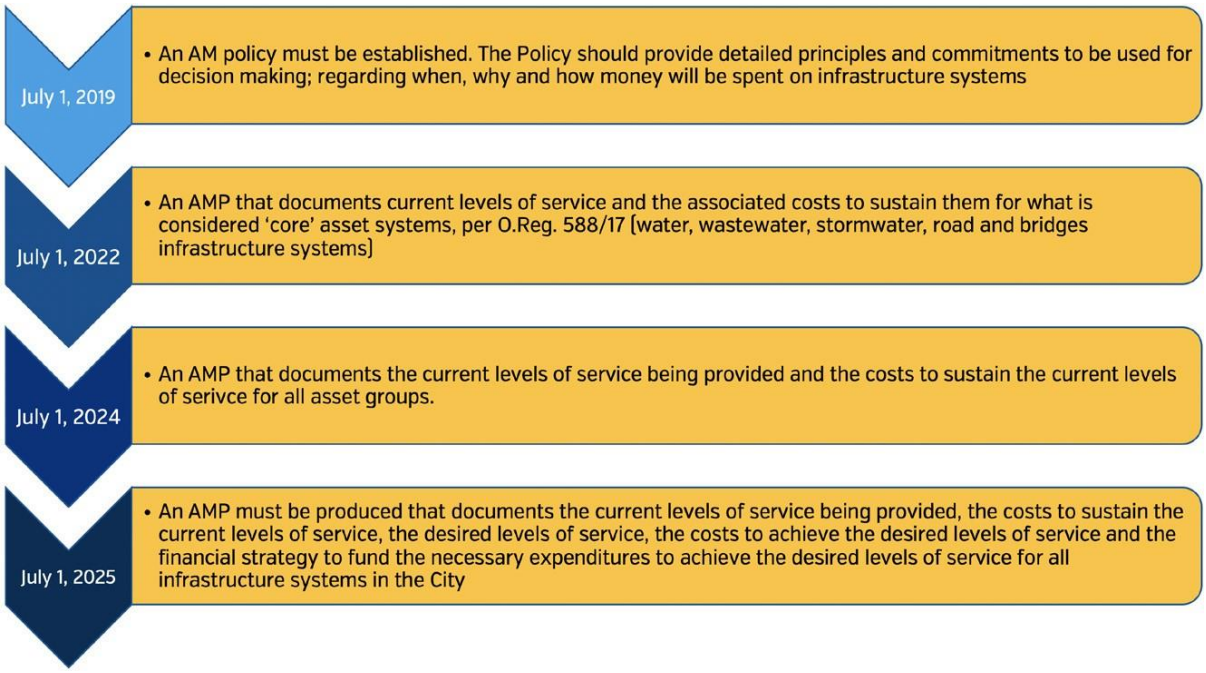
The Province of Ontario released Ontario Regulation 588/17 under the Infrastructure for Jobs and Prosperity Act, 2015. Under the legislation, every municipality is required to prepare a strategic asset management policy, a plan to maintain core municipal infrastructure, a levels of service proposal and a publicly accessible asset management plan.

The requirements and timelines associated with the regulation (as amended by the Ministry of Infrastructure on March 15, 2021) are outlined below in Figure 1. The City achieved the first milestone requirement for the adoption of a Strategic Asset Management Policy, which was approved by Council in 2019 (Report CW-30-19). This replaced the previous corporate policy, approved by Council in 2016.

The 2021 AMP (appendix 'A') ***meets and exceeds*** the second milestone of having an asset management plan in place for all core municipal assets by July 1, 2022.

Completion of the continuous improvements that have been mapped out in the plan, and stated in the Asset Management Service Business Plan, will satisfy all requirements in the third milestone well ahead of the July 1, 2024 deadline.

Figure 1: O.Reg. 588/17 Requirements



Asset Management Plan Update

In 2020, the City partnered with GM BluePlan Engineering (GMBPE) to prepare an update to Burlington's AMP that would meet the requirements of O.Reg. 588/17 to include core assets of the City, as defined to be transportation services (roads, structures and traffic infrastructure) and stormwater (including stormwater management and stormsewer network). Facilities that provide Recreation, Community and Culture service were also added as an optional component. The scope of work included the following:

- Document current asset inventory including replacement cost and condition
- Document the current levels of service being provided, develop performance measures and targets and document the current performance of the assets
- Develop a lifecycle management strategy outlining lifecycle activities that would need to be undertaken to maintain the current levels of service.
- Identify the amount and timing of future investments required to support the lifecycle management strategy (i.e. operating and capital investments over the lifespan of the assets) as well as associated funding strategies
- Identify associated risks and risk management strategies

City staff led the work on all remaining asset services (Corporate Facilities, Fleet, Fire, ITS, Parking, Transit, Forestry and Parks) to ensure that the plan was comprehensive.

The AMP was successfully completed in October 2021, and it is intended to be used to guide and inform future capital and operating budgets, as well as identify next steps towards improved asset management practices.

State of Burlington's Infrastructure

The State of Infrastructure (SOI) is reported in the AMP for each service area. The SOI provides an overview of the City's assets, including the following:

- A summary of the inventory of assets, including description and quantity;
- An approximation of the replacement value of the assets;
- A description of the proportion of estimated service life that has been consumed for the assets;
- Condition ratings of the assets

Maintaining accurate and reliable asset information is important because it acts as a foundation for all subsequent analysis used to support decision-making. Included in each section is a description of the data sources and systems used to report on the SOI.

Asset Inventory, Systems & Data

As part of the AMP project, GMBPE compiled a central asset inventory ("registry") for the City. The registry includes records for assets across all service areas. The City has various source systems and data in place that were used to provide input into the asset registry.

The City is currently undertaking an Enterprise Asset Management Solution (EAMS) project which includes the installation and configuration of a new maintenance management system and a Decision Support Solution (DSS). Together, these applications will have a transformative impact on the City's asset management program.

Several benefits include:

- Increased automation of asset management activities;
- Improved inventory management processes;
- Customer service improvements;
- Enhanced asset reporting and data visualization; and
- Operating & Maintenance inputs into lifecycle analysis and capital plans

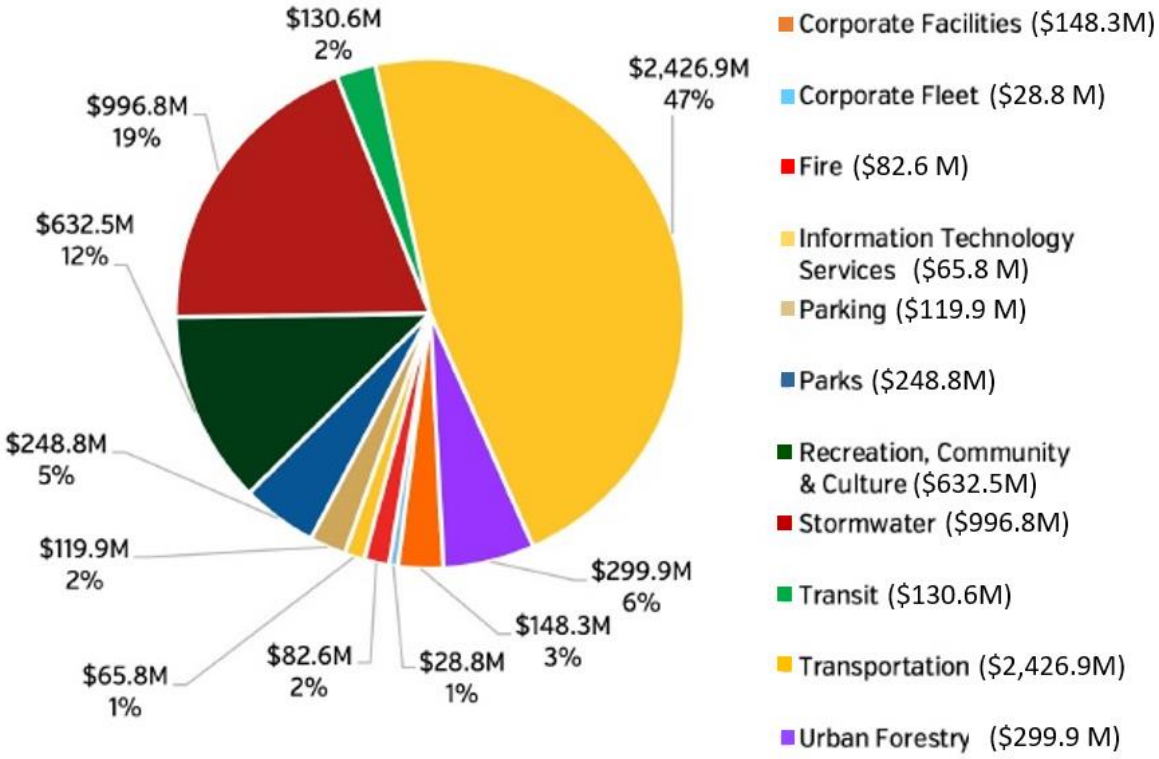
EAMS will allow City staff to continually update and refine asset data and will make reporting more efficient and repeatable. It is expected that having staff utilize these

applications will lessen the reliance on external consulting services for future AMP updates.

Asset Replacement Value

The City's infrastructure has an estimated current replacement value of **$5.2 billion**, which is summarized by asset service in Figure 2. Various methods and sources were applied for determining replacement costs.

Figure 2: Replacement Value by Asset Service



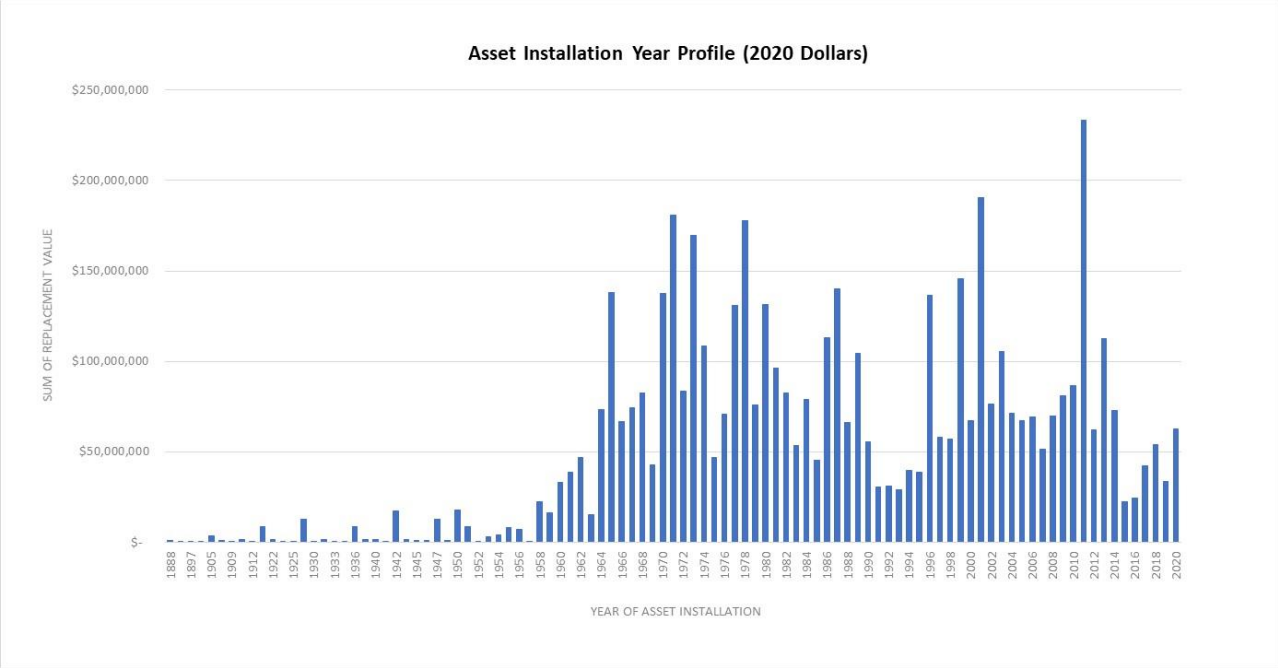
The City's transportation assets make up the largest share of the total asset base, valued at $2.43 billion. Within transportation, the road network makes up the most significant portion of this at $1.74 billion, which represents 33% of the total value of all City's assets.

Asset Age and Condition

The majority of the City's assets have been constructed over the last five decades and, as shown in Figure 3, this mirrors periods of significant population growth and development. Recent single year increases are attributed to larger scale additions to

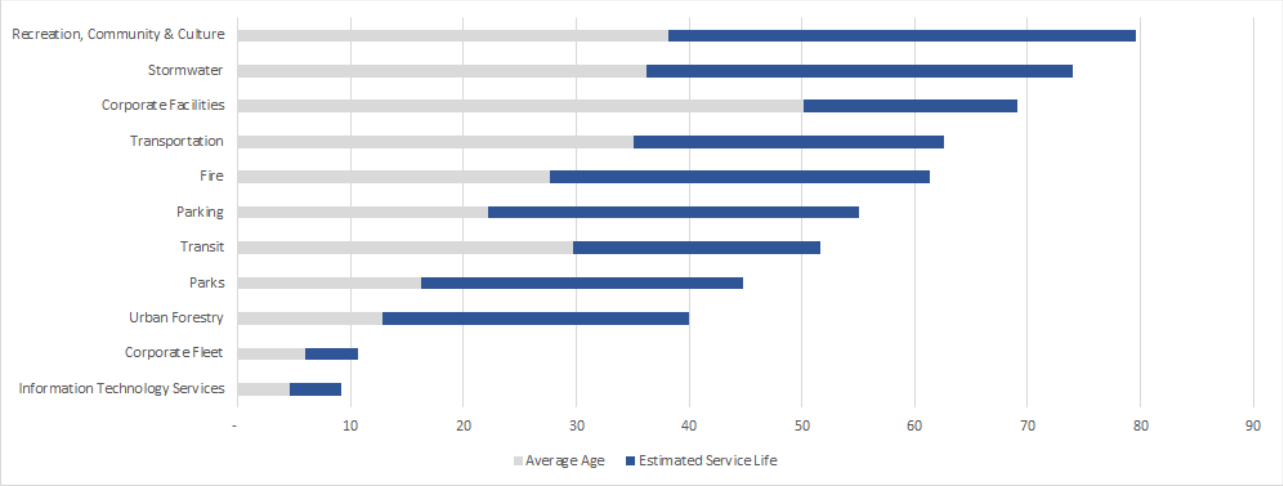
the City's asset base within Recreation, Community & Culture, Transportation and Parks.

Figure 3: Asset Installation Year Profile



Most of the City's assets are at the mid-point of their estimated service life (ESL), as shown in Figure 4.

Figure 4: Asset Average Age and Remaining Service Life



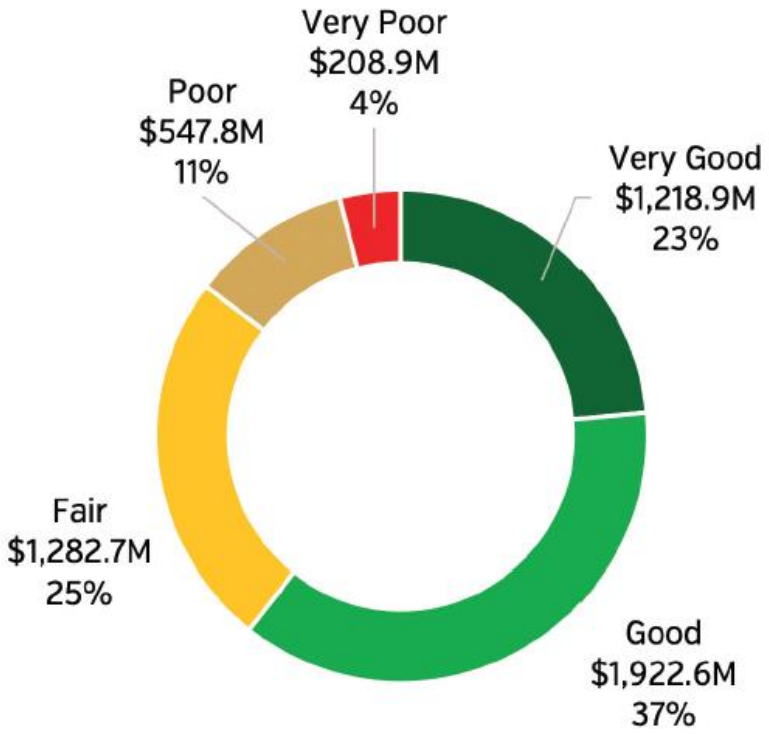
Asset condition ratings were applied to each asset based on available information using a standardized five-point rating scale, as seen in Figure 5. In addition to providing a basis for assessment, the rating scale allows for benchmarking results.

Figure 5: Asset Condition Scale

Summary	Definition
Very Good Fit for the future	The infrastructure in the system or network is generally in very good condition, typically new or recently rehabilitated. A few elements show general signs of deterioration that require attention.
Good Adequate for now	The infrastructure in the system or network is in good condition; some elements show general signs of deterioration that require attention. A few elements exhibit significant deficiencies.
Fair Requires attention	The infrastructure in the system or network is in fair condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies.
Poor At risk	The infrastructure in the system or network is in poor condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration.
Very Poor Unfit for sustained service	The infrastructure in the system or network is in unacceptable condition with widespread signs of advanced deterioration. Many components in the system exhibit signs of imminent failure, which may be affecting service.
Not Assessed	This category is reserved for assets where data is either missing, not updated, or cannot be considered reliable. Flagging this data helps the departments identify where gaps in information exist and allows them to develop assessment plans to improve future data reliability and accuracy.

As shown in Figure 6, the overall average condition of the City's assets is **Good**, with 60% of the inventory at or above this condition state. Although the majority of the City's assets are relatively new, and most assets with longer ESLs are only at mid-life, expenditures are required to address the 15% of assets classified in poor or worse condition. Equally important, the City must prevent other assets from reaching poor and very poor condition over the coming years in order to maintain current service levels.

Figure 6: Asset Condition



The City has ongoing initiatives aimed to enhance its condition assessment approaches to improve the quality of data, and this will be reflected in the next AMP update.

Levels of Service

Levels of Service (LOS) describe the quality, function and capacity of the services being delivered. For each asset service covered in the AMP measures were established through workshops with City staff. Ontario Regulation 588/17 requires two levels of service for assets. The first are community levels of service, which use qualitative data to communicate service outcomes from the perspective of the customer. The second are technical levels of service, which use metrics that are described in technical terms (e.g. average bridge condition index score).

The AMP provides community levels of service and required technical levels of service along with measures of current performance. As the City continues to focus on balancing resident needs, expectations and affordability, this is an area that will be further reviewed and developed in the future to more formally define city wide performance measures along with establishing targets.

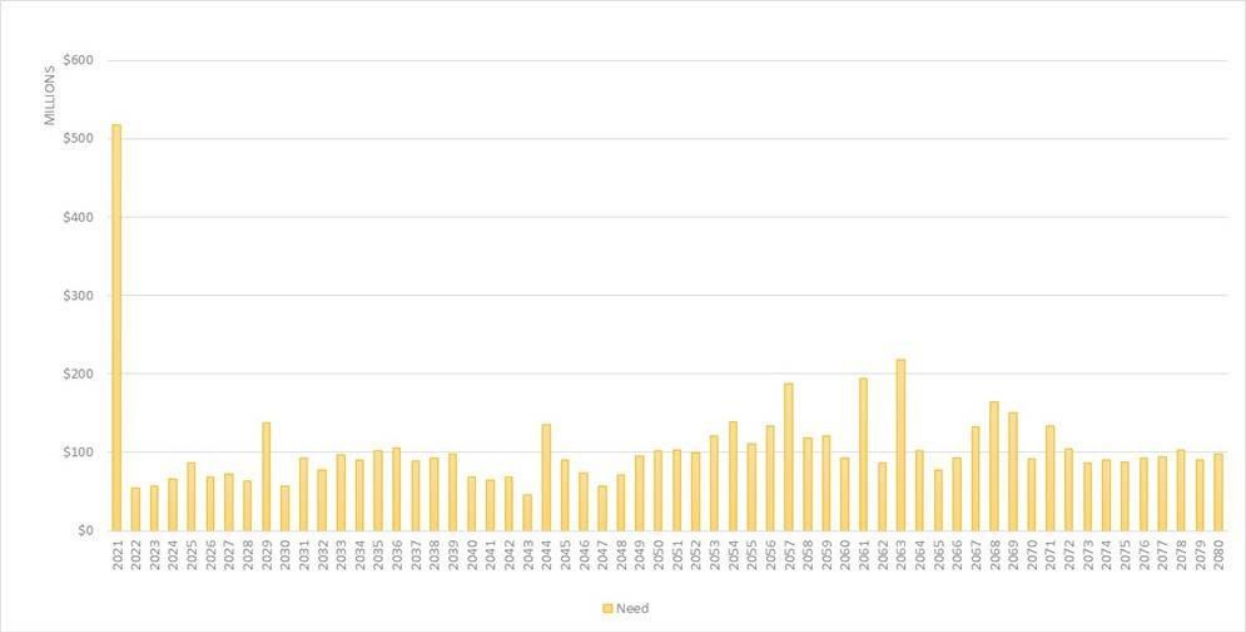
Asset Lifecycle Management Strategy

The activities the City undertakes to maintain an acceptable level of asset performance were reviewed related to the defined levels of service. The City has developed and documented lifecycle models and strategies to describe how assets behave and deteriorate over time. These are then used to inform decisions about asset capital interventions and investments required across all lifecycle stages. Included in each section of the AMP is a summary of all the planned lifecycle-based activities and practices that are carried out. Development of a risk management strategy for infrastructure was also started. Asset risk is defined as the likelihood of asset failure based on condition times the consequence of failure. Consequence of failure scores were assigned through discussions with asset service leads, and were based on assessments of social, environmental and economic factors.

Forecast Need

The result of combining state of the infrastructure, service levels, risk, and lifecycle strategies is the generation of a forecast asset need profile. This allows for determining whether current funding levels are adequate to maintain the assets in a condition that is acceptable to deliver the levels of service expected of those assets in the long term. In the AMP, capital renewal and replacement needs for all existing assets over a 60-year time horizon were forecasted, as shown in Figure 7. The need forecast is a projection based on information known about the City's assets. Within the Decision Support Solution (DSS), the current condition is used to identify where each asset is in its respective lifecycle, and the planned actions (rehabilitation treatments, replacements) are then programmed into an algorithm that outputs future timing and costs.

Figure 7: 60-Year Infrastructure Need Forecast



Report F-34-21 provides additional detail on the 60-year need analysis, including the average annual investment need required for the City's infrastructure.

Infrastructure Backlog

A key goal of asset management is to ensure that the City's assets are being managed at an optimal level, or lowest lifecycle cost. This requires addressing maintenance, renewal and replacement needs of the asset at the time the required activity comes due, on a proactive cycle. The renewal needs of the asset are determined based on an expected or legislated level of service standard. A backlog occurs when required lifecycle interventions are missed due to insufficient funding, and the "missed need" forms the backlog, this can be interpreted as a funding gap. It is comprised of assets that are beyond their "due date" for renewal or replacement. There are other backlog factors not directly related to funding, some of which are uncontrollable and are listed as follows;

- level of service increase
- new services
- technology obsolescence,
- extreme weather events,
- timing of maintenance
- in-year funding shortfall,
- legislative changes (impacting levels of service)
- joint rehabilitation projects
- internal capacity constraints

In the end, all the factors ultimately will contribute to a funding need.

As of the beginning of 2021, the City's backlog has been estimated at **$518 million**; this equates to 9.9% of the city's portfolio of asset inventory ($5.2 billion). A breakdown of the calculated backlog by asset service area is shown in Figure 8.

Figure 8: Asset Service Backlog

Asset Service	Backlog (millions)
Transportation	$262.8
Recreation, Community & Culture	$82.8
Stormwater	$60.9
Fire	$26.9
Corporate Facilities	$20.1
Parking	$18.4
Parks	$17.9
Transit	$17.7
Corporate Fleet	$7.1
Information Technology Services	$3.5
Urban Forestry	$0
Total	$518.1

Factors Driving AMP Changes (2016 – 2021)

Asset Management practices are constantly being refined. Since 2016 several significant changes have occurred, which are reflected in the results and outcomes reported. The following provides a summary of the factors that, over the last five years, have impacted the updated AMP and the annual investment need.

Net New Additions to the City's Asset Base and Inventory Updates

The City's asset base is constantly expanding with the construction and acquisition of new infrastructure. Examples include linear infrastructure built and assumed through development, facility acquisitions and new builds, and transit fleet expansion.

The 2021 Asset Management Plan contains asset groups that were previously not included in the full reporting and analysis. Several gaps in the City's asset inventories and historical records impacted the ability to reliably report on what the City owns. Examples include natural assets, equipment lists, and underground servicing in parks and facility sites. Data on the city's existing assets has continually been collected and added to the asset register as current resource levels have allowed. These gaps have been reduced since the 2016 Asset Management Plan.

Recalculation of Asset Replacement Value

The total replacement value stated in the 2021 AMP is $5.2 billion, compared to $2.94 billion in the 2016 AMP, an increase of 76%. In addition to the inventory adjustment impacts noted above, a recalculation of replacement costs has contributed to the higher reported value in the SOI and is also reflected in the generated long-term need and infrastructure backlog.

In 2016 all replacement costs were calculated based on renewing or replacing assets to a similar function and equivalent utility. Facilities are now projected to be replaced in the future at a cost that reflects a "modernized standard", meaning that all legislated requirements, corporate standards and service quality expectations are at least minimally met.

Previous replacement values were based on market replacement data and in some cases, inflated historical costs. Current replacement value (CRV) is now the preferred costing method, and staff have now been able to update data based on a detailed review of construction contracts, as well as labour rates and suppliers price lists. For linear assets, this recalculation of unit costs has resulted in significant reporting changes due to the sheer quantity of infrastructure in place.

Review of Estimated Service Life (ESL)

Previous analysis and reporting applied uniform asset useful life values across various types of assets. For example, mainline storm sewer pipes were given a useful life of 60 years, regardless of size or material. Staff have now assessed the lifespan of each asset type and are factoring typical in-service conditions. Adjustments have been made to asset ESL values that have resulted in impacts to the calculation of long-term need.

Level of Service Changes

In the 2021 AMP, preliminary current levels of service have been summarized and relevant performance measures established. The City's existing levels of service, and costs required to maintain those levels, are assumed based on renewing or replacing assets at similar function or equivalent utility. However, some of the City's infrastructure is following an "incurred standard," meaning that in the absence of a defined level of service, there is an expected level of service that the City has been delivering on. This expectation supports projects that are aligned to the City's Vision to Focus initiatives and 25-year Strategic Plan. This trend is evident across all asset service areas but is more common with public-facing assets that residents interact directly and have first-hand experience with. This includes parks, recreation and local board facilities.

As service levels increase, the infrastructure needed to support service delivery will be costlier and will be reflected in the financial analysis. The 2021 AMP reflects replacement values that are now more closely aligned with changes to the level of service standards across all asset categories.

Several examples of incurred service level standard changes, include:

- Transportation: the goal of increasing modal split and transforming the transportation network into more "complete streets" (e.g. Plains Road, with physically separated cycling facilities);
- Improving environmental sustainability and building climate resiliency by incorporating vulnerability considerations and adaptation responses into existing and planned capital projects (e.g. increasing infrastructure capacity, incorporating natural and green infrastructure);
- Facilities: more complex and intricate design has led to increased costs associated with project administration, achieving environmental and efficiency targets (LEED, carbon-neutral, geo-thermal), and meeting legislative standards (e.g. accessibility);
- Parks & Facilities: new, expanded or renovated buildings and park amenities are not designed or constructed to a similar function or equivalent utility. Facilities are undergoing a significant and costly transition, where previous design standards are no longer desired (e.g. Joseph Brant Museum: replacement value $2.8 million, project cost $11 million).

Refinement of Asset Lifecycle Strategies

In the 2016 AMP, most assets had assumed "run to failure" strategies. With access to the Decision Support Solution, it was possible to apply more detailed strategies to more accurately reflect known lifecycle activities beyond replacement. As an example, multi-

use paved recreational trails are renewed at year 15 and year 30, or based on their condition state, at a cost of 10 and 30% of their estimated replacement cost. In 2016 it was only the City's core assets where multiple lifecycle intervention strategies could be programmed.

Redefining the Infrastructure Backlog

The $518 million backlog is a significant increase from the 2016 AMP. When considering the total quantity and value of assets that the City owns, the backlog is not overly significant (9.9% of total replacement value). Unlike the 2016 AMP, the new backlog figure includes the value of all types of asset interventions that were to be required before 2021 and are yet to be completed. This includes minor and major rehabilitation, not just replacement.

Within the backlog there are varying levels of risk and potential impacts. It is therefore important to note that not all assets in the backlog present unacceptable risk. Most assets that comprise the backlog are still safe and providing service, despite operating below standard, exhibiting deterioration and/or having advanced beyond the estimated service life.

The backlog is a "fluid" number that is subject to change due to adjustments made to asset lifecycle strategies, risk tolerances, funding levels and costs. It can be analyzed to understand if there are serious pressures on the program and determine if there is risk to service delivery. Of the reported $518 million, efforts will be concentrated on assets which are in poor and very poor condition and have the highest and most immediate risk of failure, while also tracking assets with a high consequence of failure that will reach that condition state in coming years.

Continuous Improvement and Next Steps

Advancement of the City's Asset Management Program is dependent on the continuous improvement of processes, including those related to asset information, decision-making and strategic planning. There are several next steps and opportunities for improvement that were identified through the development of this AMP and the AM Financing Plan (F-34-21). These initiatives may be used to enhance future revisions of this plan and the associated financial projections and asset management policies.

For the AMP to remain relevant and useful, it will continually be revised to include updates of asset data inventories, LOS metrics, lifecycle activities, as well as continuous improvement tasks, as specified within the timelines below:

- Regularly monitor the progress of the AMP by providing an annual update to Council, including implementation progress and description of any factors impeding implementation;

- A comprehensive update to the Asset Management Plan will occur every five (5) years, or as required by O.Reg 588/17; and
- A comprehensive update to the Asset Management Policy and Strategy every five (5) years

Improvements that will be made in future iterations include the following plan sections and will be updated as part of the asset management service area workplan on an annual basis:

State of the Infrastructure: Asset inventories will be comprehensive and accurate, as data will be updated on an ongoing basis, including replacement value, estimated service life and performance/condition values. Data reliability will be improved through better internal processes, and as more condition assessments are performed, and estimates are refined.

Levels of Service: In future plans, additional LOS measures will be defined for all service areas and staff will continue to improve on how LOS performance data is collected and tracked. LOS measures will be used to represent *proposed* service levels, in addition to the current service levels in place.

Lifecycle Activities: Forecasts of lifecycle activities will be refined over time to predict asset need timing and spending requirements more reliably. Asset class-specific strategies will be identified and documented.

Risk and Climate Change: Future AMPs will include needs forecasts and risk management strategies for most assets. Risk assessments will be reviewed and refined over time to better capture future risks including climate change.

The City also aims to encourage community and stakeholder collaboration. Currently, community feedback is incorporated indirectly through existing public consultation processes related to service-specific engagement. Future iterations will aim to improve on community collaboration and availability of information.

Financial Matters:

Total Financial Impact

Refer to Finance report F-34-21 for an update to the City's Asset Management Financing Plan and recommended strategy.

Funding for the consulting services used for the development of the 2021 Corporate Asset Management Plan were included in the approved 2020 Capital Budget. The project at completion will have spent $200,000 of the original $250,000 budget.

Currently, no additional funding is assigned for external services required to meet future O.Reg 588/17 phases. City staff will assess the need for future funding in advance of the next progress update and the 2023 Capital Budget & Forecast.

Climate Implications

Within the AMP, climate change is acknowledged as a potential source of risk in terms of potential impact to the City's infrastructure and the services they provide. Assessing the vulnerability of infrastructure to these impacts, and the effect of these impacts on the level of service they provide, will be a key priority. In addition, the City will need to fully understand the long-term infrastructure funding requirements needed to support the City's climate change action goals.

Engagement Matters:

The City's website includes an overview of the asset management program, including core asset management principles, a link to the Asset Management Policy, and a link to the published 2021 Corporate Asset Management Plan.

Conclusion:

The City's 2021 AMP is being presented for Council's information and approval to achieve compliance with O.Reg. 588/17, Asset Management Planning for Municipal Infrastructure. The AMP combines state of the infrastructure, service levels, risk, lifecycle strategies and long-term investment needs. The AMP and the supporting information and data will be used as a basis for ongoing and future analysis and reporting. Asset management strategies can be used to guide the prioritization of capital investment needs and potential funding strategies to achieve long-term infrastructure sustainability. Moving forward, City staff have a work plan in place to continue to advance asset management processes in line with best practices. Asset Planning and Finance staff will continue to work collaboratively to develop long-term sustainability strategies that balance service levels, costs and risks.

Respectfully submitted,

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Appendices:

A. 2021 Corporate Asset Management Plan

Report Approval:

All reports are reviewed and/or approved by Department Director, the Chief Financial Officer and the Executive Director of Legal Services & Corporation Counsel.