KPMG

City of Greater Sudbury

Municipal Asset Management Plan

Final Report
November 28th, 2016

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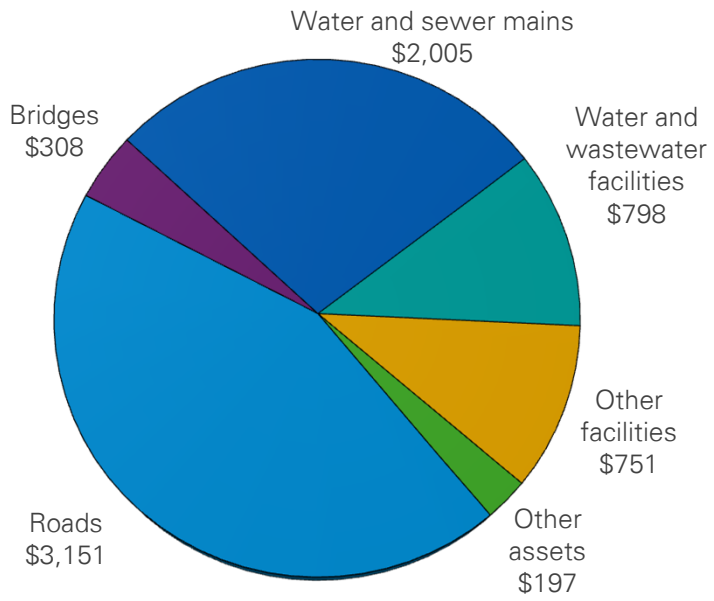
Executive Summary

Asset management planning is the process of making the best possible decisions regarding the acquisition, operating, maintaining, renewing, replacing and disposing of infrastructure assets and is regarded as best practice for long-term financial planning. Asset management planning is particularly important for municipalities given the significance of their investment in infrastructure, concerns over affordability, the increasing cost of regulatory compliance and the fact that a number of municipalities are faced with the impending end of life of a sizeable component of their infrastructures.

Since its formal establishment as a municipality in 1882, the City of Greater Sudbury (the 'City') and its predecessor municipalities have invested significant sums in municipal infrastructure that supports the delivery of services to residents. With a total geographic area in excess of 3,600 square kilometres, the scale of the City's infrastructure is not inconsequential – the estimated cost of replacing the City's roads, water and wastewater infrastructure, facilities, fleet and other assets is estimated to be in the order of $7.2 billion.

While the City has incurred significant capital expenditures in recent years – just under $1 billion over the last ten years – it continues to face a major requirement for infrastructure reinvestment. As noted in more detail in the asset management plan, the estimated cost of infrastructure that is operating beyond its useful life (and theoretically in need of immediate replacement) is $1.8 billion, with an additional $1.3 billion of infrastructure investment needs identified by 2026. In comparison, the City has budgeted a total of $106 million in capital funding during 2016, of which $61 million is funded through taxes and user fees.

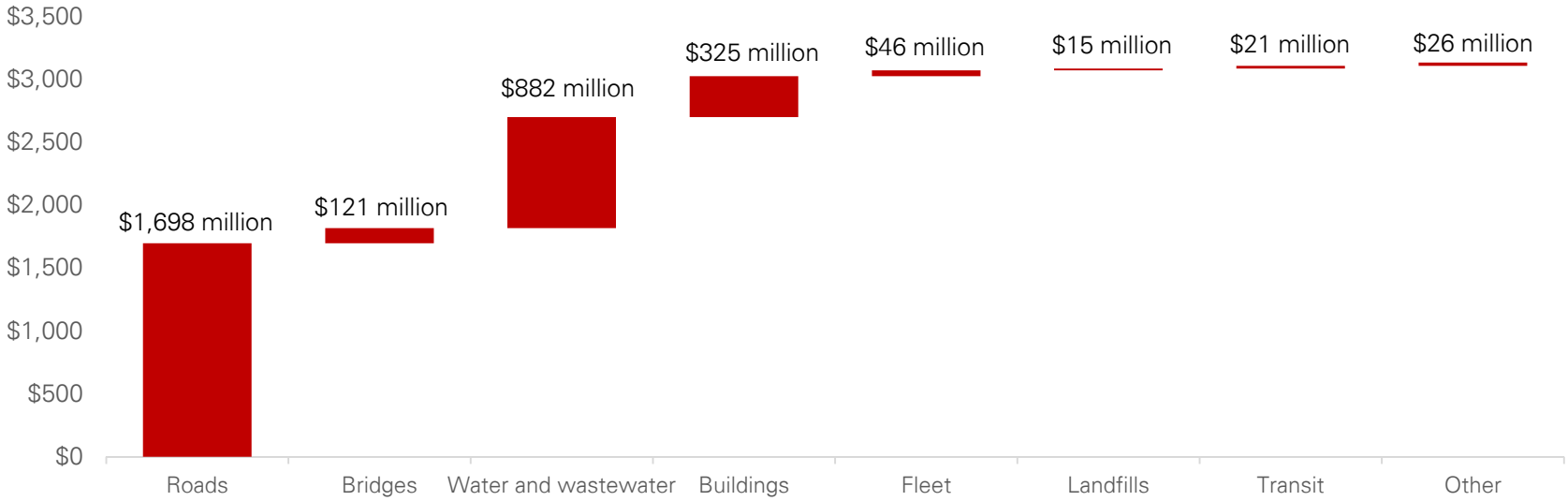
Estimated Replacement Value by Type of Asset (in Millions)



Ultimately, the extent of infrastructure replacement represents a reflection of the City's service levels. Simply put, the continued employment of assets beyond their useful lives can be seen as reflecting a decision (which arguably is unavoidable due to financial constraints) to accept a lower standard of infrastructure condition and a higher level of operating costs. Assuming that the City is willing to accept this lower standard, it is not required to fully fund its upcoming infrastructure investment requirements.

Executive Summary

Immediate Infrastructure Requirement Over the Next Ten Years (in millions)



Given its magnitude, it is apparent that the City will be unable to fully address its future capital replacement requirements. Even if the City was able to raise the necessary funding for capital reinvestment ($3.14 billion over the next years), it is unlikely that the anticipated level of construction activities could actually be supported by contractors and the City's own resources. Accordingly, we suggest that the City consider a strategy that incorporates the following components:

- A multi-year program of affordable tax increases (e.g. 2% per year for five years) that would be restricted to capital and in addition to the existing capital funding envelopes. This program would increase the City's available capital funding by approximately $5 million per year.
- The use of debt for the financing of major capital projects;
- The realignment of the City's capital envelopes to avoid a predominant focus on roads, so as to limit situations where necessary infrastructure components such as facilities and fleet are disadvantaged;
- A focus on asset rationalization, which would include the closure/consolidation/divestment of excess City facilities, fleet and other assets; and
- Service rationalizations, which would allow the City to redirect funding for operating costs to capital, thereby mitigating increases in taxes and user fees.

Glossary of Terms

Asset management planning	Asset management planning is the process of making the best possible decisions regarding the acquisition, operating, maintaining, renewing, replacing and disposing of infrastructure assets. The objective of an asset management plan is to maximize benefits, manage risk and provide satisfactory levels of service to the public in a sustainable manner.
Historical cost	Historical cost represents the actual cost incurred by the municipality at the date of acquisition. Given the timeframes between the date of acquisition and the current date, historical cost may not be reflective of the replacement cost of the asset due to the effects of inflation.
Replacement cost	Replacement cost reflects the estimated cost that would be incurred in the event that the municipality was required to replace the asset at the present time in new condition.
Life cycle cost	Life cycle costs reflect the cost of all asset management activities that are recommended for the maintenance of the asset over its useful life, including major periodic maintenance activities (e.g. crack sealing for paved roads), including the ultimate replacement of the infrastructure but not its initial acquisition. For the purposes of the asset management plan, life cycle costs have been expressed in current dollars and have not been adjusted for anticipated inflationary increases over the life of the assets except where noted.
Condition assessments	Condition assessment are a means of expressing the current state of the municipality's infrastructure based on three possible ratings – good, fair and poor. The determination of the ratings will vary based on the type of infrastructure involved.
Immediate infrastructure requirements	For the purposes of the asset management, immediate infrastructure requirements are capital investments that are recommended to be made within the next ten years, based on the condition assessment of the infrastructure and the recommended life cycle activities. The immediate infrastructure requirement identified for the municipality is intended to address those assets that are currently rated as poor or expected to be rated as poor during the next ten years (due to deterioration caused by usage, weather, etc.).
Sustaining life cycle requirement	The sustainable life cycle requirement of an asset is the total of its life cycle costs divided by its estimated useful life. The sustainable life cycle requirement represents the amount of funding that would need to be committed to the municipality's infrastructure on an annual basis in order to fully fund the recommended life cycle activities, ignoring any investment income on unexpended funds.

Glossary of Terms

Anticipated asset life cycle	The anticipated asset life cycle is the estimated productive useful life of an asset or infrastructure component. At the end of the anticipated asset life cycle, the municipality will be required to replace the asset in question, either through acquisition or reconstruction.
Integration opportunities	Integration opportunities represent potential groupings of different assets into a single project. For example, roads capital projects are often integrated with water, wastewater and storm sewer replacements given that these systems are underneath (and accessed through) municipal roads.
Replacement and rehabilitation criteria	Rehabilitation and replacement criteria are the factors considered by the municipality when consider when to undertake certain asset management activities.
Rehabilitation and replacement strategies	Rehabilitation and replacement strategies represent activities that are intended to maintain the condition and performance of the municipality's infrastructure. Rehabilitation and replacement strategies are synonymous with asset management activities.
Life cycle consequences	Life cycle consequences represent the expected outcomes in the event that the municipality does not undertake the recommended asset management activities during the recommended timeframes. Life cycle consequences can included but are not limited to deterioration of the physical condition of the asset, a reduction in the outputs and service potential of the assets, increased operating costs, higher costs for subsequent asset management activities than would otherwise have been incurred had the municipality undertaken the recommended asset management activities and/or a reduction in the estimated useful life of the asset.
Integrated asset priorities	Where different assets can be integrated into capital projects, the integrated asset priorities determine the basis for selecting and prioritizing capital projects. For example, a municipality with a water and wastewater system that is in poor condition may prioritize road construction projects based on the condition of the underlying water and wastewater system.

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City of Greater Sudbury

Introduction

Introduction to the Asset Management Plan

A. Asset management planning defined

Asset management planning is the process of making the best possible decisions regarding the acquisition, operating, maintaining, renewing, replacing and disposing of infrastructure assets. The objective of an asset management plan is to maximize benefits, manage risk and provide satisfactory levels of service to the public in a sustainable manner. In order to be effective, an asset management plan needs to be based on a thorough understanding of the characteristics and condition of infrastructure assets, as well as the service levels expected from them. Recognizing that funding for infrastructure acquisition and maintenance is often limited, a key element of an asset management plan is the setting of strategic priorities to optimize decision-making as to when and how to proceed with investments. The ultimate success or failure of an asset management plan is dependent on the associated financing strategy, which will identify and secure the funds necessary for asset management activities and allow the City to move from planning to execution.

B. The purpose of the asset management

The asset management plan outlines the City's anticipated infrastructure investment requirements, which in turn allows the City to meet its stated mission and mandate by supporting the delivery of services to its residents. In achieving this objective, the asset management plan:

- Provides elected officials, Municipal staff, funding agencies, community stakeholders and residents with an indication of the City's investment in infrastructure and its current condition;
- Outlines the total financial requirement associated with the management of this infrastructure investment, based on recommended asset management practices that encompass the total life cycle of the assets;
- Provides a framework for prioritizing the City's infrastructure needs, recognizing that the scope of the financial requirement is beyond the capabilities of the City and that some form of prioritization is required; and
- Presents a financial strategy that outlines how the City intends to meet its infrastructure requirements.

It is important to recognize that the asset management plan is just that – a plan. The asset management plan does not represent a formal, multi-year budget for the City. The approval of operating and capital budgets is undertaken as part of the City's overall annual budget process. Accordingly, the financial performance and priorities outlined in the asset management plan are subject to change based on future decisions of Council with respect to operating and capital costs, taxation levels and changes to regulatory requirements or the condition of the City's infrastructure.

Introduction to the Asset Management Plan

C. Scope

The asset management plan encompasses the following components of the City's infrastructure:

- Roads (page 19)
- Bridges and culverts (page 30)
- Water and wastewater (linear and facilities) (page 35)
- Buildings (page 43)
- Fleet (page 47)
- Landfill (page 51)
- Transit vehicles (page 54)
- Streetlights (page 57)
- Traffic signals (page 57)
- Drains and stormwater ponds (page 57)

For the purposes of developing the asset management plan, a ten year planning horizon was considered, although the analysis includes a discussion of required activities over the entire life cycle of the City's infrastructure. It is expected that the City will update its asset management plan every four years (to coincide with Council elections) or earlier in the event of a major change in circumstances, which could include:

- New funding programs for infrastructure
- Unforeseen failure of a significant infrastructure component
- Regulatory changes that have a significant impact on infrastructure requirements
- Changes to the City's economic or demographic profile (positive or negative), which would impact on the nature and service level of its infrastructure

Except where noted, the asset management plan considers existing Municipal infrastructure and does not address future incremental infrastructure resulting from growth, regulatory changes, changes to services and service levels and other factors.

In connection with the Infrastructure for Jobs and Prosperity Act, the Province is proposing to introduce asset management requirements for municipalities that will encompass how asset management plans are prepared, including the need for public consultation, the scope of asset management plans and the requirement for periodic updating. These requirements, if enacted, will require the Municipality to update its management plan by the end of the 2018 calendar year.

Introduction to the Asset Management Plan

D. Methodology

The development of the asset management plan involved the following major worksteps:

Workstep
1. Municipal staff provided a listing of the City's tangible capital assets which included the asset inventory, acquisition year, useful life, remaining useful life, historical cost and estimated replacement cost.
2. A condition assessment of the City's infrastructure was developed based on a review of previously commissioned assessments, the age and estimated remaining useful life of the infrastructure.
3. Asset management strategies for each component of the City's infrastructure were developed to provide an indication as to the recommended course of action for infrastructure procurement, maintenance and replacement/rehabilitation over the estimated useful life of the infrastructure component.
4. A forecast of the City's infrastructure replacement requirements and timing was developed to identify the level of financial resources necessary to address end-of-life replacement requirements for its infrastructure.
5. Potential capital financing strategies were developed to provide the necessary resources to address the City's infrastructure requirements, recognizing that the City will likely be unable to generate sufficient revenues to meet its infrastructure replacement needs (thereby requiring the prioritization and deferral of capital needs).

The City's asset management plan has been developed in accordance with the guidelines established by the Province of Ontario in the publication *Building Together – Guide for Municipal Asset Management Plans* and as such, conforms with the asset management requirements established by:

- The Province of Ontario
- The Federal Gas Tax Program

Introduction to the Asset Management Plan

E. Maintaining the asset management plan

The asset management plan outlined in this report represents a forecast of the City's infrastructure-related activities under a series of assumptions that are documented within the plan. The asset management plan does not represent a formal, multi-year budget for infrastructure acquisition and maintenance activities but rather a long-term strategy intended to guide future decisions of the City and its elected officials and staff, recognizing that the approval of operating and capital budgets is undertaken as part of the City's overall annual budgeting process.

In order to evaluate and improve the asset management plan, the City plans to undertake the following actions:

Action Item	Frequency
1. Updating of infrastructure priorities based on: • Ongoing condition assessments (e.g. bi-annual bridge inspections) • Visual inspection by municipal personnel • Identified failures or unanticipated deterioration of infrastructure components • Analysis of performance indicators	Every four years
2. Adjustment of asset management plan for changes in financial resources, including new or discontinued grant programs, changes to capital component of municipal levy, etc.	Every four years
3. Comparison of actual service level indicators to planned service level indicators and identification of significant variances (positive or negative)	Annually
4. Updating of infrastructure data maintained for the purposes of asset management planning.	Annually upon completion of the City's financial statement audit

Introduction to the Asset Management Plan

F. Restrictions

This report is based on information and documentation that was made available to KPMG at the date of this report. KPMG has not audited nor otherwise attempted to independently verify the information provided unless otherwise indicated. Should additional information be provided to KPMG after the issuance of this report, KPMG reserves the right (but will be under no obligation) to review this information and adjust its comments accordingly.

Pursuant to the terms of our engagement, it is understood and agreed that all decisions in connection with the implementation of advice and recommendations as provided by KPMG during the course of this engagement shall be the responsibility of, and made by, the City of Greater Sudbury. This report includes or makes reference to future oriented financial information. Readers are cautioned that since these financial projections are based on assumptions regarding future events, actual results will vary from the information presented even if the hypotheses occur, and the variations may be material.

Comments in this report are not intended, nor should they be interpreted to be, legal advice or opinion.

KPMG has no present or contemplated interest in the City of Greater Sudbury nor are we an insider or associate of the City of Greater Sudbury or its management team. Our fees for this engagement are not contingent upon our findings or any other event. Accordingly, we believe we are independent of the City of Greater Sudbury and are acting objectively.

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City of Greater Sudbury Asset Management Plan

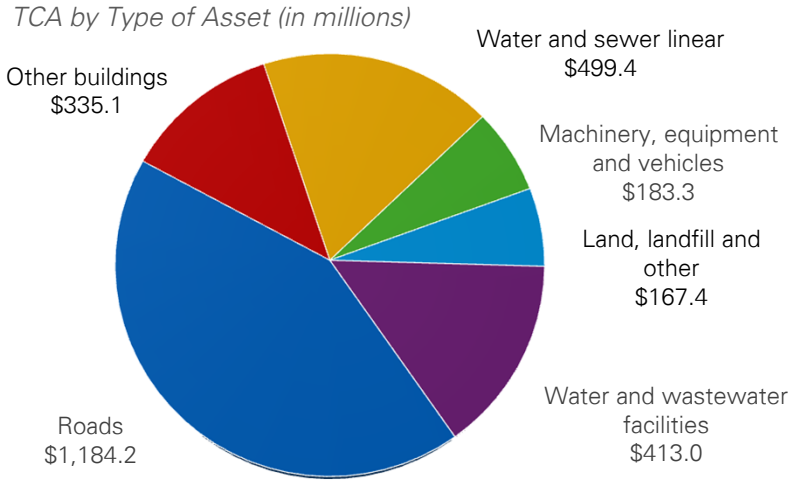
Financial Overview

Financial Overview

At the date of its most recent year-end (December 31st, 2015), the City reported a total investment of $2.782 billion in tangible capital assets ('TCA') at historical cost. This equates to an average investment of $38,400 per household or $17,400 per resident. With a historical cost of $1.18 billion, the City's road network represents the largest single type of infrastructure, accounting for 43% of the City's TCA.

Over the last ten years, the City reported total capital expenditures just under $1 billion, the majority of which ($744 million or 77%) related to transportation and environmental services. As noted on the following page, the majority of the City's capital expenditures (73%) were funded through taxation, user fees or reserves and reserve funds, with government grants and debt funding 20% and 7% of total capital expenditures, respectively. The majority of the City's borrowing over the ten years was incurred in 2015 in connection with the newly constructed bio-solids treatment facility ($46.7 million) and fleet/transit garage ($14.0 million).

TCA by Type of Asset (in millions)

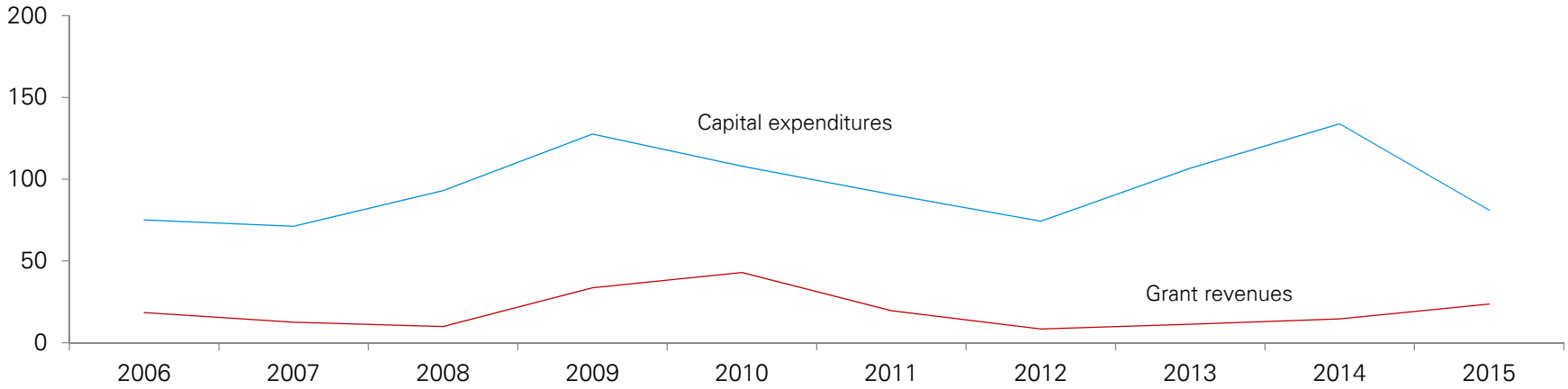


(in thousands of dollars)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
General Government	5,174	5,233	4,098	258	2,752	1,886	1,442	4,366	1,297	882	27,388
Protections to Persons and Property	4,583	2,608	4,769	4,649	3,575	1,781	3,234	10,035	5,727	2,281	43,242
Transportation	34,682	28,489	41,210	48,728	55,076	35,152	35,031	43,066	48,908	35,446	405,788
Environment	17,330	25,494	26,120	60,832	22,824	24,840	20,848	40,168	67,943	31,822	338,221
Health Services	5,058	2,337	2,743	1,505	2,549	1,022	1,410	1,488	1,246	1,969	21,327
Social and Family Services	1,592	490	4,442	1,831	4,046	2,619	479	698	767	234	17,198
Social Housing	2,394	2,930	2,578	3,206	2,552	1,510	1,272	1,993	1,647	2,315	22,397
Recreation and Cultural Services	3,297	2,397	6,194	5,804	12,742	20,356	8,975	4,265	5,845	5,965	75,840
Planning and Development	964	1,244	785	779	1,833	1,487	1,557	593	418	134	9,794
Total	75,074	71,222	92,939	127,592	107,949	90,653	74,248	106,672	133,798	81,048	961,195

Prior to 2009, municipalities were not required to capitalize TCA for financial reporting purposes, with capital expenditures shown as a period expense. Starting in 2009, municipalities were required to record and amortize TCA for financial reporting purposes, with work in progress used to report costs for projects under construction but not completed. As such, readers are cautioned that the reporting of TCA differs for periods prior and subsequent to 2009. Also, reported capital assets include consolidated entities such as the Greater Sudbury Housing Corporation.

Financial Overview

Capital Expenditures and Grants (in millions of dollars)



(in thousands of dollars)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Total capital expenditures	75,074	71,222	92,939	127,592	107,949	90,653	74,248	106,672	133,798	81,048	961,195
Grants received	18,399	12,487	9,816	33,599	42,927	19,590	8,338	11,291	14,562	23,628	194,637
Municipal share of expenditures	56,675	58,735	83,123	93,993	65,022	71,063	65,910	95,381	119,236	57,420	766,558
Debt issued	–	–	–	4,175	–	–	–	–	–	60,781	64,956
Other own-source funding for capital	56,675	58,735	83,123	89,818	65,022	71,063	65,910	95,381	119,236	(3,361)	701,602

The negative other own-source funding for capital represents the timing of financing for the biosolids and transit/fleet facility capital projects. While the cost of these projects was incurred over multiple years, debt financing was only secured in 2015 upon completion of the projects.

Financial Overview

At December 31st, 2015, the City reported an accumulated surplus of $1.63 billion, the majority of which ($1.37 billion or 84%) related to its investment in TCA. The remaining portion of the City's reported surplus consisted of its reserves and reserve funds ($166 million), investment in government business enterprises ($95 million) and amounts committed to future capital projects or liabilities.

Over the last five years, the City's reserve and reserve fund position has increased from $114 million to $166 million. It is important to recognize, however, that these reserves are not fully available to fund future capital projects as the City has already committed a significant portion of these funds to specific future projects. At the same time, its total long-term debt has increased by $43 million, reflecting the issuance of $61 million in debt in 2015 relating to the new biosolids treatment facility and fleet/transit garage.

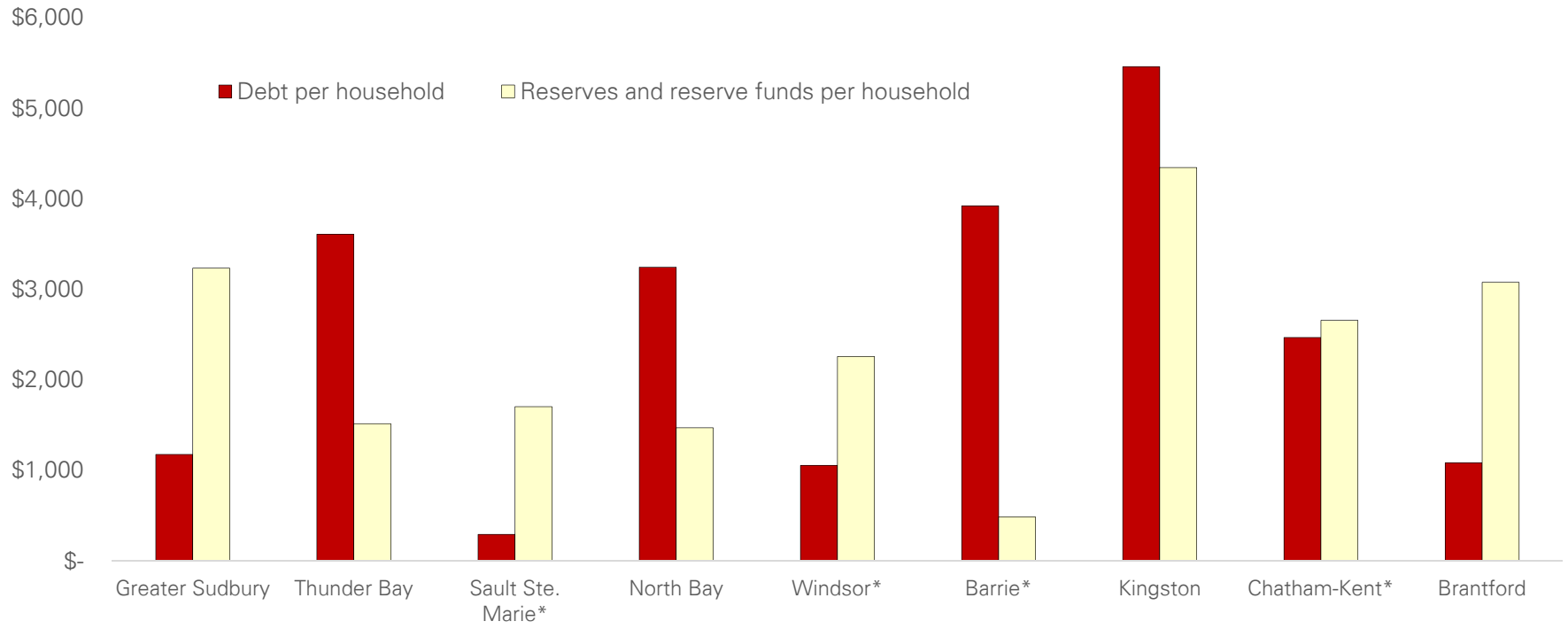
Municipal Financial Position (in thousands)

Based on the above, we would characterize the City's overall financial position as relatively strong, with significant reserve balances and limited debt, particularly when compared to other municipalities (see next page).

Financial Overview

In comparison to other similar sized single tier municipalities located in Ontario, as well as larger municipalities in Northern Ontario, the City has a higher level of reserves and reserve funds per household and a lower level of outstanding debt per household. We attribute this to the City's historical pay as you go policy for capital funding as well as significant funds committed but unspent for capital projects.

Municipal Financial Position per Household (in thousands)



Amounts based on 2015 FIR data with the exception of municipalities identified with an asterisk, which reflect 2014 FIR data.

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City of Greater Sudbury Asset Management Plan

Asset Management for Roads

Asset Management Planning for Roads

A. Introduction

Section 44(1) of the Municipal Act establishes the City's responsibility to keep highways or bridges under its jurisdiction "in a state of repair that is reasonable in the circumstances". Ontario Regulation 239/02: Minimum Maintenance Standards for Municipal Highways (which has been amended by Ontario Regulation 47/13) provides further clarification by establishing minimum maintenance standards for a range of road network maintenance activities, including but not limited to:

- Patrolling highways to monitor conditions
- Snow plowing
- Ice prevention (sanding and salting)
- Surface repairs, including potholes and surface cracking

Under Ontario Regulation 239/02, municipal roads are divided into one of six classes, with the categorization depending on the average annual daily traffic volume and the posted speed limit (see next slide). As noted on the following slides, maintenance standards will vary by class of road, with the standards decreasing (both in terms of response time and service level) as the classification progresses from Class 1 to Class 5. Minimum maintenance standards do not apply to Class 6 roads.

In addition to Ontario Regulation 239/02, other Provincial regulations and guidelines affect roads maintenance activities, including but not limited to:

- Ontario Traffic Manual, Book 11, provides guidance for pavement, hazard and delineation markings (including painting)
- Roadside Safety Manual prescribes warrants for guide rails

While the bulk of the minimum maintenance standards are arguably operational in nature (e.g. snow removal), there are aspects that influence the City's capital program, including standards relating to:

- Pothole patching
- Crack repairs
- Surface discontinuances
- Shoulder drop offs
- Traffic sign reflectiveness

Asset Management Planning for Roads

Classification of Roads Under Ontario Regulation 239/02

Average Annual Daily Traffic	Speed Limit (kilometres per hour)						
	>90	81-90	71-80	61-70	51-60	41-50	<41
>15,000	Class 1			Class 2			
12,000-14,999							
10,000-11,999							
8,000-9,999							
6,000-7,999					Class 3		
5,000-5,999							
4,000-4,999							
3,000-3,999						Class 4	
2,000-2,999							
1,000-1,999							
500-999						Class 5	
200-499							
50-199							
<50			Class 6				

Asset Management Planning for Roads

B. Condition Assessments

The City uses ASTM International Designation D6433-07 – Standard Practice for Roads and Parking Lots Pavement Condition Index Surveys for the purposes of determining the condition of paved roads. This standard practice defines how to assess the condition of paved and concrete roads, which is expressed as a Pavement Condition Index ('PCI'). PCI is typically expressed on a scale of 0 (lowest) to 100 (highest) with the PCI dictating the level and timing of maintenance activities. A synopsis of the guidelines is provided below.

	Condition Rating	Pavement Condition Index
No maintenance required	Very good	PCI of 85 to 100
Routine maintenance	Good	PCI of 60 to 84
Corrective maintenance	Fair	PCI of 40 to 59
Rehabilitation required within three to five years	Poor	PCI of 25 to 39
Rehabilitation required within one to three years	Very poor	PCI of <25

Condition indexes are not available for the City's gravel and surface treated roads.

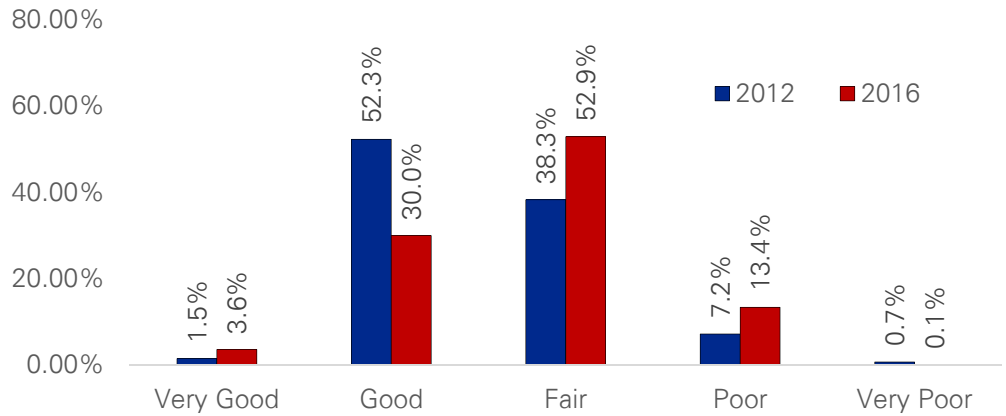
Asset Management Planning for Roads

Based on these condition guidelines, the majority of the City's paved roads are characterized as being in very good or good (33.6%) or fair (52.9%) condition, with arterial roads having the highest percentage of roads rated as very good or good.

Condition Assessment	PCI	Arterial Roads		Collector Roads		Local Roads		Total	
		KMs	Percent	KMs	Percent	KMs	Percent	KMs	Percent
Very good	PCI of 85 to 100	90.70	13.5%	3.17	0.5%	15.93	0.9%	109.8	3.6%
Good	PCI of 60 to 84	296.18	44.1%	157.40	26.9%	448.47	25.6%	902.05	30.0%
Fair	PCI of 40 to 59	240.29	35.8%	372.90	63.8%	977.55	55.7%	1,590.74	52.9%
Poor	PCI of 25 to 39	44.06	6.6%	50.92	8.8%	307.81	17.5%	402.79	13.4%
Very poor	PCI of <25	–	–	–	–	4.24	0.9%	4.24	0.1%
Total		671.23	100.0%	584.39	100.0%	1,754.00	100.0%	3,009.62	100.0%

Since the preparation of the City's initial financial plan for roads in 2012, the overall condition rating of the City's paved roads has decreased. As noted in the graph, all categories of roads have experienced a decrease in their condition ratings since 2012, with the exception of rated as very good. The overall decrease in the condition of the City's roads reflects the impact of the shortfall in capital funding identified in the 2012 financial plan for roads, while the increase in the percentage of roads rated as very good is due to the impact of major road projects involving arterial roads, including the rehabilitation/reconstruction of Regent Street and Municipal Road 15.

Distribution of Paved City Roads by Condition Assessment



Asset Management Planning for Roads

C. Asset Management Strategies

Asset management strategies for municipal roads will depend on the nature of the road surface (paved, surface treated or gravel) but will generally commence within a few years of the initial construction of the road and continue at recommended intervals until complete reconstruction of the road is required. Generally speaking, asset management activities for paved roads are the most intensive, in terms of both frequency and cost, while gravel roads have a lower level of associated maintenance activities. Similar, urban roads have a higher asset management requirement than rural roads, while arterial roads have a higher asset management requirement than collector or local roads.

Asset management activities are recommended to occur throughout the life cycle of the road for all road surface types (gravel, surface treated and paved). As such, financial decision-making should consider all asset management activities as opposed to only the replacement of the road as focusing on replacement costs will exclude a significant portion of the required asset management activities (and associated financial requirement). In order to demonstrate this requirement, we have included on the following pages a summary of suggested asset management activities for roads, as well as an indication of the required level of activities and associated costs for an urban arterial road. We understand that the City is currently in the process of finalizing similar asset management profiles for the different categories within its road network.

Asset Management Planning for Roads

Gravel Roads

Anticipated asset life cycle	The life cycle of newly placed gravel road systems are dependent on several factors including the material and construction quality, design, traffic volume, traffic loading, and environmental conditions. The service life for City gravel roads is 75 years. Sufficient maintenance provided during the service life will help preserve conditions using such strategies as machine grading, ditching and brushing, and granular top up.
Integration opportunities	Various other elements may be considered as integrated with gravel roads. These include buried assets in the corridor, such as water mains, wastewater mains, storm sewers, hydro, telephone, natural gas, and cable. Other possible affected elements include traffic signs and signals, street lighting and guide rails.
Replacement and rehabilitation criteria	The replacement and rehabilitation criteria for gravel roads generally considers a variety of factors, including surface defects (loose gravel, dust, potholes, breakup), surface deformation (washboard, rutting, flat or reverse crown, distortion) and shoulder distress (excessive height, ponding, overgrowth).
Rehabilitation and replacement strategies	Several different rehabilitation strategies can be implemented. The selection of the strategy is dependent on road classification (collector, local), urban or rural and the benefit/cost ratio. In a rehabilitation scenario, the top 150 mm of gravel type "A" would be replaced/over built. In the case of total reconstruction, the work would include the replacement of the granular road base and the granular surface.
Life cycle consequences	The effects of gravel road rehabilitation that is insufficiently funded are reflected in the overall condition of the road, resulting in rising reconstruction and maintenance costs.
Integrated asset priorities	The schedule of road rehabilitation is often planned in conjunction with underground utility rehabilitation works. In some cases, it is the rehabilitation of gravel roads that prompts the replacement of underground utilities and sewer and water services if those services are deteriorating and approaching their useful service life. In other cases, road rehabilitation may be deferred if the underground infrastructure is not in need of replacement.

Asset Management Planning for Roads

Surface Treated Roads

Anticipated asset life cycle	The life cycle of newly placed surface treated road systems are dependent on several factors including the material and construction quality, design, traffic volume, traffic loading, and environmental conditions and is generally in the order of 75 years for the road base and 25 years for the road surface.
Integration opportunities	Various other elements may be considered as integrated with surface treated roads. These include buried assets in the corridor, such as water mains, wastewater mains, storm sewers, hydro, telephone, natural gas, and cable. Other possible affected elements include traffic signs and signals, street lighting and guide rails.
Replacement and rehabilitation criteria	The PCI can be used to assess the condition of surface treated roads. The development of the PCI for surface treated roads generally considers a variety of factors, including surface defects (loss of cover aggregate, streaking, flushing, potholes, pavement edge breaks), surface deformation (rippling, wheel track rutting, distortion) and cracking (longitudinal, transverse, pavement edge, alligator).
Rehabilitation and replacement strategies	Several different rehabilitation strategies can be implemented. The selection of the strategy is dependent on PCI, road classification (collector, local), urban or rural and the benefit/cost ratio. In a rehabilitation scenario, the surface treatment (either single or double) would be replaced. In the case of total reconstruction, the work would include the replacement of the granular road base and the surface treatment.
Life cycle consequences	The effects of surface treated road rehabilitation that is insufficiently funded are reflected in the PCI, resulting in rising reconstruction and maintenance costs. Roads which are identified by a PCI of 40 or lower typically show signs of a poor level of service increasing the associated degrees of risk and liability.
Integrated asset priorities	The schedule of road rehabilitation is often planned in conjunction with underground utility rehabilitation works. In some cases, it is the rehabilitation of surface treated roads that prompts the replacement of underground utilities and sewer and water services if those services are deteriorating and approaching their useful service life.

Asset Management Planning for Roads

Paved Roads

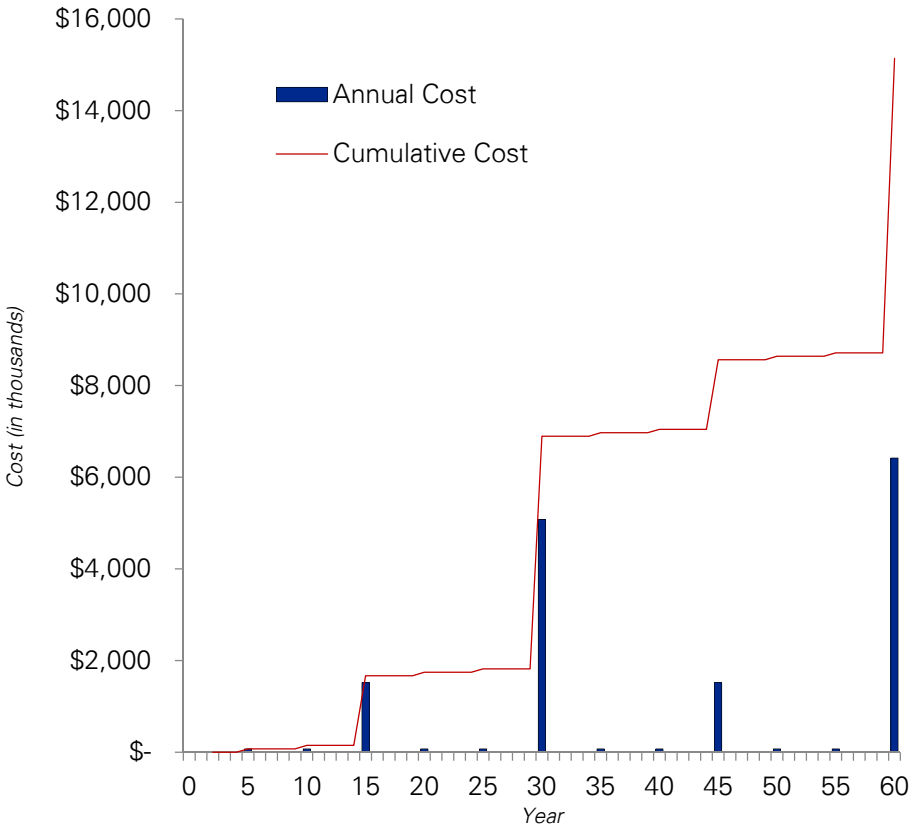
Anticipated asset life cycle	The life cycle of newly constructed pavement systems is dependent on several factors including the pavement design, material and construction quality, traffic volume, traffic loading, and environmental conditions, and can range from 45 to 75 years for the road base and 15 to 25 years for the road surface.
Integration opportunities	Various other elements may be considered as integrated with paved roads. These include buried assets in the corridor, such as water mains, wastewater mains, storm sewers, hydro, telephone, natural gas, and cable. Other possible affected elements include traffic signals, street lighting, guiderails and sidewalks.
Replacement and rehabilitation criteria	The PCI is used to assess the condition of paved roads. The development of the PCI for paved roads generally considers a variety of factors, including surface defects (loss of coarse aggregates raveling, flushing), distortion or permanent deformation (rippling and shoving, wheel track rutting, distortion) and cracking (longitudinal wheel-track, longitudinal meander and mid-lane, centre line, pavement edge, transverse, map and alligator).
Rehabilitation and replacement strategies	Several different rehabilitation strategies can be implemented. The selection of the strategy is dependent on a variety of considerations, including PCI, road classification (arterial, collector, local), urban or rural, ditched or curbed and the benefit/cost ratio. These strategies include: • Total reconstruction of pavement with 90mm to 140mm of hot mix asphalt (HMA) • Mill and resurface pavement with 40mm to 100mm of HMA • Strip and resurface pavement with 40mm to 100mm of HMA • Pulverize with underlying granular and surface with 90mm to 140mm of HMA • Mill and resurface patches of pavement with 50mm of HMA • Routing and crack sealing pavements
Life cycle consequences	Failure to fund timely pavement rehabilitation will result in a reduction in the PCI, resulting in exponential increases in pavement rehabilitation costs. It also increases significantly road maintenance costs. Pavements identified by a PCI below 40 typically reflect decreases in level of service and increasing associated degrees of risk and liability.
Integrated asset priorities	The schedule of pavement rehabilitation is often planned in conjunction with underground utility rehabilitation works, where these exist. In some cases, it is the rehabilitation of pavement systems that prompts the replacement of underground sewer and water services if that infrastructure is also in deteriorating condition and approaching its useful service life.

Asset Management Planning for Roads

Paved Roads (continued)

Asset management activities for paved roads are typically suggested to commence five years following the initial construction of the road with crack sealing, and continue at five year intervals until the end of the paved road's useful life. Suggested asset management activities for paved urban arterial roads (five lanes, 19.5 meters in width) are provided below. Asset management costs for collector and local roads will differ from the amounts presented below.

Year	Activity	Estimated Cost per KM
5	Crack sealing	$75,000
10	Crack sealing	$75,000
15	Resurfacing (shave and pave)	$1,520,000
20	Crack sealing	$75,000
25	Crack sealing	$75,000
30	Rehabilitation	$5,075,000
35	Crack sealing	$75,000
40	Crack sealing	$75,000
45	Resurfacing (shave and pave)	$1,520,000
50	Crack sealing	$75,000
55	Crack sealing	$75,000
60	End of life reconstruction	$6,420,000
Total cost of asset management activities		$15,135,000
Average cost per year		$252,000



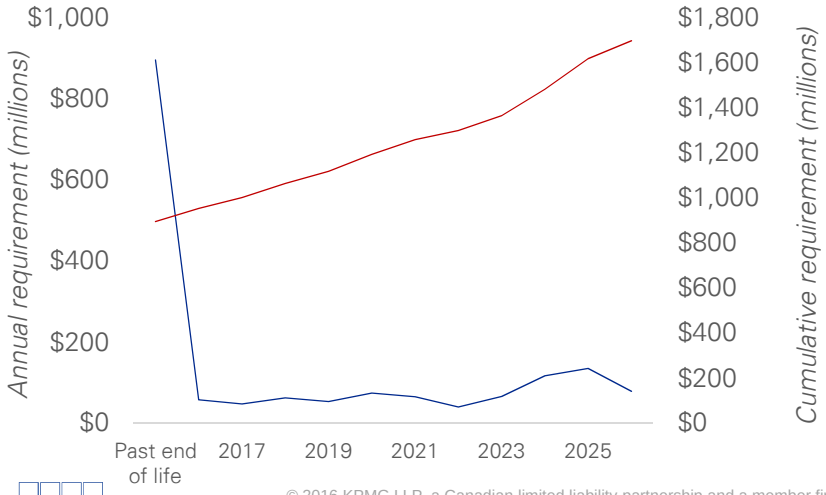
Asset Management Planning for Roads

D. Overall Financial Requirements

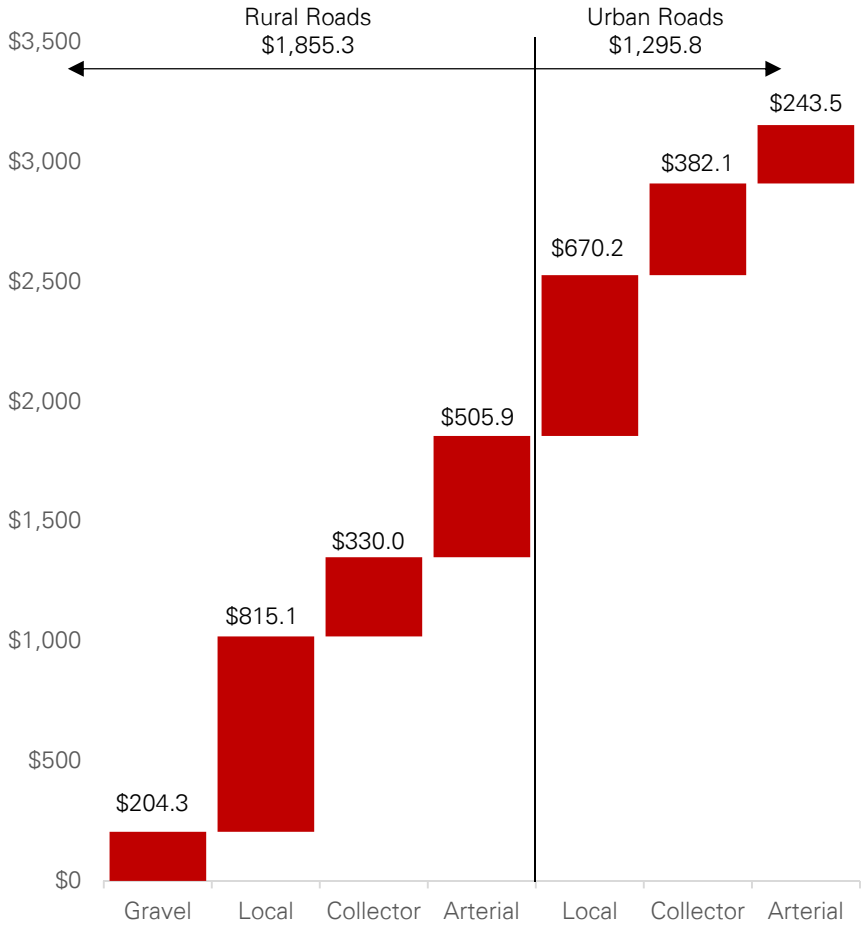
The City's road network is estimated to have a total replacement cost of $3.15 billion, consisting of $1.86 billion in rural roads and $1.29 billion in urban roads. As noted in the accompanying graph, local roads (rural and urban) have the highest replacement cost by type of road ($1.49 billion).

Based on the estimated useful lives of the City's roads, an estimated $896 million should be expended to address roads that are in immediate need of rehabilitation or reconstruction. Over the next ten years, the projected replacement and rehabilitation requirements of the City are expected to be in the order of an additional $802 million, resulting in a total investment requirement of $1.7 billion.

Projected and cumulative road investment requirements



Estimated Replacement Cost (in millions)



KPMG

City of Greater Sudbury Asset Management Plan

Asset Management for Bridges and Structures

Asset Management Planning for Bridges and Structures

A. Introduction

Under Ontario Regulation 104/97: Standards for Bridges (amended by Ontario Regulation 472/10), all municipalities are required to undertake detailed visual inspections in accordance with the Ontario Structure Inspection Manual ('OSIM') of all:

- Bridges, culverts and tunnels with spans of three metres or greater; and
- All movable bridges.

Under Ontario Regulation 104/97, inspections are required every second calendar year.

B. Condition Assessments

In addition to establishing the requirements for bi-annual visual inspections, the OSIM defines the guidelines for bridge inspections. Specifically, the OSIM includes Condition State Tables that are used to assess the condition of various bridge components, based on the following ratings:

Condition Rating	Description	Examples
Excellent	• New (as constructed) condition • No visible deterioration-type defects noted, with minor construction defects excluded • No remedial action required	
Good	• First signs of minor defects noted • Defects would not normally require remedial action as overall performance is not affected	• Light corrosion • Narrow cracks in concrete
Fair	• Medium defects are visible • May require preventative maintenance where it is economic to do so	• Medium corrosion (up to 10% section loss) • Medium cracks in concrete
Poor	• Severe and very severe defects are noted • Rehabilitation or replacement required if overall performance is affected	• Severe corrosion • Spalling

Asset Management Planning for Bridges and Structures

The results of the inspection of individual elements is then weighted to provide an overall Bridge Condition Index ('BCI'), which determines the timing of required maintenance activities for the structure under inspection.

BCI	Condition	Maintenance Schedule
70 to 100	Good	No maintenance requirements are identified within the next five years
60 to 69	Fair	Maintenance requirements are identified within the next five years
<60	Poor	Maintenance requirements are identified within one year

The City's road network includes 102 bridges and 83 culverts with spans in excess of three metres, with a total of area of 46,856 square metres. Based on the most recent bridge condition assessments (conducted in 2014), 70.8% of the City's bridges and culverts with spans in excess of three metres are rated as good or very good, with 21.1% rated fair and 8.2% rated poor.

C. Asset Management Strategies

Asset management strategies for bridges are determined primarily through the bi-annual engineering inspections and will generally involve the rehabilitation or replacement of specific bridge elements as opposed to the complete replacement of the bridge. Asset management activities for culverts are also identified through the bi-annual engineering inspections. Unlike bridges, culverts are more suited towards compete replacement at the end of their useful life, although inspections will identified elements such as guide rails that may require rehabilitation or replacement prior to the replacement of the culvert.

A summary of asset management strategies for bridges and culverts is provided on the following page.

Asset Management Planning for Bridges and Structures

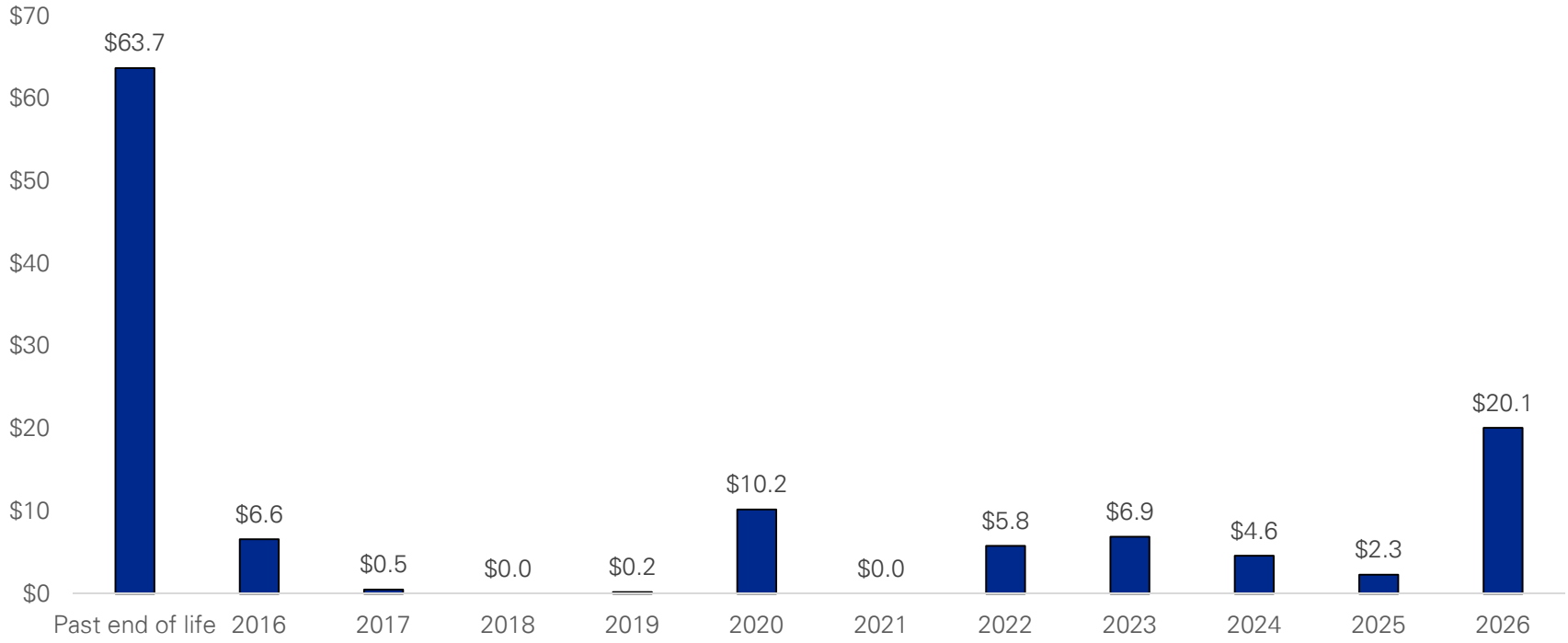
Anticipated asset life cycle	The life cycle of bridges and culverts is considerably variable and dependent on construction methodology and materials, traffic loading, traffic volume, and environmental exposure conditions (temperatures, chloride concentrations, etc). Bridges and concrete culverts have various useful lives, with most bridges having useful lives of 75 years for the structure and 25 years for the deck. Useful lives for culverts will depend on their construction material, with steel culverts having a useful life of 50 years and concrete culverts having a useful life of 60 years.
Integration opportunities	Bridge life cycle activities are typically not integrated with other infrastructure components with the exception of road widening or resurfacing projects.
Rehabilitation and replacement criteria	Asset management activities for bridges and culverts are determined primarily through the results of the bi-annual engineering inspections, which identify maintenance requirements for specific elements as well as the anticipated timeframe for completion (within one year, within five years).
Rehabilitation and replacement strategies	The specification of the bridge or culvert rehabilitation strategy is reliant on the structure's age, data and observations acquired through inspections and condition surveys, and the estimated remaining service life.
Life cycle consequences	The reduction of bridge and culvert service life endangers user safety and results in a decrease of level of service.
Integrated asset priorities	Bridge life cycle activities are typically not integrated with other infrastructure components with the exception of road widening or resurfacing projects.

Asset Management Planning for Bridges and Structures

D. Overall Financial Requirements

The City's bridges and culverts have an estimated replacement value of $307.8 million, with the highest replacement value associated with the Paris Street Overpass ($19.7 million). Based on the estimated useful lives of the City's bridges and culverts, an estimated $63.7 million should be expended to address bridges and culverts that are in immediate need of rehabilitation or replacement (i.e. beyond their end of useful lives). Over the next ten years, the projected replacement and rehabilitation requirements of the City's bridges and culverts are expected to be an additional $57.2 million, resulting in a total capital requirement of $120.9 million.

Annual and cumulative bridge investment requirements (in millions)



KPMG

City of Greater Sudbury Asset Management Plan

Asset Management for Water and Wastewater

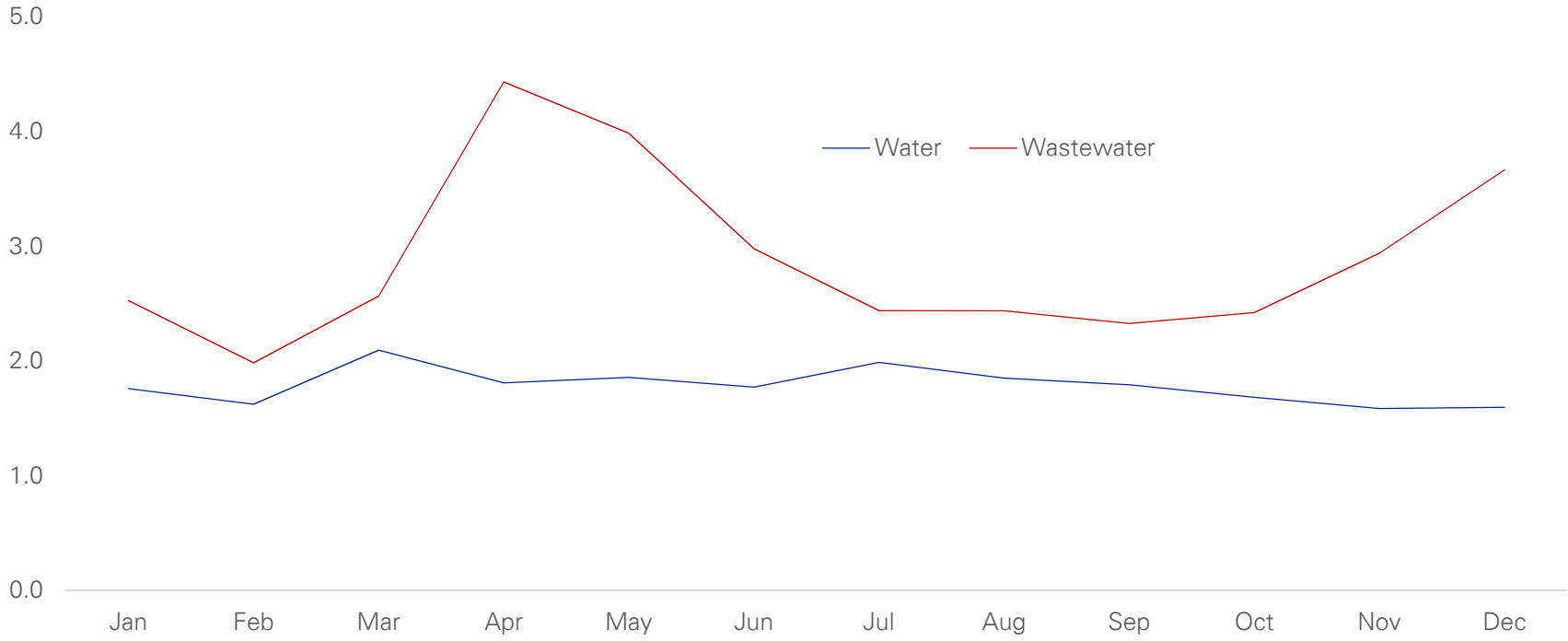
Asset Management Planning for Water and Wastewater

A. Introduction

During 2015, the City produced in excess of 21.4 million cubic metres in treated water for consumption by its residents, 71% of which was produced by the Wahnapitae and David Street treatment plants. During the same year, 34.7 million metres of wastewater was treated by the City's wastewater treatment facilities, of which 74% was treated by the Sudbury wastewater treatment plant.

As demonstrated below, water treatment is relatively consistent on a monthly basis, while wastewater treatment peaks during the spring months due to water infiltrating the wastewater collection system through storm sewers, openings (cracks) in the wastewater mains and other means.

Water and Wastewater Treatment Levels – 2015 (in millions of m^3)



Asset Management Planning for Water and Wastewater

B. Condition Assessments

For the purposes of assessing the condition of the City's water and wastewater mains, we have rated the mains as being in either good, fair or poor condition, based on the percentage of the infrastructure's remaining useful life. As summarized below, the majority of the City's water and wastewater mains – 70.1% and 84.6% respectively – are classified as being in good condition.

Condition Rating	Remaining Useful Life	Watermains		Wastewater mains	
		KMs	Percentage	KMs	Percentage
Good	More than 50%	665	70.1%	657	84.6%
Fair	10% to 49%	11	1.6%	16	2.1%
Poor	Less than 10%	272	28.3%	104	13.3%
Total		948	100.0%	777	100.0%

At the present time, sufficient information concerning the deferred maintenance costs for the City's water and wastewater facilities is not available. While a condition assessment can be estimated through an analysis of the remaining useful lives of the City's facilities, this approach can be problematic as different components of buildings will have varying useful lives, resulting in a piecemeal approach to facility maintenance planning.

C. Asset Management Strategies

Asset management strategies for water and wastewater mains will depend on the nature of the mains (ductile iron, PVC, concrete) but will generally commence within 20 years of the installation of the main and continue at recommended intervals until complete replacement of the main is required.

Summaries of asset management strategies are provided on the following pages. Consistent with the City's road network, asset management activities are recommended to occur throughout the life cycle of the water and wastewater mains. Financial decision-making should consider all asset management activities as opposed to only the replacement of the mains as once again, focusing on replacement costs will exclude a significant portion of the required asset management activities (and associated financial requirement).

Asset Management Planning for Water and Wastewater

Watermains

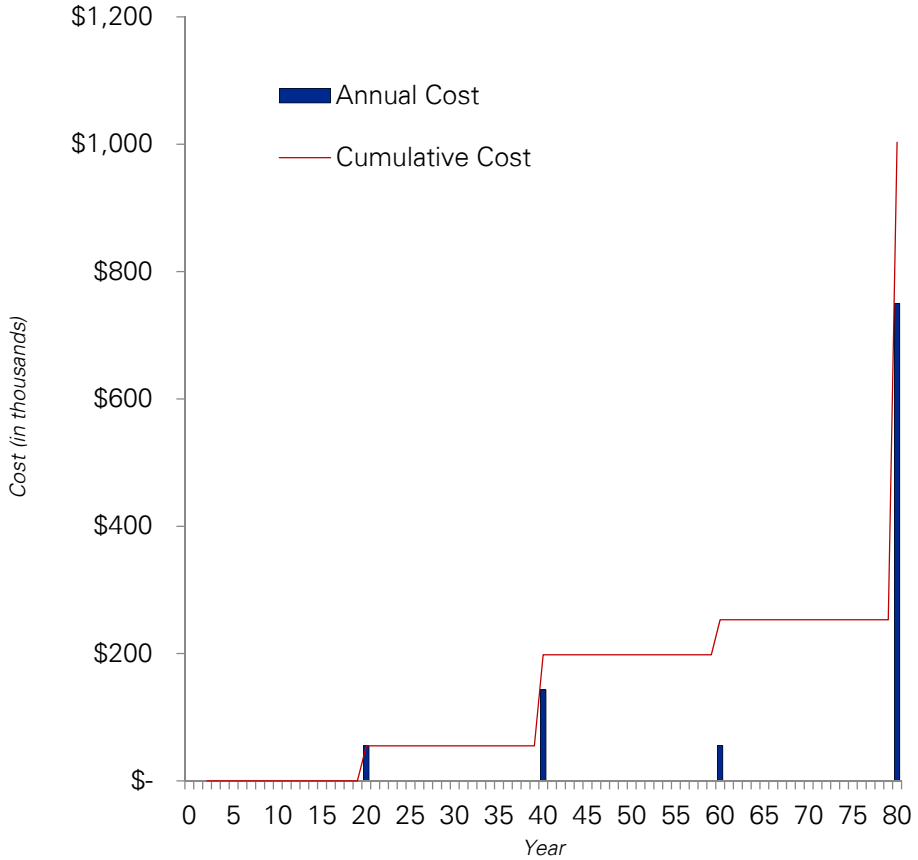
Anticipated asset life cycle	The life cycle ranges of water mains ranges from 40 to 80 years depending on pipe material. Water storage tanks have an estimate useful life of 50 years for the structure and 20 years for the associated equipment. Water facility components have useful lives of 10 to 60 years.
Integration opportunities	The replacement of these components may either be implemented as part of other construction work or may be conducted as a standalone project. The replacement may be incorporated into resurfacing and road reconstruction work which could include the integration of other utilities (wastewater, telephone, hydro, cable, natural gas, etc). In the case that full road replacement is not intended, standalone replacement of watermains can be carried out using trench cut and repair.
Rehabilitation and replacement criteria	Several criteria used to evaluate and prioritize the watermain replacement schedules include: age, break history of the pipe, material type, size, surrounding soil conditions, pressure related issues, and hydrant spacing. In addition to these criteria other factors, such as the intent of future road rehabilitation, will modify the priority of the replacement schedule accordingly. Available historical data, which includes but is not limited to pipe failures and pipe break history, is used to aid in the replacement criteria. When a continued increase in maintenance costs reaches an uneconomical value, the replacement of the pipe is justified. Due to unaccounted circumstances and unpredictable events, it is possible that some pipe materials will require replacement earlier than expected. In contrast, pipe materials may have the service life extended, with timely maintenance and rehabilitation. Due to fiscal restraints, suggested maintenance activities are typically in excess of actual work performed.
Rehabilitation and replacement strategies	The rehabilitation strategy is dependent on the current state of the pipe. It is difficult to assess the state of deterioration in buried services, as such, high pressure cleaning and videotaping of watermains may be instituted. Several different rehabilitation approaches can be taken and include full replacement, cleaning and relining, and potential pipe bursting. The strategy is chosen based primarily on the available data including the age, size, material type, break history, and hydraulic requirements.
Life cycle consequences	The repercussions of unexpected failure may be significant and could include a lack of service to residents, low pressure flows during firefighting operations to contamination of the City's water system.
Integrated asset priorities	Replacement of deteriorating watermains is carried out based on the associated level of risk. The sequence in which rehabilitation or replacement is carried out is reliant on the priority of the watermain and the impact of disruption to service. High priority watermains include those where fire protection, water quality, and service disruption will results in water loss and collateral damage. Typically the integration of road rehabilitation with watermain replacement will increase the priority of the project. The project may also incorporate utilities such as wastewater, hydro, telephone, cable and gas.

Asset Management Planning for Water and Wastewater

Water mains (continued)

Asset management activities for water mains are suggested to commence 20 years following the initial installation of the main with value exercising and swabbing of mains, and continue at 20-year intervals until the end of the main's useful life. Suggested asset management activities for 200mm PVC mains are provided below. Asset management costs for mains of different sizes will vary from the amounts presented below.

Year	Activity	Estimated Cost per KM
20	Valve exercise and swabbing	$55,000
40	Appurtenance replacement and swabbing	$143,000
60	Valve exercising and swabbing	$55,000
80	End of life replacement	$750,000
Total cost of asset management activities		$1,003,000
Average cost per year		$13,000



Asset Management Planning for Water and Wastewater

Wastewater mains

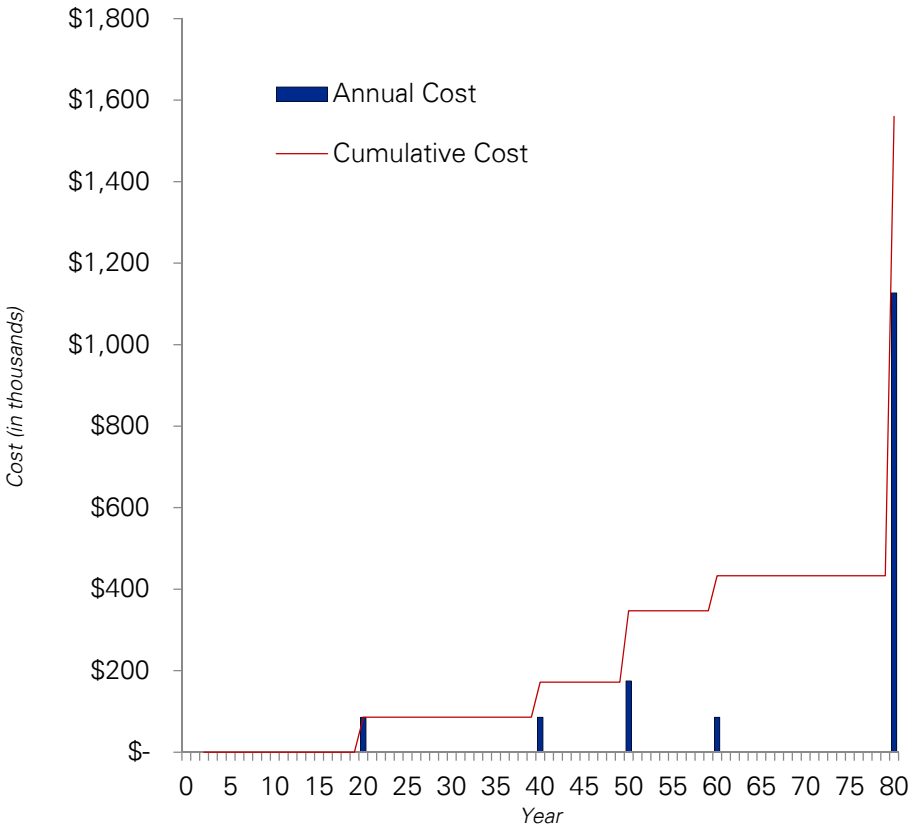
Anticipated asset life cycle	The life cycle ranges from 50 to 100 years depending on the pipe material. Wastewater facility components have useful lives ranging from 10 to 60 years.
Integration opportunities	The replacement of these components may either be implemented as part of other construction work or may be conducted as a standalone project. The replacement may be incorporated into resurfacing and road reconstruction work which could include the integration of other utilities (wastewater, telephone, hydro, cable, natural gas, etc). In the case that full road replacement is not intended, standalone replacement of sanitary trunk can be carried out using trench cut and repair.
Rehabilitation and replacement criteria	The assessment of the replacement schedule is determined primarily through conducting a CCTV inspection. The results of the inspection will be evaluated to estimate the degree of deterioration of the infrastructure. Included in the assessment are other criteria such as the material type, visible local collapses, upsizing requirements, and synchronization with roads rehabilitation programs.
Rehabilitation and replacement strategies	The rehabilitation strategy is dependent on the assessed condition rating of the infrastructure. The optimal rehabilitation method is determined by assigning and examining the condition rating of the pipe through close circuit camera inspections undertaken every five years. Most commonly the selected strategy is replacement of collapsing and deteriorated pipe. For localized damage, other practices may be instituted which include: spot repair, joint sealing, and Cured in Place Pipe (CIPP).
Life cycle consequences	The process of degradation in sanitary sewers is similar to that of storm sewers. The repercussions of failure in sanitary sewers are considerably more substantial. Structural deterioration may lead to infiltration of ground water into the system which results in an increased volume of sewage directed to waste water treatment plants. These plants may not be designed to meet the growing demand result in increase in waste water flow. Infiltration of ground water can also result in the deposition of sediment and debris, significantly reducing the flow capacity for waste water. Continued maintenance and rehabilitation is essential for the performance and reliability of any type of buried infrastructure.
Integrated asset priorities	Replacement of deteriorating sanitary sewers is carried out based on the assessed condition. In the event that replacement is selected as the rehabilitation strategy, the project may expand to include other assets such as sidewalks, road trench cuts, or full pavement. Other utilities may also become included in the scope of work: hydro, telephone, cable, and natural gas. Typically the integration of road rehabilitation will increase the priority of the project.

Asset Management Planning for Water and Wastewater

Wastewater mains (continued)

Asset management activities for wastewater mains are suggested to commence 20 years following the initial installation of the main with CCTV inspections, cleaning and flushing and inspection of structures, and continue at 20-year intervals until the end of the main's useful life. Suggested asset management activities for 300mm collection mains are provided below. Asset management costs for mains of different sizes will vary from the amounts presented below.

Year	Activity	Estimated Cost per KM
20	Camera inspection, cleaning, flushing and structure inspection	$86,000
40	Camera inspection, cleaning, flushing and structure inspection	$86,000
50	Replacement of 60% of structure	$175,000
60	Camera inspection, cleaning, flushing and structure inspection	$86,000
80	End of life replacement	$1,127,000
Total cost of asset management activities		$1,560,000
Average cost per year		$19,500



Asset Management Planning for Water and Wastewater

D. Overall Financial Requirements

The City's water and wastewater mains have an estimated replacement value of $2.005 billion, comprised of $1,004.2 million for watermains and $1,001.2 million for wastewater mains. Based on the estimated useful lives of the City's water and wastewater mains, an estimated $433.9 million should be expended to address water ($330.2 million) and wastewater ($103.7 million) mains that have reached the end of their useful lives and are in immediate need of rehabilitation or replacement. Over the next ten years, the projected replacement and rehabilitation requirements of the City's water and wastewater mains are expected to an additional $19.2 million and $45.6 million, respectively.

In addition to water and wastewater mains, the estimated replacement cost of the City's approximately 150 water and wastewater facilities is in the order of $798.1 million, which includes treatment facilities, lift stations, booster stations and storage facilities. At the present time, sufficient information concerning the deferred maintenance costs for the City's treatment facilities is not available. However, an analysis of the remaining useful lives of the City's treatment facilities indicates that the City's immediate investment need for water and wastewater facilities that are beyond their useful lives is in the order of $201.3 million, with an additional $182.9 million required over the next ten years.

Overall, we have estimated the total ten year capital requirement for water and wastewater to be in the order of $882.9 million as follows:

Immediate replacement requirement for water mains	$330.2 million
Immediate replacement requirement for wastewater mains	$103.7 million
Immediate replacement requirement for treatment facilities	$201.3 million
Total immediate replacement requirement	$635.2 million
Projected replacement requirement for water mains over the next ten years	$19.2 million
Projected replacement requirement for wastewater mains over the next ten years	$45.6 million
Projected replacement requirement for treatment facilities over the next ten years	$182.9 million
Total replacement requirement over the next ten years	$247.7 million
Total financial requirement over the next ten years for water and wastewater infrastructure	$882.9 million

KPMG

City of Greater Sudbury Asset Management Plan

Asset Management for Buildings

Asset Management Planning for Buildings

A. Introduction

The City's building inventory is comprised of approximately 550 facilities, of which approximately 150 are used for water and wastewater services (treatment plants, lift stations, storage tanks). The remaining facilities are involved in the delivery of other municipal services, including parks and recreation, cultural services, emergency services, public works and administrative functions.

B. Condition Assessments

To assess facilities, a Facility Condition Index ('FCI') is recommended. FCI is a ratio of total deferred maintenance to the current replacement value of the facility. The index can be used to assess either individual assets or grouped assets. The FCI is currently accepted throughout North America.

At the present time, sufficient information concerning the deferred maintenance costs for the City's facilities is not available. While a condition assessment can be estimated through an analysis of the remaining useful lives of the City's facilities, this approach can be problematic as different components of buildings will have varying useful lives, resulting in a piecemeal approach to facility maintenance planning. At the same time, the City has a number of major facilities that are approaching the end of their useful lives and could either be continued to be used (with or without repairs) or replaced, including the following:

Facility	Initial Construction Year	Current Age	Estimated Useful Life	Remaining Useful Life	Replacement Value
Tom Davies Square	1977	39	50	11	$180 million
Sudbury Community Arena	1951	65	50	–	$65 million
Mackenzie Street Library	1952	64	50	–	$25 million

In light of the above, we have not presented a summary of condition assessments for the City's facilities.

Asset Management Planning for Buildings

C. Asset Management Strategies

Asset management activities for buildings will vary based on a number of factors, including the type of facility, its current condition, its intended use (residents vs. internal purposes) and the financial resources available to the City.

Anticipated asset life cycle.	The life cycle for facility components will vary from 15 to 60 years. The actual life cycle of building components will vary based on the level of maintenance provided throughout their service lives.
Integration opportunities	Assets are typically approached separately with little to no integration of facilities. However, some municipalities have attempted to achieve economies of scale through (i) the consolidation of different types of facilities into one building (i.e. fire halls and public works depots); and/or (ii) the co-location of municipal operations with other public sector entities under shared service arrangements.
Rehabilitation and replacement criteria	To assess facilities, the Facility Condition Index (FCI) is recommended. FCI is a ratio of total deferred maintenance to the current replacement value of the facility. The index can be used to assess either individual assets or grouped assets. The FCI is currently accepted throughout North America.
Rehabilitation and replacement strategies	The replacement schedule will be dictated by the actual asset conditions at the time, the stage in its life cycle, and the FCI asset condition summaries. Replacement may also be undertaken to meet any changes in safety, industry or technological specifications and standards. The facility must also be maintained to meet the requirements of the Accessibility for Ontarians with Disabilities Act (AODA) and upgrade ingress/egress points as necessary. Critical components which should be given special attention with annual inspections include facility roof and HVAC systems. Any scheduled improvements should take into consideration the institution of economical energy efficient systems and equipment.
Life cycle consequences	Degradation of the building and its components are noticed by users, with associated increases in operational costs due to inefficiencies, increased maintenance costs or health and safety concerns. There may be significant challenges to operating in buildings that are in need of immediate attention, impacting a range of items such as the efficiency of staff deployment, energy costs, facility maintenance costs, customer service (e.g. the ability to offer 'one window' service, accessibility concerns) and potential health and safety issues caused by mould and other irritants.
Integrated asset priorities	The schedule of replacement is dependent on the facility's stage in its life cycle, the actual condition at the time, and the convenience of performing the replacement without disturbing the operations.

Asset Management Planning for Buildings

D. Overall Financial Requirements

Excluding water and wastewater treatment facilities (which are funded through water and wastewater rates), the overall replacement cost of the City's facilities is estimated to be in the order of $750.5 million.

	Number of Facilities		Estimated Replacement Value	
	Number	Percentage	Amount	Percentage
Recreational and cultural facilities	250	62.5%	$246.3 million	32.8%
Other facilities	147	36.7%	$234.2 million	31.2%
Major facilities (see below)	3	0.8%	$270.0 million	36.0%
Total	400	100.0%	$750.5 million	100.0%

Three major facilities – Tom Davies Square, Sudbury Community Arena and Mackenzie Street Library – are approaching or are at the end of their useful lives. For the purposes of the asset management plan, we have assumed that the City will:

- Replace the arena and library with new facilities (with an estimated combined cost of $90.0 million); and
- Renovate/rehabilitate Tom Davies Square (as opposed to replace the facility outright). This is expected to result in a future capital cost that is less than the cost to construct a new facility. In the absence of a formal budget for the renovation and rehabilitation of Tom Davies Square, we have assumed a capital requirement of $50.0 million for the purposes of the asset management plan.

Overall, the City's TCA data indicates that buildings with an estimated replacement cost of $260.5 million years (which includes the three major facilities noted above) are in need of immediate replacement (i.e. are past their estimated useful lives), with an additional $64.3 million required to be spent over the next ten years.

KPMG

City of Greater Sudbury Asset Management Plan

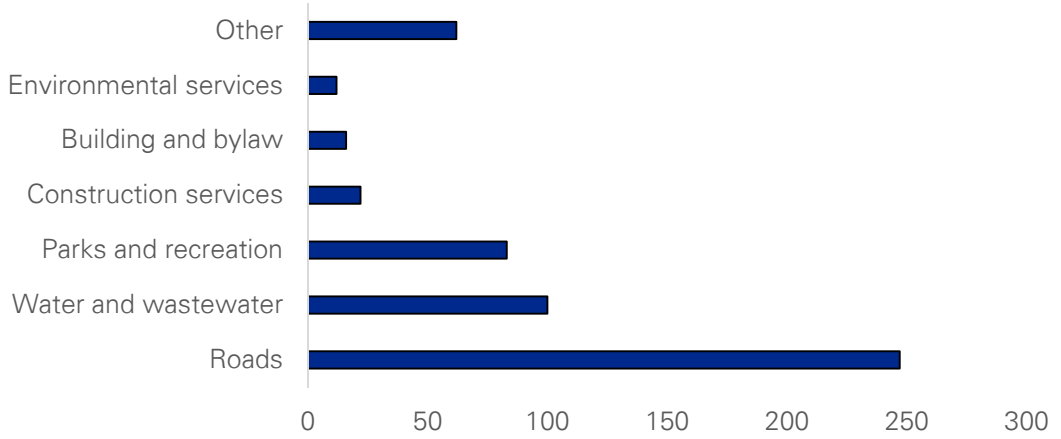
Asset Management for Fleet

Asset Management Planning for Fleet

A. Introduction

Excluding transit, fire and police vehicles, the City's current fleet is comprised of approximately 540 vehicles and pieces of moveable equipment. The City's Roads Department accounts for the largest component of City's fleet, with 247 vehicles or 46% of the City's fleet.

City Fleet by Department (excluding transit, fire and police)



B. Condition Assessments

For the purposes of assessing the condition of the City's fleet, we have rated the vehicles as being in either good, fair or poor condition, based on the percentage of the vehicles remaining useful life. As summarized below, 45% of the City's fleet is considered to be in poor condition, which reflects a number of vehicles that continue to be in use beyond their expected useful lives.

Condition Rating	Remaining Useful Life	Number of Vehicles	Percentage of Total Fleet
Good	More than 50%	130	24.0%
Fair	10% to 49%	164	30.3%
Poor	Less than 10%	248	45.7%
Total		542	100.0%

Asset Management Planning for Fleet

C. Asset Management Strategies

Asset management activities for vehicles and moveable equipment will vary based on a number of factors, including the type of vehicle, its current condition, and the financial resources available to the Municipality. A summary of the asset management strategy for vehicles and moveable equipment is included below.

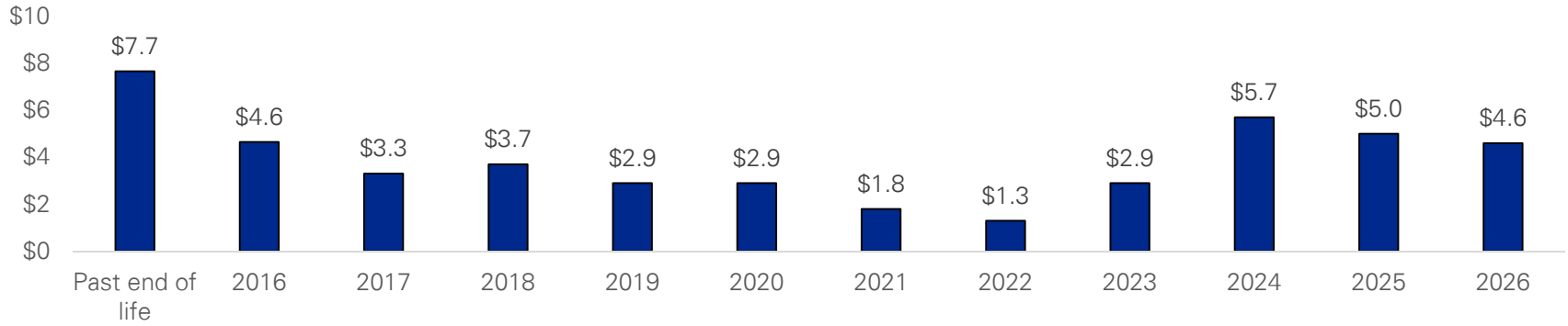
Anticipated asset life cycle.	Service life is dependent on the type or vehicle/equipment and service area, and will range from five to 20 years.
Integration opportunities	Assets are typically approached separately with little to no integration of vehicles. However, operational changes, including modifications to service levels, the use of external vs. internal resources, changing regulatory requirements and other considerations can impact on fleet replacement.
Rehabilitation and replacement criteria	Replacement of fleet should be dictated by the results of lifecycle cost analysis considering the operating costs of continuing to own the vehicle (repairs, insurance, fuel, depreciation, and downtime costs) vs. the operating and acquisition costs of a new vehicle.
Rehabilitation and replacement strategies	In the case that vehicular repairs exceed 25% to 30% of replacement costs, replacement is the optimal strategy. Other strategies include leasing opportunities, refurbishing, seasonal rentals, or tendering services to a third party.
Life cycle consequences	Vehicles that are not maintained, or as vehicles reach the end of the service lives, the efficiency of vehicles decrease, seeing an increase in cost per km. In the event of service interruption, work force costs are increased due to extended work schedules. In addition, failure of critical vehicles and equipment (e.g. fire, winter roads maintenance) may result of public safety risks and potential regulatory risk if the municipality does not meet minimum maintenance standards.
Integrated asset priorities	Not applicable.

Asset Management Planning for Fleet

D. Overall Financial Requirements

The City's fleet (excluding transit, police and heavy fire vehicles) has an estimated replacement value of $38.0 million. Based on the estimated useful lives of the City's vehicles and moveable equipment, an estimated $7.7 million should be expended to replace vehicles and equipment that are beyond their useful lives, with an additional $38.7 million required over the next ten years. This results in a total replacement requirement of $46.4 million over the next ten years, which exceeds the replacement value of the City's fleet due to the fact that certain assets have useful lives of less than 10 years, thereby requiring replacement twice during the planning period of the asset management plan.

Annual and cumulative fleet investment requirements (in millions)



The current backlog in fleet replacements over its useful life has been an ongoing issue facing the City's fleet of vehicles and equipment. Staff is working on identifying but more importantly putting forth future plans in upcoming years to reduce the overall capital requirement, such as;

- Identify opportunities to rationalize the true fleet requirements for each department. Reductions in the number of fleet will have a direct impact on lower maintenance and capital replacement costs
- Improvements to fleet management software, creating relevant and useful data to better decision making (buy or rent, repair in house or outsource, extend warranty or not etc.)
- Plan fleet replacements to include a condition assessment, in addition to strictly the age of the asset
- Analyze and prepare recommendations to create proper business processes for the repair, annual maintenance and parts procurement of the City fleet. Adherence to set processes and procedures will help maximize the useful life of the equipment.

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City of Greater Sudbury Asset Management Plan

Asset Management for Landfills

Asset Management Planning for Landfills

A. Introduction

The City currently operates three landfills – Sudbury, Valley East and Rayside-Balfour. Three former landfill sites are currently in the post-closure stage of management.

B. Condition Assessments

For the purposes of assessing the condition of the City's landfills, we have rated the landfills as being in either good, fair or poor condition, based on remaining useful life, as follows:

- Good — More than 15 years
- Fair — Five to 15 years
- Poor — Less than five years

Landfill			Remaining Useful Life	Condition Assessment
	Remaining	Percentage Remaining		
Sudbury	3.8 million m^3	49%	33 years	Good
Valley East	0.7 million m^3	33%	25 years	Good
Rayside-Balfour	0.7 million m^3	50%	37 years	Good

Asset Management Planning for Landfills

C. Asset Management Strategies

The Environmental Protection Act sets out the regulatory requirements to properly close and maintain all active and inactive landfill sites. Under environmental law, there is a requirement for closure and post-closure care of solid waste landfill sites. Landfill closure and post-closure care requirements have been defined in accordance with industry standards and include final covering and landscaping of the landfill, pumping of ground water and leachates from the site, and ongoing environmental monitoring, site inspection and maintenance.

Landfill post-closure care is required to be provided over the greater of (i) the contaminating life of the landfill site; or (ii) 20 years. All landfills have estimated contaminating life spans of 25 years and as such, this is the planned duration of post-closure monitoring activities.

D. Overall Financial Requirements

The City's estimated cost for closure and post-closure activities for all six landfills, discounted to 2015, is estimated to be in the order of $23.6 million. This represents the notional cost of closure and post-closure activities (i.e. the amount that will actually be incurred) and differs from the amount of the liability recorded in the City's financial statements ($14 million), which represents the net present value of the future notional costs.

Ultimately, the City's approach to meeting its future solid waste management needs, and the associated capital costs, will be determined upon the updating of its waste management master plan, which is scheduled to occur in 2021. Based on discussions with City personnel, we understand that a range of options may be available for future waste management strategies, including:

- *Developing one or more new landfills to replace the City's existing landfill sites.* We understand this option would likely require a capital investment of $50 million but may not be viable given regulatory approval requirements and the fact that the Province of Ontario has not approved the construction of new municipal landfills in a number of years;
- *Exporting solid waste to a third party landfill*; and
- *Adopting a waste to energy strategy* whereby solid waste is either (i) incinerated; or (ii) used to produce a combustible material for use in energy generation.

For the purposes of the asset management strategy we have assumed that the capital investment requirement for the City's landfills, regardless of the waste management strategy to be adopted, will be in the order of $50 million. Based on the assumption that the City will fund this over the remaining useful life of the Sudbury landfill (33 years), it would be required to commit an average of $1.5 million per year to a dedicated reserve, or $15 million over the next ten years.

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City of Greater Sudbury Asset Management Plan

Asset Management for Transit

Asset Management Planning for Transit

A. Introduction

The City's Transit Department currently operates a fleet of 71 transit vehicles of varying types and is also responsible for the maintenance of bus shelters, the City's transit terminal and the newly constructed (2014) transit and fleet garage.

B. Condition Assessments

For the purposes of assessing the condition of the City's transit infrastructure, we have rated the vehicles as being in either good, fair or poor condition, based on the percentage of the asset's remaining useful life. As summarized below, the majority of the City's transit vehicles and all of the associated fareboxes are considered to be in good or fair condition.

Condition Rating	Remaining Useful Life	Vehicles		Fareboxes	
		Number	Percentage	Number	Percentage
Good	More than 50%	29	40.8%	–	–
Fair	10% to 49%	34	47.9%	63	100.0%
Poor	Less than 10%	8	11.3%	–	–
Total		71	100.0%	63	100.0%

C. Asset Management Strategies

Asset management activities for the City's transit fleet are consistent with the fleet asset management strategies identified earlier in the report.

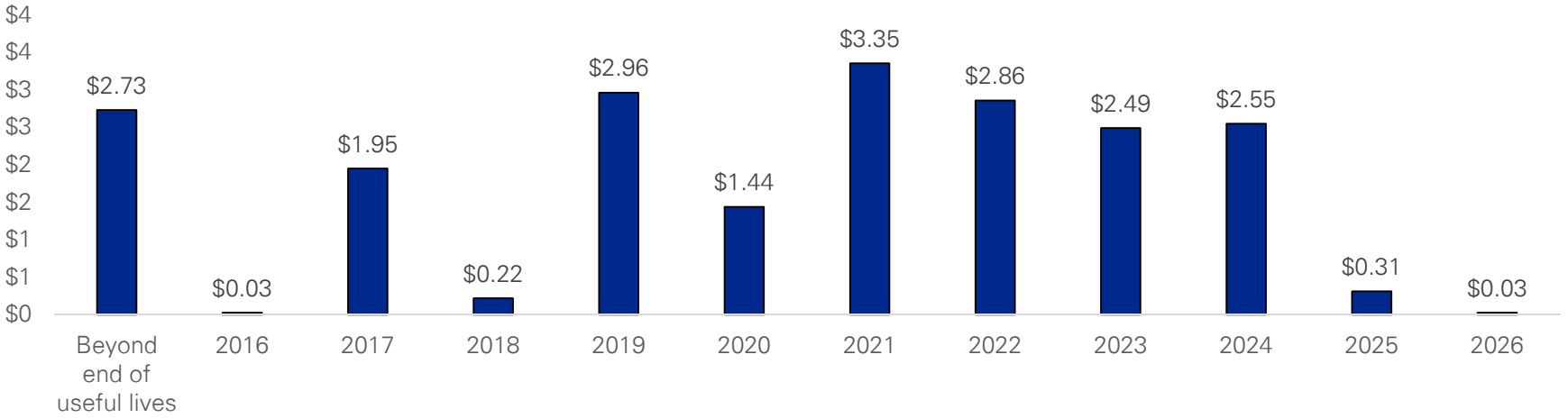
Asset Management Planning for Transit

D. Overall Financial Requirements

In total, the City's transit infrastructure has an estimated replacement value of $32.2 million, the largest component of $28.7 million relates to transit buses and vehicles.

Based on the useful life of the City's transit assets, a total of $20.9 million is projected over the next ten years for asset replacements, of which $2.73 million is required to replace assets that are currently beyond the end of their useful lives.

Annual and cumulative transit investment requirements (in millions)



It is expected that significant changes are to be made to Transit's long term plan due to a recent government funding announcement (Public Transit Infrastructure Fund). Staff have submitted projects for funding, with the expectation that the projects will assist long term planning in Transit in the following ways;

- Accelerate the replacement of Transit buses, which will result in lower estimated useful lives offset by reduced repair and maintenance costs
- Identify opportunities to reduce bus spare ratios
- Review and make changes to the planned life cycle for buses to align with utilization and industry standards
- Plan bus replacements to include a condition assessment, in addition to strictly the age of the asset

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City of Greater Sudbury Asset Management Plan

Other Assets

Other Assets

In addition to the infrastructure noted elsewhere in this report, the City is responsible for the maintenance and replacement of a range of other assets. As noted below, the replacement cost of these assets is $76.7 million, with an estimated $26.4 million required to be invested over the next ten years.

Asset Category	Replacement Value	Immediate Investment Requirement (Assets Beyond End of Useful Life)	Investment Requirement (2016 to 2026)
Traffic signal components	$24.6 million	$3.7 million	$8.7 million
Street lights	$25.6 million	$5.4 million	$8.6 million
Drains and stormwater ponds	$26.5 million	–	–
Total	$76.7 million	$9.1 million	$17.3 million

There are no identified investment needs for drains and stormwater ponds as these assets have useful lives of 50 to 100 years and are not expected to reach the end of their useful lives within the next ten years. However, the City is conducting a detailed review of drain and stormwater infrastructure requirements and may identify short-term capital needs in the future.

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City of Greater Sudbury Asset Management Plan

Service Levels

Service Levels

The City's asset management strategy is intended to maintain its infrastructure at a certain capacity and in doing so, allow it to meet its overall objectives with respect to service levels for its residents. Key performance measures and service level targets have been identified for core infrastructure assets, which is defined by the Province as follows:

Core infrastructure assets include paved and unpaved roads; bridges; culverts; any assets involved in wastewater collection, conveyance, treatment and disposal; urban and rural stormwater systems; water treatment, distribution and transmission, and; public and non-profit housing infrastructure[1].

Key performance measures for core infrastructure assets, as well as the City's current status, are summarized below.

Core Infrastructure Asset	Performance Measure	Targeted Performance
Roads	Compliance with Ontario Regulation 239/02 – Minimum Maintenance Standards for Municipal Highways	Full compliance
Bridges	Compliance with Ontario Regulation 104/97 – Standards for Bridges	Full compliance
	Compliance with Ontario Regulation 239/02 – Minimum Maintenance Standards for Municipal Highways	Full compliance
Water and wastewater	Compliance with Safe Water Drinking Act, 2002, S.O. 2002, c.32 and corresponding regulations	Full compliance
	Number of boil water advisories	0
	Number of water main breaks per 100 km of water mains	7
	Number of blocked sewers per 100 km of wastewater mains	5

[1] *Asset management planning for social housing infrastructure has been undertaken separately by the Greater Sudbury Housing Corporation.*

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City of Greater Sudbury Asset Management Plan

Financial Strategy

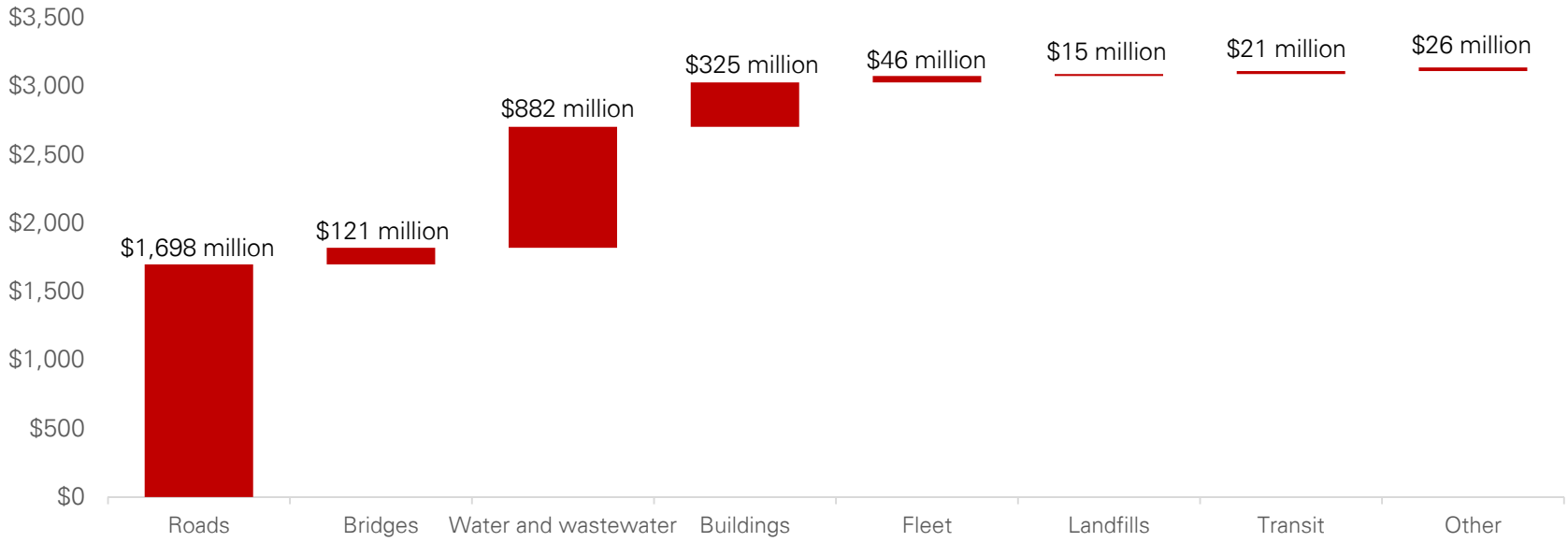
Financial Strategy

A. Immediate Investment Requirement

In order to provide sufficient funding for infrastructure replacement and rehabilitation over the next ten years, the City would be required to spend $3.14 billion, representing an average of $314 million per year. In comparison, the City's capital budget for 2016 amounted to $106 million, or approximately 34% of the required amount of capital investment. Of the $106 million in available capital funding, only $61 million was derived from user fees and municipal taxes, with the remainder obtained from reserve and reserve funds, future financing commitments, development charges and grants. The ability of the City to sustain (or increase) capital funding at 2016 levels is contingent upon its ability to continue to generate these additional sources of revenue.

This results in an infrastructure deficit of $208 million per year ($314 million per year required compared to $106 million in funding budgeted in 2016), or $2.08 billion over the next ten years (assuming the City's current capital budget is available to address the identified capital needs).

Immediate Infrastructure Requirement Over the Next Ten Years (in millions)



Financial Strategy

B. Financial Strategies

In order to address the shortfall in capital funding, the City may consider the following potential courses of action:

1. **Five year capital levy.** The City may wish to consider the introduction of a five year capital levy that would see the total municipal levy increase by 2% per year in order to fund capital expenditures. The proceeds from this capital levy would either be expended during the year, used to finance debt servicing costs for infrastructure related borrowings or placed in a reserve fund until such time as the funds are required. As noted below, the introduction of a 2% five year capital levy is expected to provide an additional $25 million for capital purposes annually by year five, representing a 24% increase in capital funding from 2016.

Year	Municipal Levy (in millions)			Capital Budget (in millions)		
	Prior Year's Levy	Capital Levy Increase	Current Year's Levy	Prior Year's Funding	New Funding	Current Year's Funding
2017	$239	$4.8	$244	$106	$4.8	$111
2018	$244	$4.9	$249	$111	$4.9	$116
2019	$249	$5.0	$254	$116	$5.0	$121
2020	$254	$5.1	$259	$121	$5.1	$126
2021	$259	$5.2	$264	$126	$5.2	$131
Average annual increase in municipal levy			2.0%	Increase in capital expenditures		24%

Financial Strategy

2. **Use of borrowing for infrastructure investments.** Historically, the City has not relied on borrowings as a means of funding infrastructure investments, with the City adopting a pay-as-you go strategy for most capital expenditures. On an ongoing basis, the City may wish to consider the use of debt for additional infrastructure investments, conditional upon one or more of the following:

   - The infrastructure investment will provide a stream of non-taxation revenues that can be used to fund some or all of the associated debt servicing costs; and/or
   - The City requires debt financing to fund its portion of infrastructure projects that are cost shared with senior government; and/or
   - The infrastructure investment is unavoidable as a result of regulatory changes or concerns over public health and safety and cannot be funded through other means; and
   - The associated debt servicing costs would not jeopardize the City's financial sustainability or result in the City exceeding its annual debt repayment limit.

   The City's current Capital Budget Policy, based on the existing Long Term Financial Plan, recommends that funds used to service existing external debt shall be redirected to the capital budget once the external debt is repaid. This allows the capital funding envelopes to increase while having no impact on the operating budget. The existing Long Term Financial Plan also recommends that as debt charges decline due to retirement of debt, apply savings to accelerate achievement of full life cycle costing for City infrastructure.

Financial Strategy

3. **Capital project deferral.** As time proceeds, aspects of the City's sustaining capital reinvestment requirement will evolve into immediate infrastructure requirements as the City's infrastructure continues to decline through usage, weather conditions and other considerations. The City's funding appears to be insufficient to fund its immediate infrastructure requirements over the next ten years, and over the long-term its ability to meet its infrastructure replacement and rehabilitation requirements will be compromised. In the absence of new funding sources (taxes, grants or loan proceeds), the City will be required to defer capital projects, accepting increased operating costs and/or lower levels of service as a consequence, including:

   - Increased operating costs for older and less energy efficient facilities;
   - Health and safety impacts for employees and residents due to the presence of mould and other irritants as well as accessibility issues;
   - A reduction in the quality of ride conditions resulting from the deterioration of PCI for municipal roads;
   - Load restrictions for municipal roads and bridges (some of which are already subject to load restrictions);
   - Increased maintenance costs and downtime for municipal vehicles and moveable equipment
   - Increased maintenance costs, functional obsolescence and space limitations with respect to municipal facilities.

   In determining where to focus capital expenditures where funding shortfalls occur, the City may wish to consider investing in projects that:

   - *Provide the greatest impact to residents and focus on core services.* For example, roads with higher daily traffic volumes will generally represent a priority over more rural roads with lower traffic volumes. Similarly, core services such as fire protection may receive a higher priority than discretionary services such as cultural programs.
   - *Address the greatest risks.* With the potential to impact on public health and safety, investments in fire and winter roads maintenance vehicles may be viewed as a priority over roads, where poor infrastructure conditions can be managed through load restrictions, speed limit reductions and other means. Similarly, water infrastructure represents a priority given the potential health issues that may result of the City's water system is compromised due to infrastructure failure.
   - *Have the greatest probability of failure.* Infrastructure in poor condition has a greater risk of failure than infrastructure in good condition and as such, represents a higher priority from a reinvestment perspective.
   - *Align with the City's strategic direction and priorities.* The City's strategic plan has identified a number of priorities that should guide future capital expenditures.

In order to assist with prioritizing capital expenditures, a suggested impact, risk, probability and fit framework has been provided on the following page.

Financial Strategy

	1	2	3	4	5
Impact	Impact of failure is restricted to low use infrastructure with no effect on residents or community assets (e.g. arena)		Impact felt by some Municipal residents or impacts aspects of community infrastructure		Highest use assets impacted, with effects felt by almost all residents and community infrastructure
Risk	Failure poses no threat to public health and safety, property, local economy or environment.		Failure poses minor threat to public health or results in moderate property loss, economic disruption for some businesses or some environmental damage.		Failure poses major threat to public health and safety and/or will result in major property losses, economic disruption or environmental damage.
Probability of Failure	Probability of failure is low as asset has 20% or more of useful life remaining or condition rating indicates failure is not imminent.		Probability of failure is moderate as asset has 10% to 15% of useful life remaining or condition rating indicates failure is not likely for 10 years.		Probability of failure is high as asset is past its useful life or condition rating indicates immediate replacement required.
Fit	There is no linkage between the capital project and the priorities identified in the official plan or strategic plan.		The capital project has some contribution towards priorities identified in the strategic and/or official plans but is not viewed as essential.		The capital project strongly supports priorities identified in the strategic or official plans.

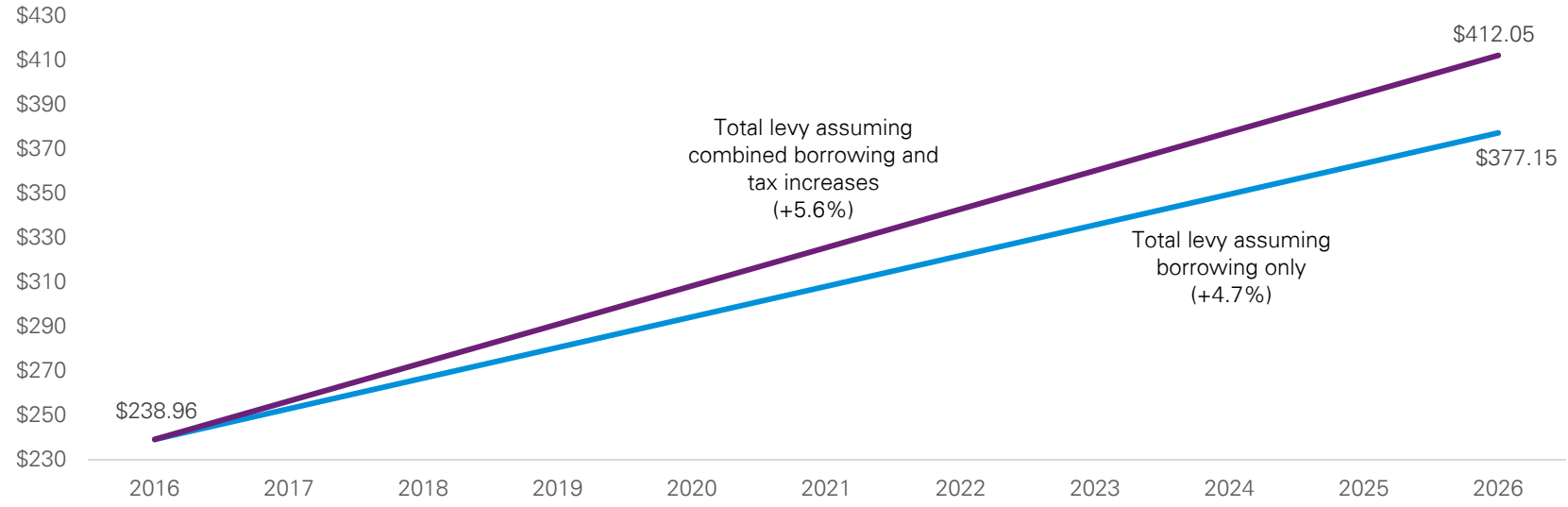
Financial Strategy

In order to demonstrate the financial impact of fully addressing the City's infrastructure requirements over the next ten years, we have presented the impact on the overall municipal levy under two scenarios:

- The City will borrow the required amount of $2.08 billion over a ten year period (i.e. annual borrowings of $208 million per year over each of the next ten years); and
- The City will rely on a combination of tax increases (50%) and debt (50%) to address the estimated funding gap of $2.08 billion.

As noted below, the total municipal levy under the first scenario (full borrowing) is projected to be $377.15 million in 2026, representing an average annual increase of 4.7% over the ten year period (excluding all other levy adjustments such as inflation, service level changes and/or changes in non-taxation revenue). Under the second scenario (combination of debt and taxes), the average annual increase in the municipal levy is projected to be 5.6% per year in each of the ten years. A scenario involving only tax increases was not prepared as the level of tax increases required was not considered to be practical (i.e. +50% per year).

Projected Municipal Levy – 2017 to 2026 (in millions)



Key Findings and Potential Courses of Action

- As noted earlier in the plan, we have estimated the City's total infrastructure investment requirement over the next ten years to be in the order of $3.14 billion, of which $1.87 billion relates to assets that are currently in operation past the end of their useful lives.
- Based on the assumed continued budgeted capital funding of $106 million in 2016 over the next ten years, the City faces a projected infrastructure funding shortfall of $208 million per year, or just under $2.1 billion over the ten year planning period.
- The quantum of the City's infrastructure funding shortfall is such that a strategy based solely on increases in taxes and user fees is likely impractical due to affordability concerns.
- The use of debt provides the opportunity to significantly reduce the infrastructure funding shortfall, with low interest-borrowing currently available to the City. For example, Infrastructure Ontario's 20 year lending rate is 3.28% as of the date of this report.
- We do not, however, believe that the City can fully address its infrastructure funding shortfall due to:
  - The impact on the municipal levy and concerns over affordability;
  - Potential concerns resulting from the City approaching (but not exceeding) its mandated allowable debt repayment limit; and
  - The inability of the City and local contractors to manage and deliver $3.14 billion of capital construction over the next ten years.
- In light of the above, we suggest that the City consider a hybrid approach to capital funding, which would include:
  - A multi-year program of affordable tax increases (e.g. 2%) that would be restricted to capital and in addition to the existing capital funding envelopes. This program would increase the City's available capital funding by approximately $5 million per year.
  - The use of debt for the financing of major capital projects;
  - The realignment of the City's capital envelopes to avoid a predominant focus on roads, so as to avoid situations where necessary infrastructure components such as facilities and fleet are disadvantaged;
  - The continued use of assets past their useful lives, with the acceptance of the corresponding impacts on service levels;
  - A focus on asset rationalization, which would include the closure/consolidation/divestment of excess City facilities, fleet and other assets; and
  - Service rationalizations, which would allow the City to redirect funding for operating costs to capital, thereby mitigating increases in taxes and user fees.

Contacts

The contacts at KPMG in connection with this report are:

Oscar Poloni, CPA, CA, CBV
Partner
KPMG LLP

705.669.2515

opoloni@kpmg.ca

kpmg.ca