London
CANADA

2019
Corporate Asset Management Plan

CM BluePlan ENGINEERING

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Acknowledgements

Land Acknowledgement

We respectfully acknowledge that the City of London is located on the traditional territories of the Anishinaabeg, Haudenosaunee, Lunaapeewak, and Attawandaron peoples, who have longstanding relationships with the land and the region. We would like to acknowledge the many longstanding treaty relationships between Indigenous Nations and Canada. The City of London recognizes its relationship with the local First Nation communities, including Chippewas of the Thames First Nation, Oneida Nation of the Thames, and Munsee Delaware Nation. In the region, there are eleven First Nation communities and a growing Indigenous urban population. The City of London values the significant historical and contemporary contributions of local and regional First Nations and those whose histories, languages, and cultures continue to influence our vibrant community. We acknowledge them and others who care for the land and its past, present, and future stewards.

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Section 1: Executive Summary

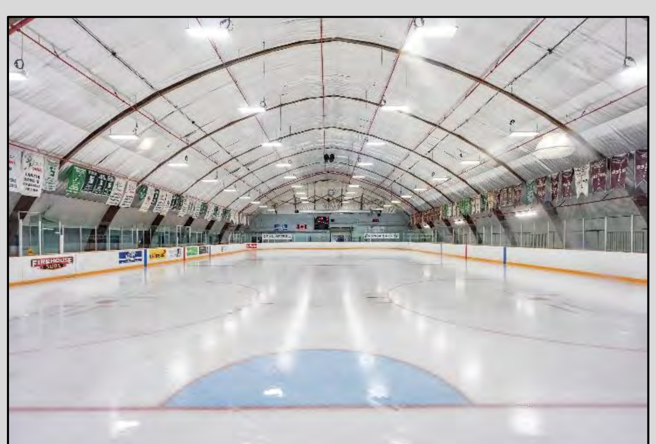
1.1 INTRODUCTION

The Corporation of the City of London's ("City of London" or "City") infrastructure systems are the backbone of our community. They support a range of municipal services that enable the quality of life experienced by residents, businesses, and other stakeholders.

The City's Corporate Asset Management (CAM) Program is designed to enable management of infrastructure assets in a way that connects strategic Council and community objectives to day-to-day infrastructure investment decisions.

This CAM Plan is a tactical outcome of the CAM Program, setting out the current plan for the City to manage its $20.1 Billion worth of core infrastructure under the direct ownership and control of the Corporation of the City of London. This is accomplished by:

- Aligning with the Provincial regulatory landscape, meeting the requirements of O.Reg 588/17, and positioning London for grant funding applications.
- Understanding the current state of the infrastructure systems.
- Measuring and monitoring Level Of Service (LOS) metrics to quantify how well an infrastructure system is meeting expectations.
- Establishing asset lifecycle management activities (i.e. how infrastructure is operated, maintained, rehabilitated and replaced).
- Determining the optimal costs of the asset lifecycle activities required to ensure the infrastructure systems provide service levels that meet community expectations.
- Establishing a financial strategy to fund the expenditures that are required to complete the optimal lifecycle activities for Council's approval.
- Prepare conclusions and provide recommendations resulting from the data analysis performed.



Lambeth Arena - Beattie Street

Stormwater Management Pond – Sunningdale Rd

Based on existing City budget, the infrastructure gap is expected to grow from the current gap of $167.9 million to $568.8 million within the Plan's 10 year period of analysis.

The City's proposed strategy is to mitigate the annual growth of the infrastructure gap. The strategy is to balance the affordability of municipal taxes and utility rates with the needs of the City.

Failing to address growing infrastructure needs will result in increased risk of infrastructure failures that will negatively affect Londoners quality of life through more frequent impacts like road closures, water alerts, unkempt parks, etc. Failure to take care of a minor repair in the short term can lead to more costly solutions in the future. The City's projected lifecycle investment plans currently do not meet the needs of our infrastructure. If nothing is done to address the projected shortfall, the infrastructure gap will continue to grow, resulting in an untenable situation. The most efficient way to manage our assets is through well planned investments; making the right investment at the right time for the right amount.

Table 1.1 City of London Asset Replacement Value, Condition and Gap Overview

Replacement Value	Current Condition	Current Infrastructure Gap	Cumulative 10 Year Infrastructure Gap	Gap as a % of Replacement Value
$20.1 Billion	Good	$167.9 Million	$568.8 Million	2.8%

A.J. Tyler Operation Centre – Bathurst Street

London Fleet – Sewer Cleaning Truck

Section 1: Executive Summary

1.1 INTRODUCTION (continued)

PROGRAM AREAS AND SERVICES OVERVIEW

The Program Areas and Services that are included in the scope of the 2019 CAM Plan are listed in Table 1.2. The purpose is to align with budget and highlight how different programs are responsible for delivering specific services and the associated infrastructure assets used to deliver the service.

Table 1.2 City Program Areas and Service(s) in scope of the 2019 CAM Plan

Program Area	Service(s)
Water, Wastewater Services	Water
	Sanitary
	Stormwater
Transportation Services	Roads
	Structures
	Traffic
	Parking
Environmental Services	Solid Waste
Parks, Recreation & Neighbourhood Services	Recreation
	Parks
	Urban Forestry
Protective Services	Fire
	Corporate Security & Emergency Management
Social and Health Services	Long Term Care
Corporate, Operational & Council Services	Corporate Facilities
	Cultural Facilities
	Fleet
	Information Technology
	Land

1.2 ONTARIO REGULATION 588/17 (O. REG 588/17)

PRECURSOR

In 2012, the Province of Ontario published 'Building Together: Guide for Municipal Asset Management Plans' (AMP) to encourage and support municipalities in Ontario to develop AMP(s) in a consistent manner.

In 2015, Ontario passed the Infrastructure for Jobs and Prosperity Act which affirmed the role that municipal infrastructure systems play in supporting the vitality of local economies. After a year-long industry review process, the Province created Ontario Regulation 588/17 - Asset Management Planning for Municipal Infrastructure under the Infrastructure for Jobs and Prosperity Act . O.Reg. 588/17 further expands on the Building Together guide, mandating specific requirements for municipal Asset Management Policies and Asset Management Plans, phased in over a five-year period.

O. Reg 588/17 has a phased approach with three deadlines of July 1, 2021, July 1, 2023, and July 1, 2024. The July 1, 2021 and July 1, 2023 deadline is where 'Core' assets (water, wastewater, stormwater, road and bridges) and all City infrastructure assets, respectively will have an asset management plan documenting current levels of service. The final deadline (July 1, 2024) is to document proposed levels of service and financial strategies to fund these expenditures.

REQUIREMENTS ACHIEVED FOR THE 2019 CAM PLAN

For directly-owned City infrastructure assets, this CAM Plan is compliant with the July 1, 2021 and July 1, 2023 Regulation requirements. Furthermore, it also includes some components of the July 1, 2024 requirements.

2019 CAM PLAN SCOPE

The 2019 CAM Plan includes all directly owned assets of the City of London. O. Reg 588/17 defines a municipal infrastructure assets as directly owned by a municipality or included on the consolidated financial statements of a municipality (excluding joint municipal water board). The interpretation is that Boards and Agencies will have to be in scope of the CAM Plan by July 1, 2023. The City is undertaking an asset management maturity assessment in late 2019/early 2020 to determine the appropriate work to ensure July 1, 2023 regulation requirements are met with regards to the City's boards and agencies.

Section 1: Executive Summary

1.3 CURRENT STATE OF INFRASTRUCTURE

The City owns infrastructure with a total current replacement value of $20.1 Billion. The condition of the infrastructure is overall in Good condition meaning that the infrastructure is adequate for now with some elements showing general signs of deterioration that require attention and a few elements exhibiting significant deficiencies. The Current State of Infrastructure summarizes the existing asset inventory, its replacement value, condition, age distribution and how London stores its asset data.

The following Table highlights infrastructure the City owns directly. It is intended to portray the range of assets and not intended as a comprehensive list.

Table 1.3 City of London Inventory Highlights

Asset	Inventory	Unit
Watermain	1,603	km
Water Storage Reservoirs	5	Each
Sanitary Sewer	1,434	km
Storm Sewer	1,377	km
Wastewater Treatment Plants	6	Ea.
Stormwater Management Facilities	64	Ea.
Roads	3,656	Lane km
Sidewalks	1,568	Km
Cycling Facilities *	161	km
Bridges	102	Ea.
Street Lights, Traffic Signs, Signals	45,355	Ea.
Pathway & Trail	235	km
Arenas	11	Ea.
Aquatic Facilities	40	Ea.
Community Centre	13	Ea.
Trees (Street Trees, Manicured Parks, and Woodland Trees)	1,666,369	Ea.
Fire Station	14	Ea.

* Note that Cycling Facilities inventory includes all Separated, Designated, and Shared categories.

Figure 1.1 presents the percentage of asset replacement value by Program Area. Although this report is directed at assets, assets alone do not reflect the entire value of the services provided by the City. Many important services such as Parking, Long Term Care, etc. have very little hard asset value. While reading this report, one must bear in mind that funding for assets is only one aspect of our City's financial requirements. The focus of the City is providing services that sustain or improve quality of life.

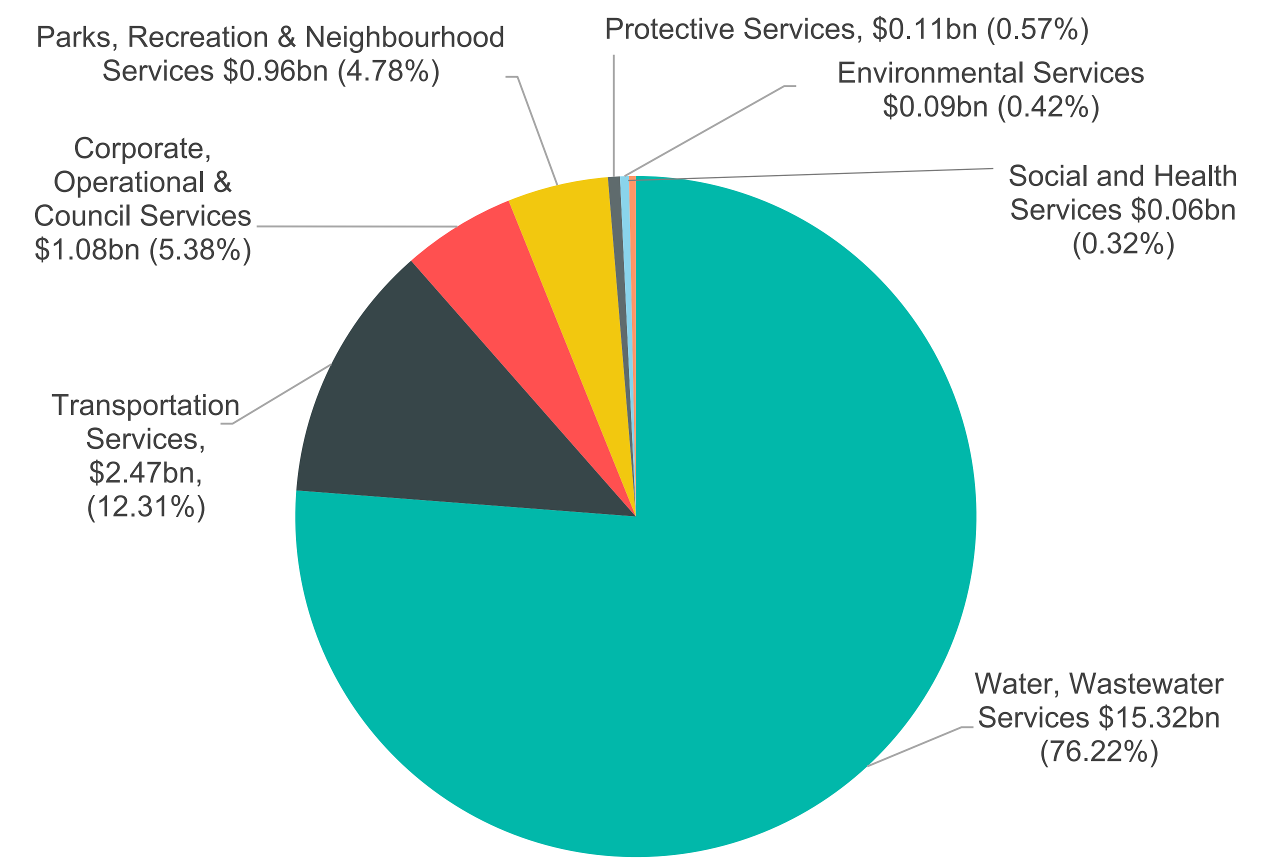


Figure 1.1 City of London Infrastructure Replacement Value Summary

1.3.1 CURRENT CONDITION

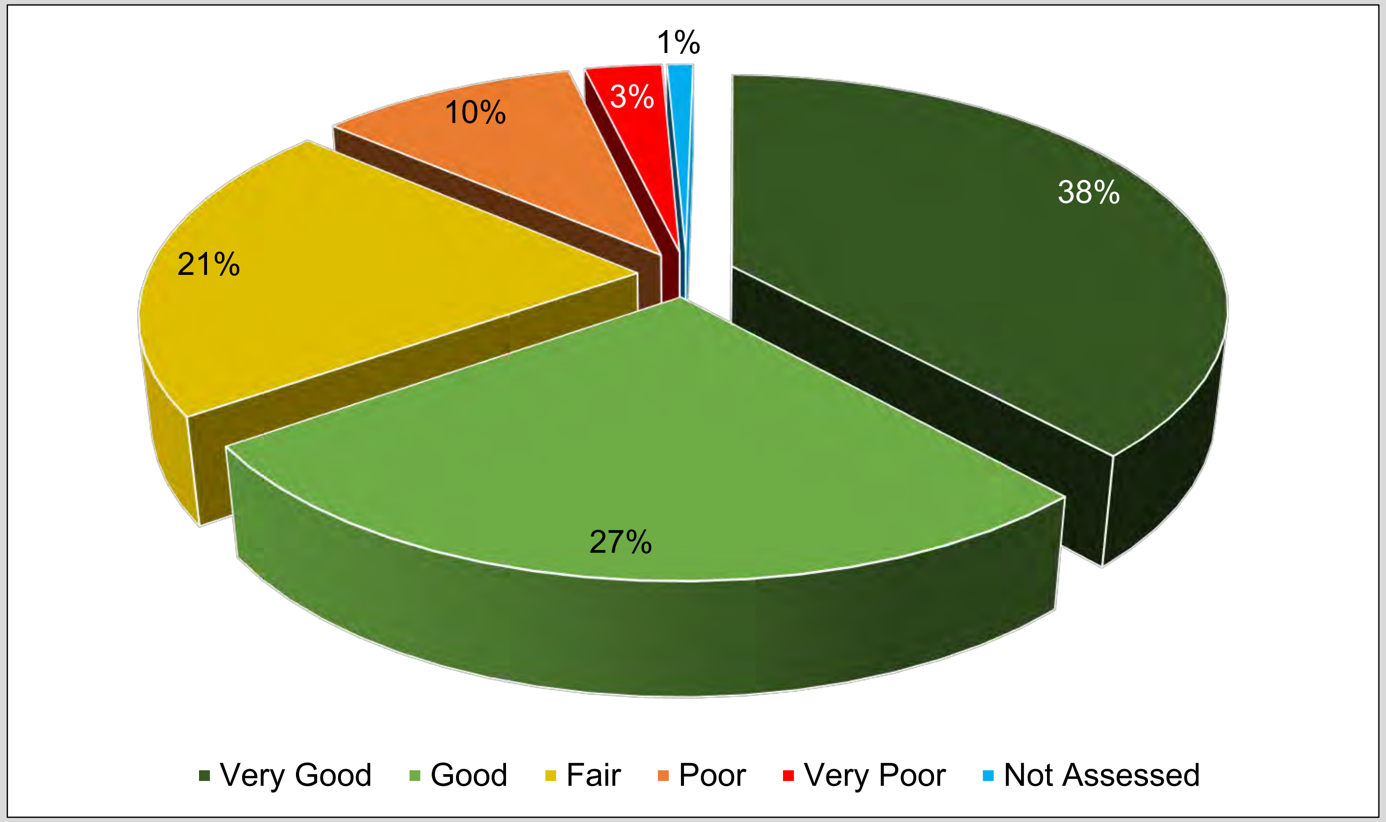


Figure 1.2 City of London Overall Condition

CONDITION

Figure 1.2 summarizes the overall condition distribution of the City assets, rated as **Good.** Good condition indicates that the infrastructure is adequate for now with some elements showing general signs of deterioration that require attention. The assets that are of concern to the City are the smaller fraction of assets listed in Poor or Very Poor condition. These are the assets that are approaching the end of their useful lives. They may still be functioning but at a questionable level of service and the City needs to be prepared to respond to failures or proactively address them before they fail. This reflects an area in need of investment.

This report uses a combination of methods to determine the asset conditions presented. Some assets undergo routine formal condition assessments while for some assets, condition information is based on the age and expected useful life of the asset.

1.4 LEVELS OF SERVICE

QUANTIFYING LEVELS OF SERVICE

The CAM Plan quantifies the levels of service provided by infrastructure systems through a series of performance metrics for each service grouping. Levels of service (LOS) tables for each service grouping are developed and maintained through discussions with staff in all service areas that support the provision of the respective service(s). The structure of all the LOS tables is the same for each service grouping. Major components of the tables are: identifying customer values, corporate LOS objectives, customer/Council focused performance measures, and technical focused performance measures. The LOS measures are established through discussions with staff and also include mandatory metrics that are prescribed by O.Reg 588/17. LOS metrics are split between foundational and advanced metrics.

Customer and technical performance measures include both the current performance, as well as a proposed future performance target, as listed in Figure 1.3.

Figure 1.3 Level of Service Target Legend

Victoria Park – London Downtown

1.5 ASSET LIFECYCLE MANAGEMENT STRATEGY

ASSET LIFECYCLE ACTIVITIES

The asset lifecycle management activities are the range of actions funded through the operating or capital budget that are practiced on the asset category. Asset lifecycle activities are generally grouped into the categories as shown in Table 1.4. Each service area section also documents the risks associated with each lifecycle activity.

Table 1.4 Typical Asset Lifecycle Activities

Lifecycle Activity	Description	Examples
Non-Infrastructure	Actions or policies that can lower costs or extend asset life	Better integrated infrastructure planning and land use planning, demand management, process optimization, managed failures
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events	Sewer spot repairs, fixing potholes
Replacement		
Disposal		Salvage of equipment
Growth/Service Improvement	Planned activities required to extend services to previously unserviced areas - or expand services to meet growth demands	New recreation centre to service new subdivision

ASSET LIFECYCLE MANAGEMENT STRATEGY

The asset lifecycle management strategy is the set of planned actions (i.e. operate, maintain, rehabilitate or replace) that will enable the assets to provide the desired levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost. Each section of the CAM Plan:

1. Describes the asset lifecycle activities applied to the asset category;
2. Establishes the condition profile expected from the current budget and the expected impact on LOS metrics; and
3. Establishes the optimal budget to achieve the ideal condition profile to maintain the current LOS.

Examples of these condition profiles are provided below:

Figure 1.4 Example Projected 20-year Current Budget Condition Profile

1 Very Good
2 Good
3 Fair
4 Poor
5 Very Poor

Figure 1.5 Example Projected 20-year Budget Optimum Condition Profile

1.6 INFRASTRUCTURE GAP

The City of London currently invests in the renewal of its infrastructure through capital budget projects. This report measures the difference between what we plan to invest through the 2018 annual Budget update and what we need to invest in order to sustain the services delivered using infrastructure to the defined LOS. The applicable Capital Asset Renewal & Replacement Reserve Funds are analyzed to determine what reserve funds may have availability to reduce the infrastructure gap.

Figures 1.6 and 1.7 show the optimal expenditures compared to expected budget and additional reserve fund availability, and the resulting infrastructure gap. It is split between Property Tax-based assets and Water and Wastewater assets. The gap breakdown is then represented by Program Area. Figure 1.8 illustrates the difference between current spending plans and investments required in our infrastructure. It also forecasts the infrastructure gap over the 10 years of analysis should the City maintain its current spending plans.

*Amounts subject to rounding.

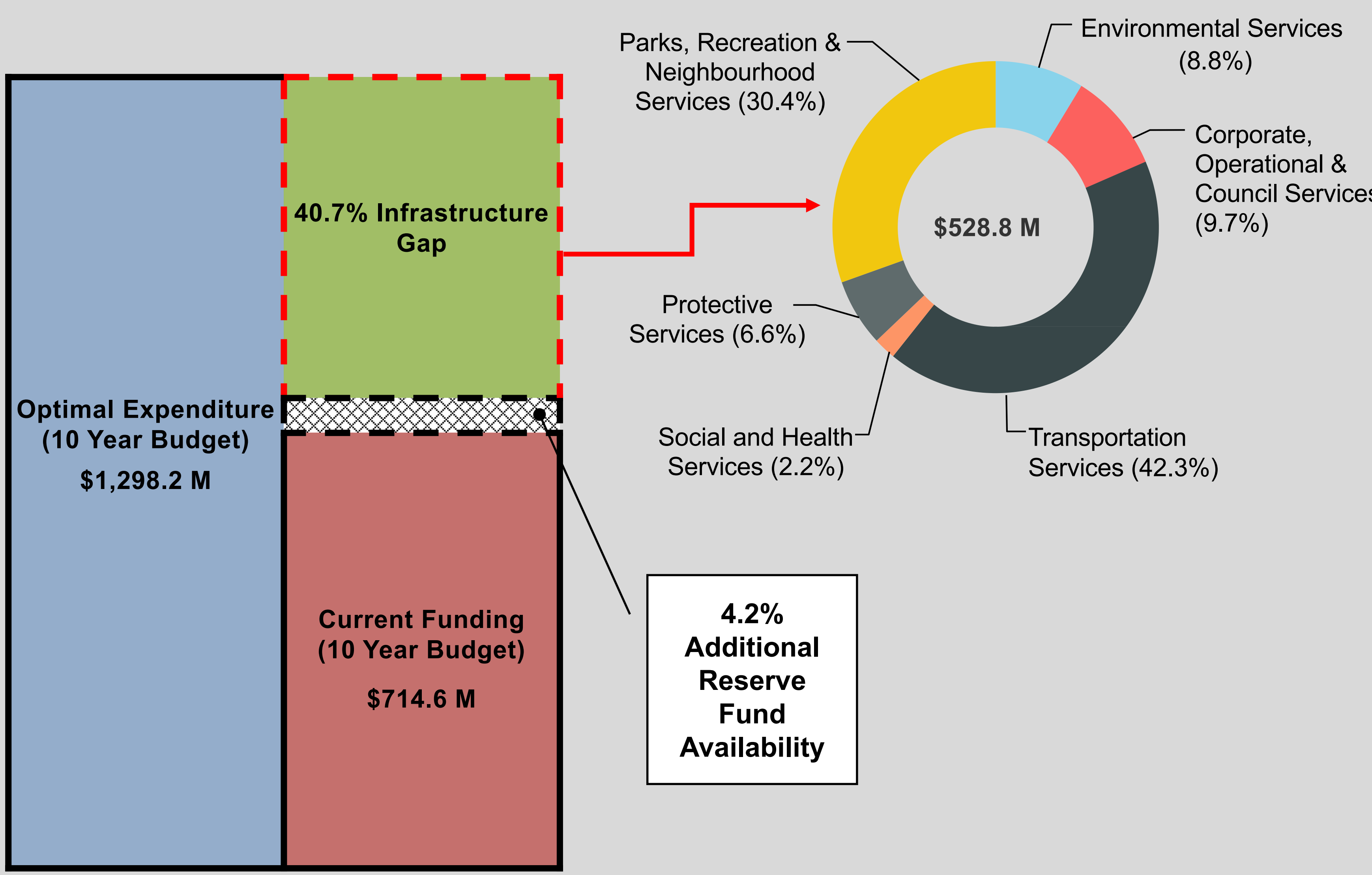


Figure 1.6 Infrastructure Gap Visual (Property Tax-based Assets)

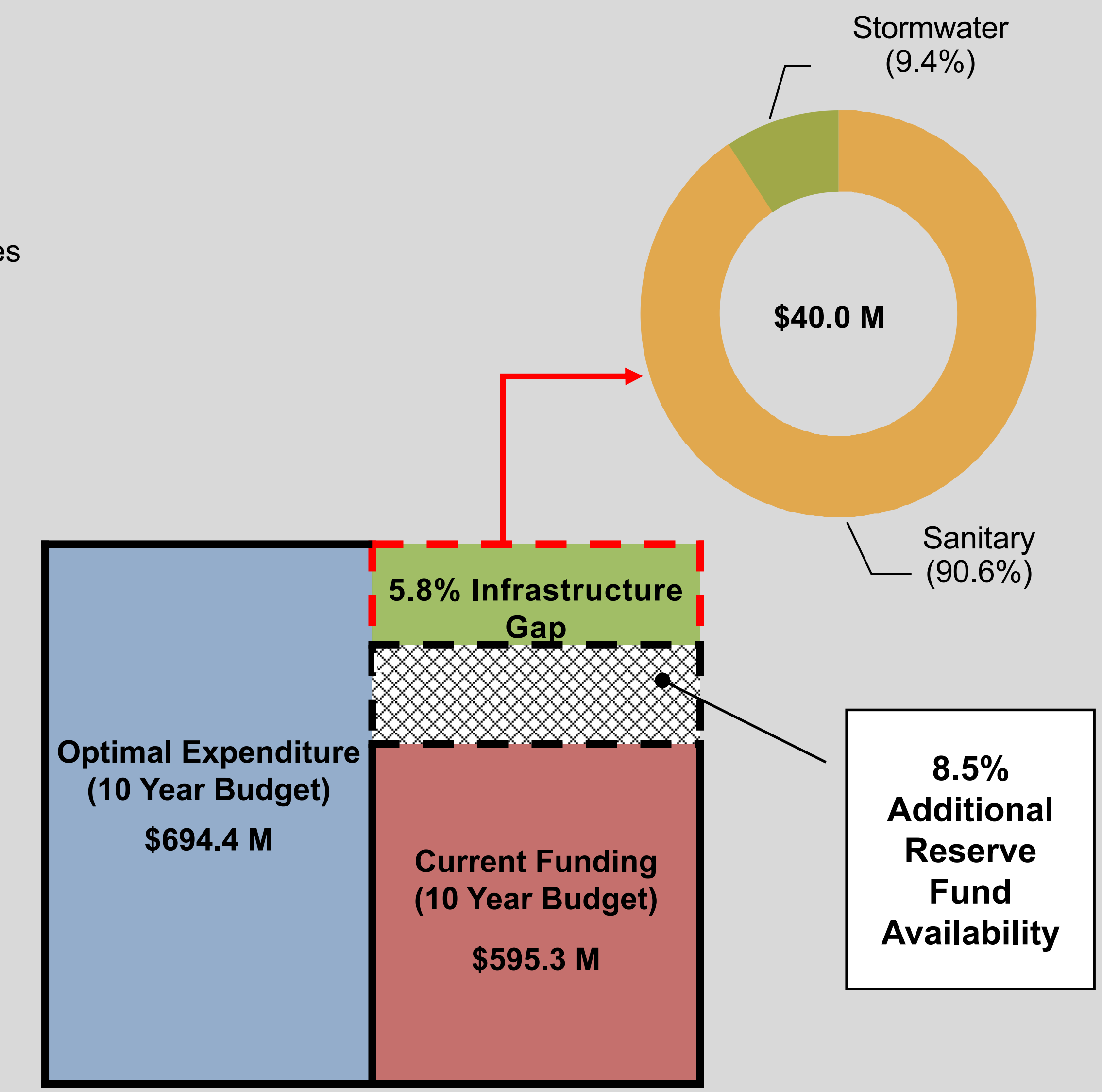


Figure 1.7 Infrastructure Gap Visual (Water and Wastewater based Assets)

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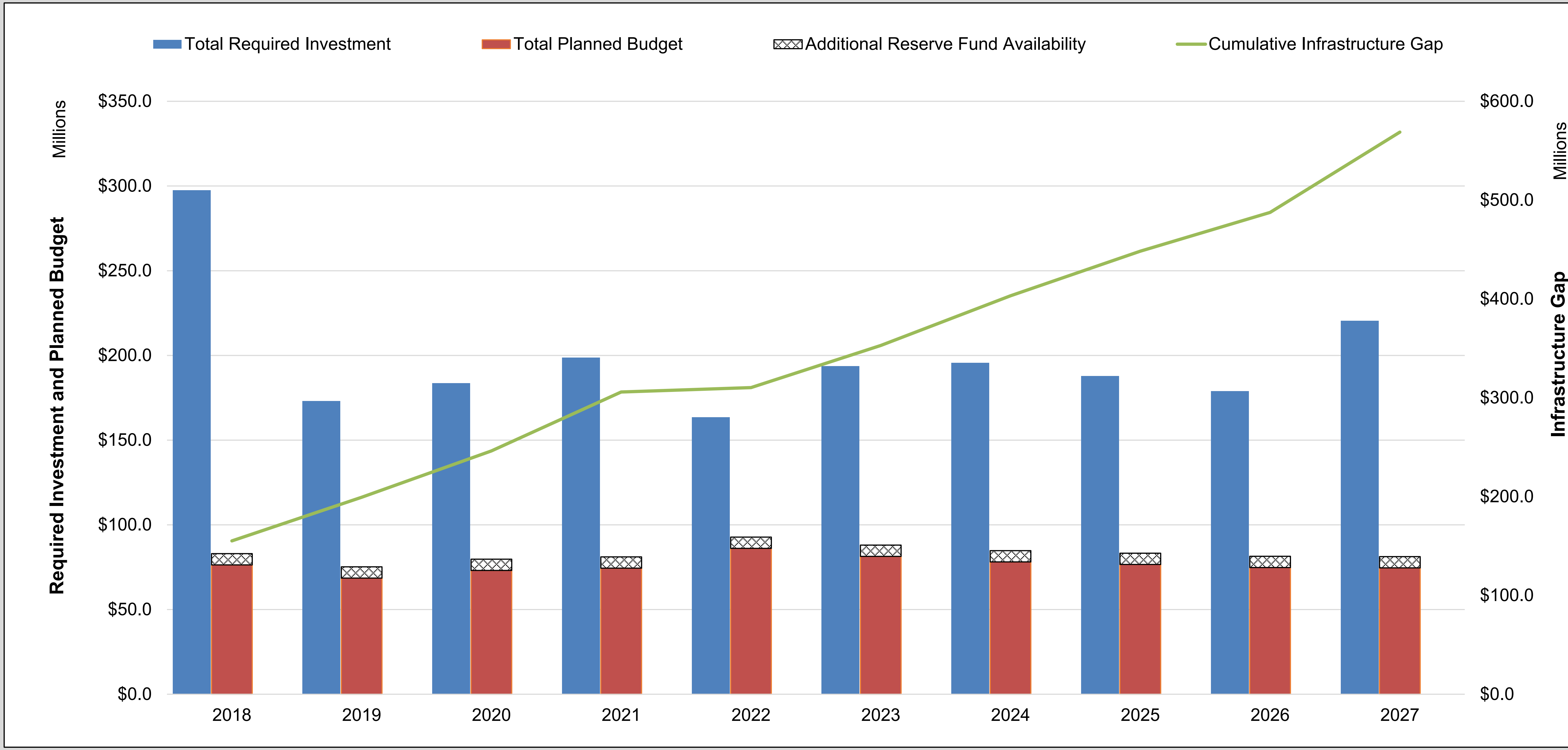


Figure 1.8 Cumulative 10 year Infrastructure Gap (All Assets in Scope of the CAM Plan)

The current infrastructure gap is projected to significantly increase over the next 10 years; indicating that planned investment in asset lifecycle initiatives does not address the needs of London's infrastructure. In this environment asset failures can be expected to increase along with a corresponding drop in the levels of satisfaction with services.

This plan is intended to suggest actions are in place to manage the infrastructure to provide acceptable levels of service. This is a complex activity without any single solution. However, collectively the actions of the City are expected to address the growing gap. The following highlights the major contributors to the gap.

Section 1: Executive Summary

Table 1.6 shows that the largest infrastructure gap amounts are associated with areas having the highest replacement values such as Transportation Services. However, the results are not intended to suggest service areas with higher replacement value should have their needs prioritized over the needs of any other group. Rather, the City should maintain all of its assets in a condition that supports service delivery. It does not reflect the importance of any service(s) over another to the City as a whole. All services have critical elements. Furthermore, there is an interconnectedness in the system where failure of a service can impact another. For example, a sink hole has the potential to affect road, water, sewer, IT and traffic assets. Deterioration of any of the assets within the City's asset network has potential to affect the performance of other assets and ultimately the services delivered.

Table 1.5 breaks down the infrastructure gap into three categories by magnitude of the funding gap per service(s):

- Major - Greater than $30 Million in the next 10 years are determined;
- Minor – Between $7.5 and $30 Million in the next 10 years are determined;
- Non-Contributors – Less than $7.5 million in the next 10 years are determined.

Table 1.5 Infrastructure Gap Contributors

Category	Contribution to the Infrastructure Gap	Service(s)
Major Contributors	This group have funding gaps of greater than $30 Million in the next 10 years.	Roads, Structures, Recreation Solid Waste Wastewater (Sanitary) Corporate Facilities Parks
Minor Contributors	This group includes those areas estimated between $7.5 and $30 Million funding gap in the next 10 years.	Fire Traffic Urban Forestry Cultural Facilities Long Term Care
Non Contributors	These areas have less than an estimated $7.5 Million funding gap in the next 10 years.	Corporate Security & Emergency Management Wastewater (Stormwater) Parking Fleet Information Technology Water

Table 1.6 Replacement Value, Current and Cumulative 10 year Infrastructure Gap

Service(s)	Replacement Cost ($000's)	Current Infrastructure Gap ($000's)	Cumulative 10 Year Infrastructure Gap ($000's)
Roads, Structures, & Traffic	2,468,946	40,039	223,049
Parking	5,579	No Gap	411
Solid Waste	85,004	247	46,544
Parks	187,308	13,882	31,330
Recreation	372,286	52,985	106,478
Urban Forestry	402,114	2,942	22,920
Fire	105,277	5,673	28,484
Long Term Care	64,637	1,822	11,623
Corporate Facilities	244,605	28,310	32,036
Cultural Facilities	91,028	7,396	19,530
Fleet	57,368	3,401	No Gap
Information Technology	38,010	No Gap	No Gap
Land	650,272	N/A	N/A
Corporate Security & Emergency Management	8,812	No Gap	6,364
Subtotal - Property Tax	**4,781,246**	**156,697**	**528,769**
Water	5,868,709	4,117	No Gap
Sanitary	5,047,641	7,178	36,280
Stormwater	4,408,474	No Gap	3,746
Subtotal - Water, and Wastewater	**15,324,824**	**11,295**	**40,026**
Total Property Tax, Water, and Wastewater	**20,106,070**	**167,992**	**568,795**

Section 1: Executive Summary

Infrastructure Gap Overview by Program Area

Figure 1.9 outlines the infrastructure gap by Program Area. There are stories behind the infrastructure gap, or lack of infrastructure gap, in each service area. Figures 1.9* to 1.16* discusses some of the key background elements behind the results.

*Amounts subject to rounding.

Transportation Services Gap

Major Contributors	Minor Contributors	Non-Contributors
Roadways $159.7 Million	Traffic $24.9 Million	Parking $0.4 Million
Structures $38.5 Million		

This area has some of the strongest asset management tools and practices in the City which are used to meet the legislated and regulated Minimum Maintenance Standards for inspection. However this is also the service area with the highest infrastructure gap and potentially highest risk of unanticipated failures. The funding Transportation receives has led to an overall decline of infrastructure and a significant accumulation of backlog works. This is in part due to inconsistencies in transfer funding from upper tier governments which strongly influence London's capital programs. This service area does not have a dedicated revenue source such as rates or fees which limits its ability to address sustainability needs.

However, since 2014 a Capital Infrastructure Gap Reserve Fund was established to provide funding to mitigate the City infrastructure gap. This reserve fund provides some funding to Transportation – For example it provided funding for numerous road rehabilitations to upgrade road surfaces and some street lights, parking lot upgrades for lots #'s 1, 2 and 17. This reserve fund is also projected to be used to provide funding for portion of Victoria Bridge capital work. The City will continue to investigate opportunities for increasing funding for Transportation services.

The infrastructure gap in this service will become visible to Londoners through rough roads, potholes, increased vehicle damage claims, reduced road safety, poor pedestrian facilities, lighting and signal failures, bridge load restrictions, closures, and increased operating costs.

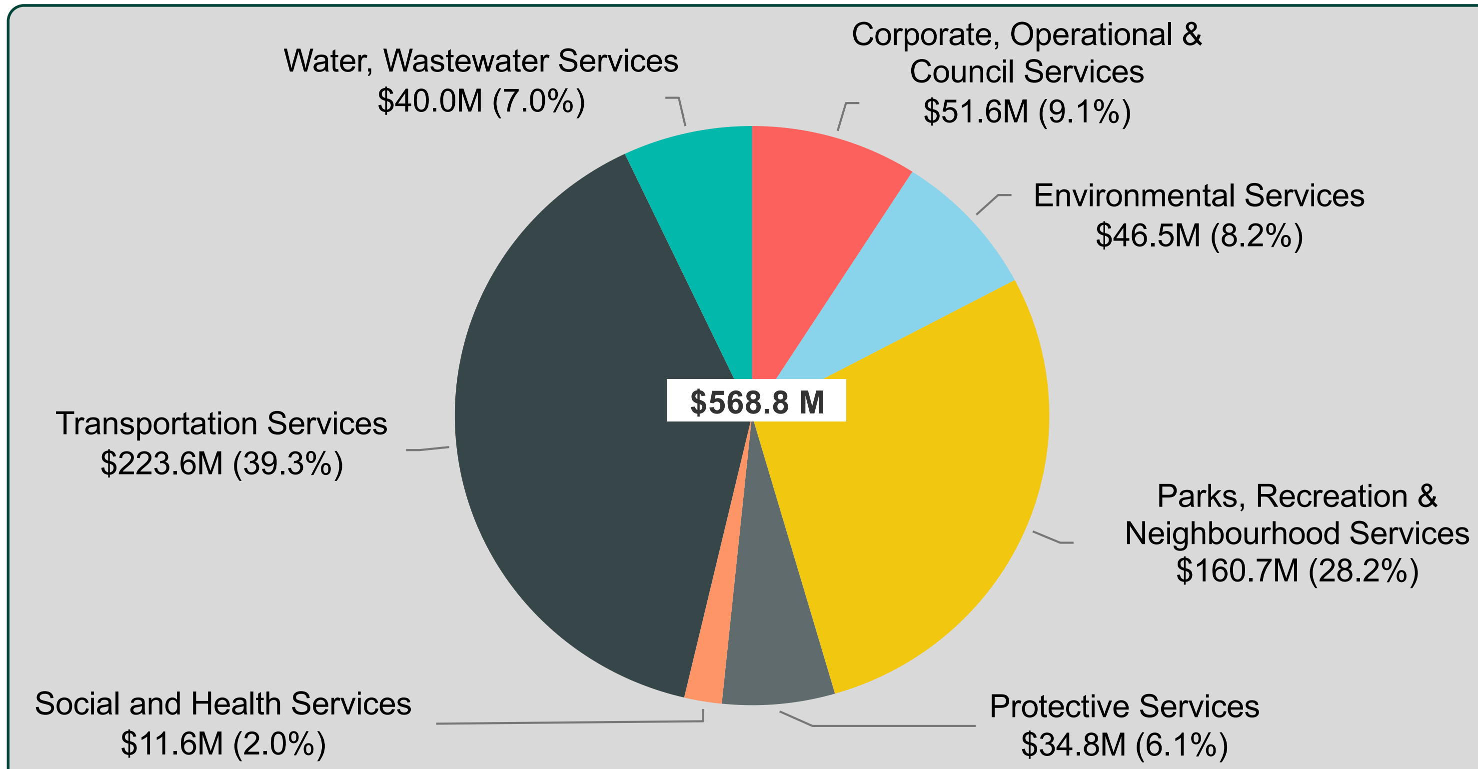


Figure 1.9 Cumulative 10 year Infrastructure Gap by Program Area

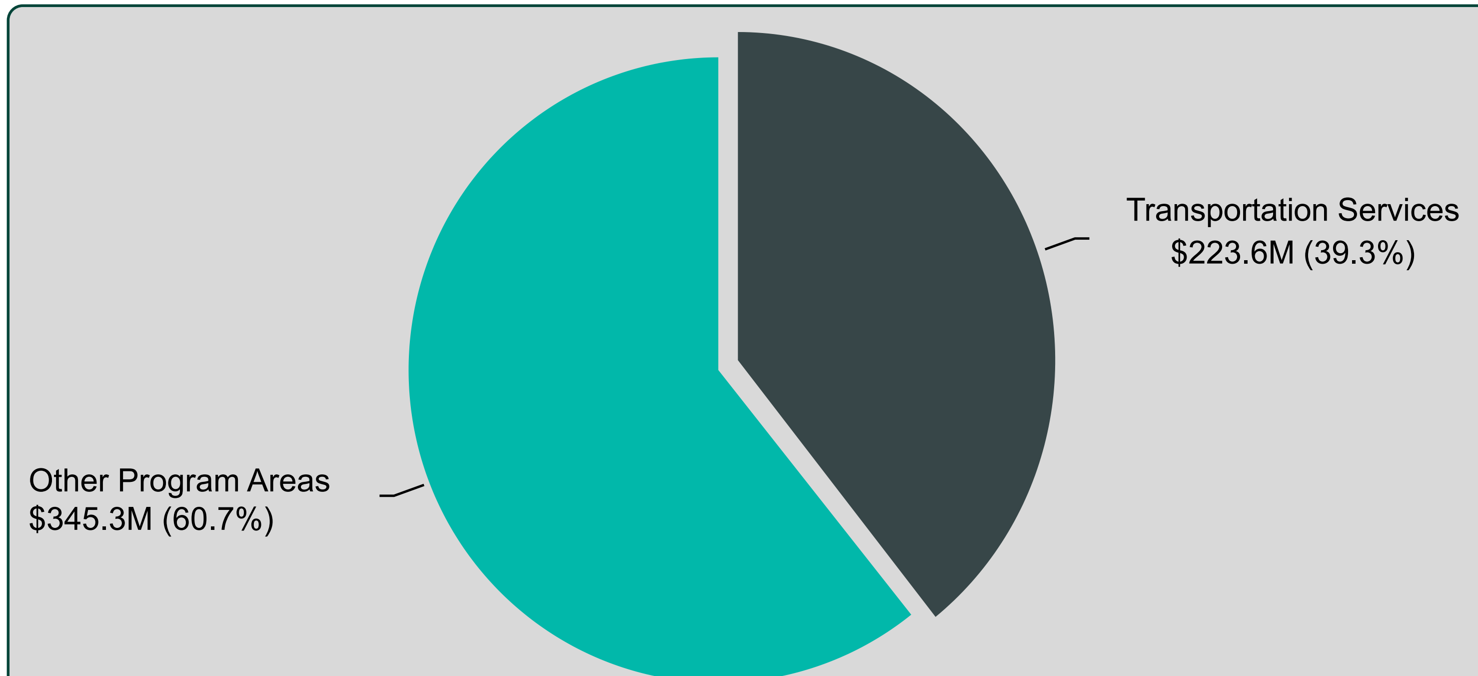


Figure 1.10 Cumulative 10 year Infrastructure Gap (Transportation Services)

Parks, Recreation & Neighbourhood Services Gap

Major Contributors

Recreation Services - $106.5 Million

Parks - $31.3 Million

Minor Contributors

Urban Forestry - $22.9 Million

Parks, Recreation & Neighbourhood Services assets in this report consist of facilities, multi-use pathways, parks (including their amenities) and trees (street trees, trees in manicured parks, and woodland trees). Management of the facility assets falls to the Facilities Division, who base their sound asset management decisions by skilled staff using regular facility audits and a database of facility information and inspections.

The infrastructure gap for Recreation is primarily driven by the future investment requirements of aquatics, arenas, community centres, and Storybook Gardens facilities.

The Parks infrastructure gap is primarily driven by the requirements projected in the multi-use pathway system and numerous categories of park amenities. There is a projected annual shortfall of $2 Million for capital maintenance and renewal of the Thames Valley Parkway, multi-use pathway system and park amenities based on replacement value and estimated useful life.

The infrastructure gap in these services will impact Londoners through localized reductions to service, global service reductions such as fewer parks per capita, visual signs of deterioration, potential closures of amenities, high maintenance costs, reduced operating hours, etc. For trees, the infrastructure gap manifests itself in increased insect and disease damage, increased tree related damage, and a reduction to the number of trees along with the benefits they provide for air and water quality, habitat, and recreational uses. Ultimately the Parks, Recreation & Neighbourhood Services infrastructure gap leads to reduced quality of life and less recreation opportunities for the public.

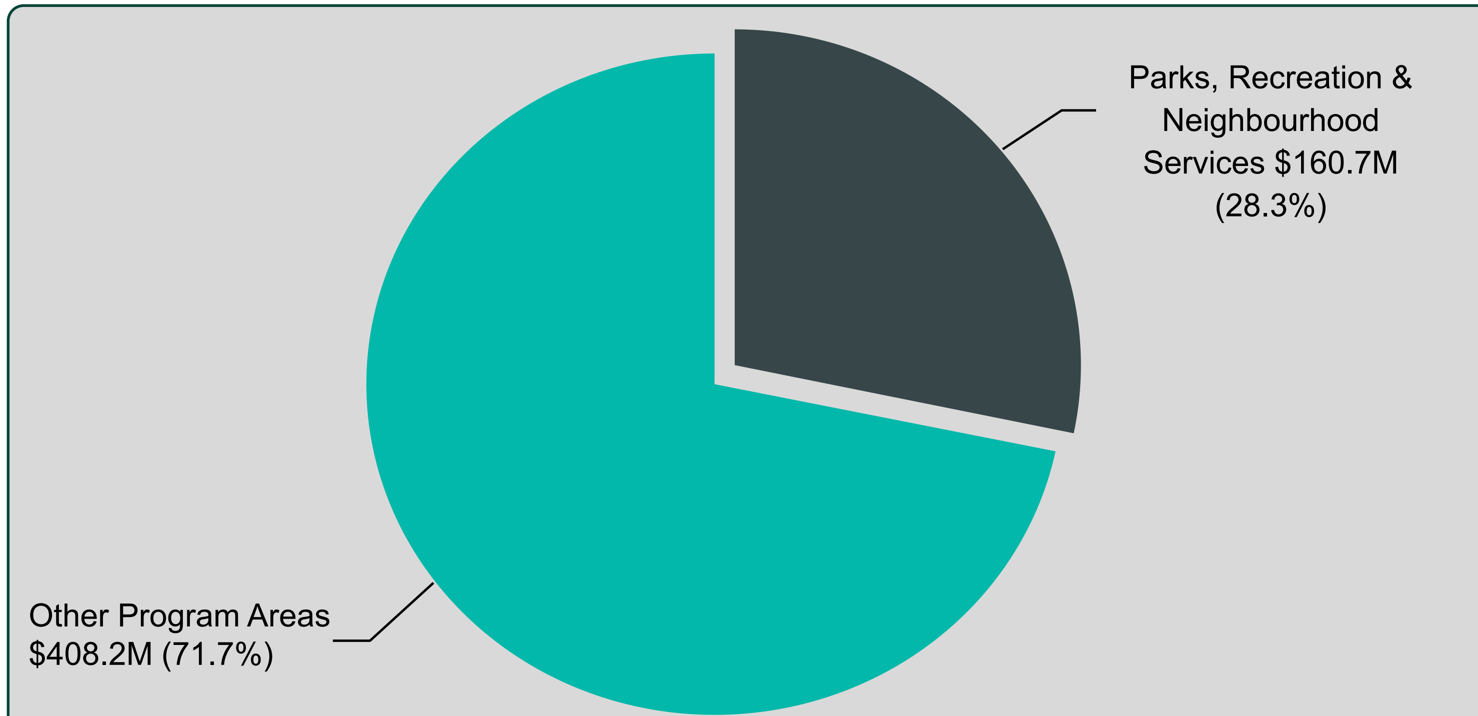


Figure 1.11 Cumulative 10 year Infrastructure Gap (Parks, Recreation & Neighbourhood Services)

Environmental Services Gap

Major Contributor

Solid Waste - $46.5 Million

Environmental Services assets in this report include the W12A landfill, closed landfills, Material Recovery Facility, transfer stations, and facilities. Solid Waste has prudent saving strategies via reserve funds, but the expected Resource Recovery Facility construction (with a construction date approximately in 2027-2029) to meet provincial diversion targets to commence in 2025 drives Solid Waste's infrastructure gap. This infrastructure gap will impact Londoners through increased risk to public health.

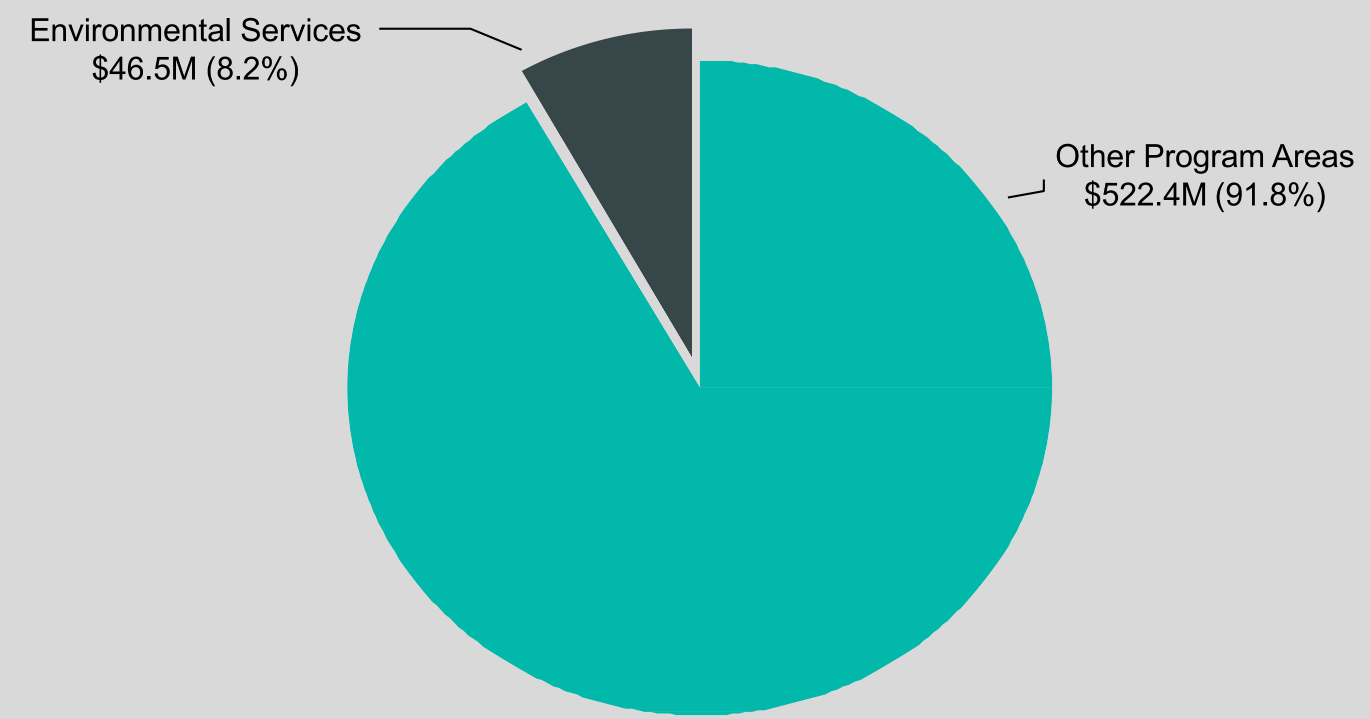


Figure 1.12 Cumulative 10 year Infrastructure Gap (Environmental Services)

Section 1: Executive Summary

Water, Wastewater Services Gap

Major Contributor

Wastewater – Sanitary - $36.28 Million

Non-Contributor

Wastewater – Stormwater - $3.75 Million

Water – No Gap Identified

Water infrastructure consists of pipe conveyance, pumping facilities, storage reservoirs, bulkwater stations, and wells (undergoing a decommissioning process).

Wastewater - Sanitary infrastructure consists of pipe conveyance networks and treatment / pumping facilities. Wastewater sanitary infrastructure gap is facilities-driven – pumping stations and treatment facilities.

Wastewater – Sanitary infrastructure gap is primarily driven by needs in the wastewater treatment plants. This infrastructure gap will impact Londoners through localized reductions to service including potential reductions in public safety, increased break frequency, sewer backups, service outages, increased maintenance costs, etc. This area receives its revenue primarily through utility rates.

Wastewater – Stormwater infrastructure consists of pipe conveyance networks and management assets (primarily stormwater ponds and open conveyance drains, channels, and dykes). Wastewater stormwater infrastructure gap is primarily Management Facilities driven. This infrastructure gap will impact Londoners through localized reductions to service including potential reductions in public safety.

Water has no expected infrastructure gap over the 10 year period of analysis.

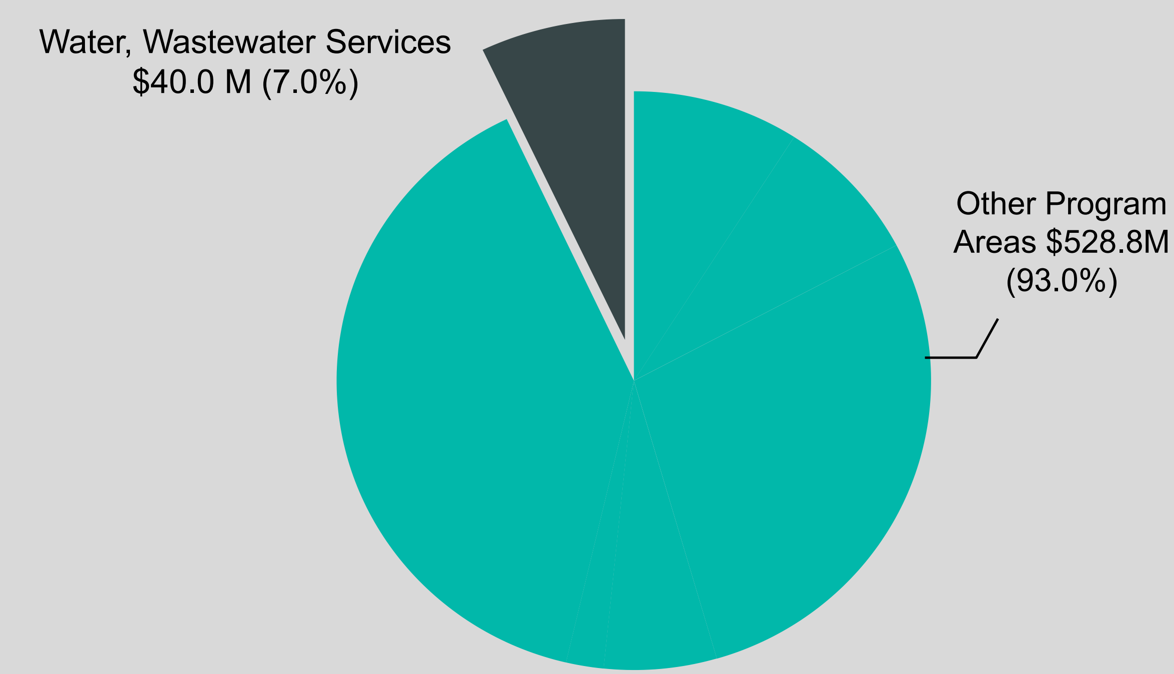


Figure 1.13 Cumulative 10 year Infrastructure Gap (Water, Wastewater Services)

Social and Health Services Gap

Minor Contributor

Long Term Care - $11.6 Million

Social and Health Services assets in this report include Long Term Care (Dearness Home). The infrastructure gap is approximately 70% driven by the lifecycle renewal needs of this facility. The remainder of the infrastructure gap relates to equipment required to provide services to Dearness Home residents. Failure to address the Social and Health Services infrastructure gap will, in the long term, impact the quality of life for the residents at the Dearness Home; potentially resulting in the City failing to comply with regulations.

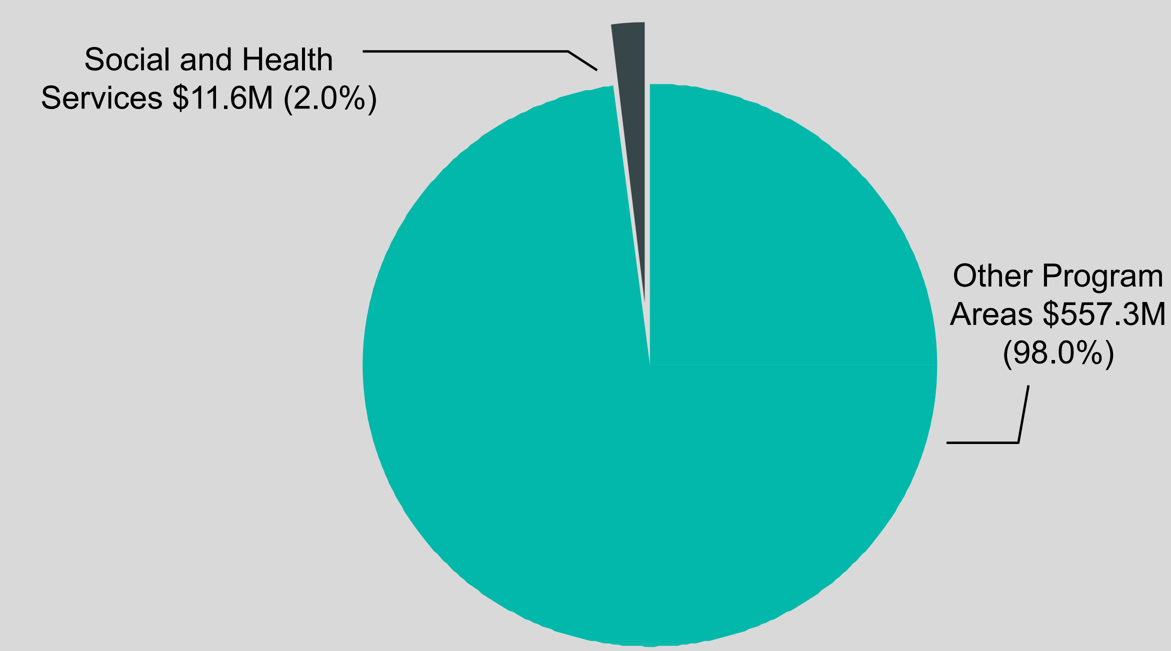


Figure 1.14 Cumulative 10 year Infrastructure Gap (Social and Health Services)

Corporate, Operational & Council Services Gap

Major Contributor

Corporate Facilities - $32.0 Million

Minor Contributor

Cultural Facilities - $19.5 Million

Non-Contributor

Fleet – No Gap Identified

Information Technology – No Gap Identified

Land – No Gap Identified

The Corporate Facilities infrastructure gap is primarily driven by the future investment requirements of Civic Administrative facilities (for example City Hall) and Operations facilities (examples include AJ Tyler, Oxford, Adelaide, and Exeter Operations Centres). Management of these facility assets falls to the Facilities Division.

The Cultural Facilities infrastructure gap is driven by conservation of Heritage assets and municipal owned heritage buildings and Centennial Hall.

Fleet has no expected infrastructure gap over the 10 year period of analysis. It is noted that fleet's reserve fund, its sole source of financing, is experiencing reserve fund contributions less than expenditures and will result in a depleted reserve fund. If the internal rate transfer system is not updated an infrastructure gap could occur in 2029.

Information Technology has no expected infrastructure gap over the 10 year period of analysis. Land's infrastructure gap is considered none or not assessed – the land on which assets are used does not lend to the asset management methodology of renewal/replacing assets.

Allowing the Corporate, Operational & Council Services infrastructure gap to grow will result in localized reductions to service including increased maintenance costs, localized closures, relocations, inconvenience to staff, operational inefficiencies, inability to adapt to changing technology, decreased productivity, loss of data and communications, decreased quality of life for London residents, etc.

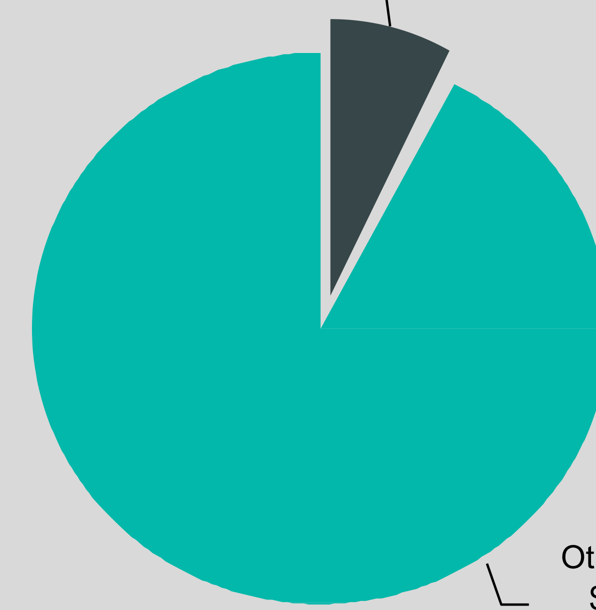


Figure 1.15 Cumulative 10 year Infrastructure Gap (Corporate, Operational & Council Services)

Protective Services Gap

Minor Contributor

Fire - $28.5 Million

Non-Contributor

Corporate Security & Emergency Management - $6.4 Million

Protective Services assets in this report include fire stations, light & heavy vehicles and equipment, and emergency and security communication equipment.

Fire's infrastructure gap is approximately one-half related to Fire Stations and Facilities - Management of the facility assets falls to the Facilities Division. Approximately one-third of Fire's infrastructure gap relates to non-emergency vehicles and equipment, with the remainder to Front Line Vehicles.

Corporate Security & Emergency Management's infrastructure gap primarily relates to building two communication towers in 2024 to maintain the level of service provided.

This infrastructure gap will impact Londoners through increased risk to public safety.

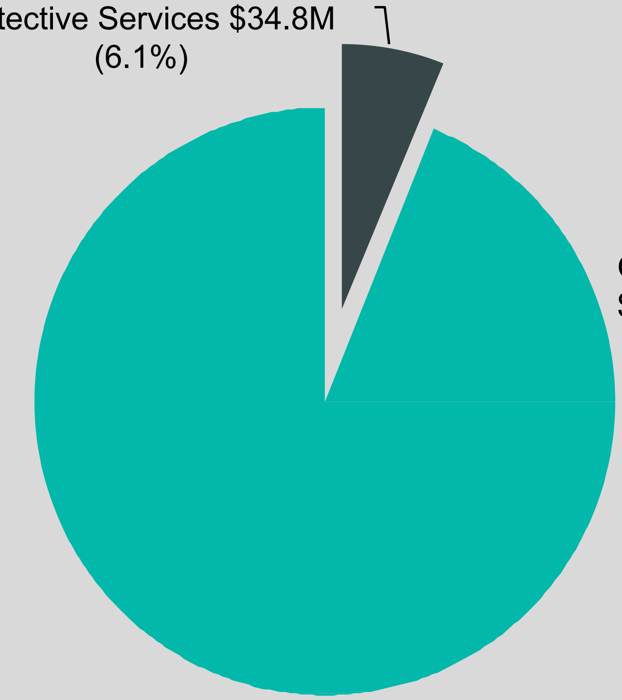


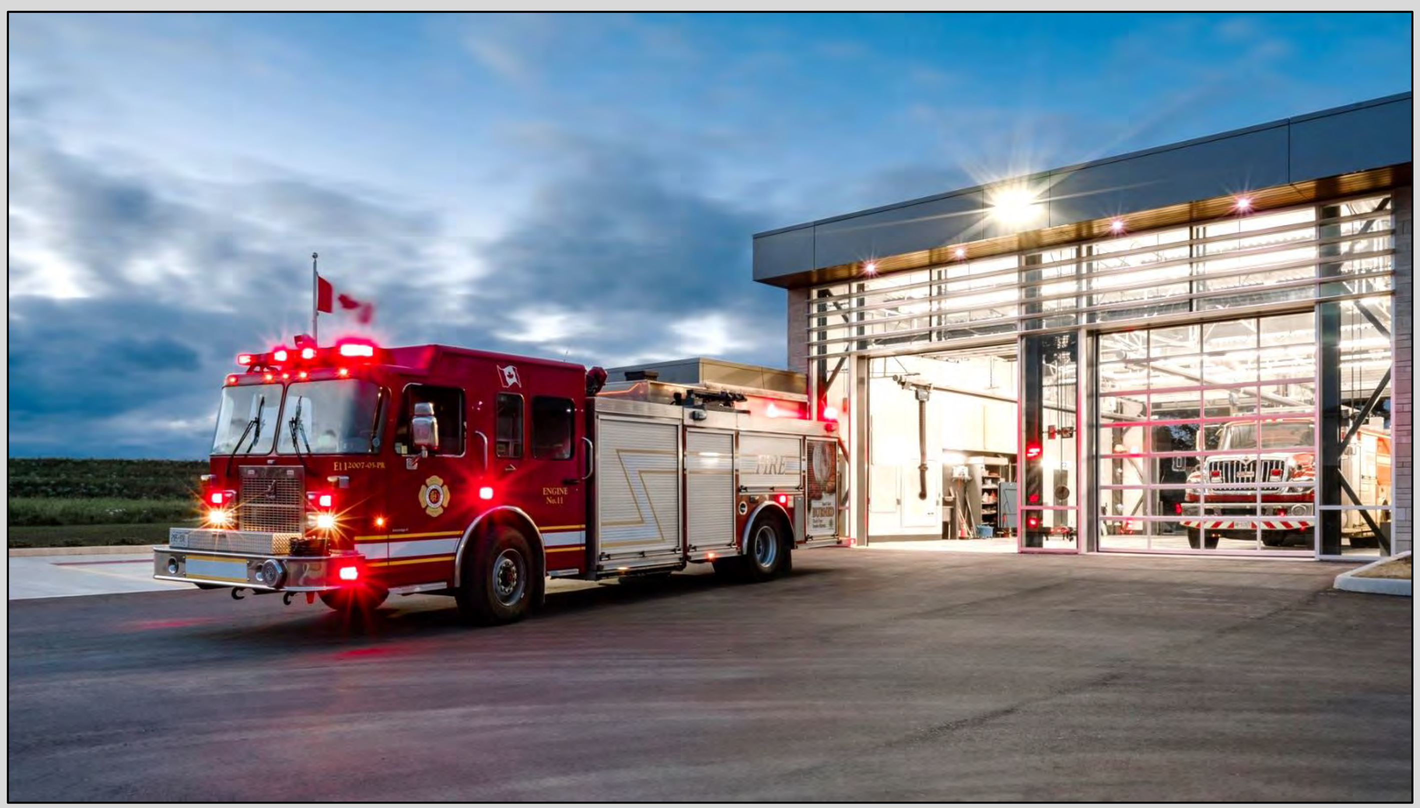
Figure 1.16 Cumulative 10 year Infrastructure Gap (Protective Services)

Section 1: Executive Summary

CURRENT AND RECOMMENDED ANNUAL REINVESTMENT RATES

Table 1.7 highlights the current annual reinvestment rate a service is expected to spend over the ten year period of analysis. It is compared to the recommended annual reinvestment rate. The recommended annual reinvestment rate is based on two sources:

- The 2016 Canadian Infrastructure Report Card* lists reinvestment rates for Core Assets (Water, Wastewater, Stormwater, Roads, Bridges) and Buildings/Facilities. It provides guidance for approximately 90% (weighted by replacement value) of City assets; and
- The expected useful life of an asset, and the implied annual average amount that should be spent on the asset. For example, an asset with a 10 year life should, on an annual average basis, have 10% of its replacement value spent on asset renewal or replacement. It is noted this average annual amount is not always practical – for example, a roof is replaced at once, not over an average annual period. However, these rates provide insight and assist decision making if sufficient infrastructure spending is occurring.



Fire Station # 11 – Savoy Street

* http://canadianinfrastructure.ca/en/index.html

Table 1.7 Current and Recommended Annual Reinvestment Rates

Program Area	Service	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Water, Wastewater Services	Water	0.5%	1.0%
	Sanitary	0.3%	1.4%
	Stormwater	0.3%	1.0%
Transportation Services	Roads, Structures, & Traffic	1.7%	2.7%
	Parking	2.8%	2.1%
Environmental Services	Solid Waste	1.9%	2.4%
Parks, Recreation & Neighbourhood Services	Parks	2.6%	4.1%
	Recreation	1.2%	2.5%
	Urban Forestry	0.5%	2.3%
Protective Services	Corporate Security & Emergency Management	8.1%	7.7%
	Fire	2.8%	3.4%
Social and Health Services	Long Term Care	0.7%	2.6%
Corporate, Operational & Council Services	Corporate Facilities	1.0%	2.5%
	Cultural Facilities	1.0%	2.1%
	Fleet	9.2%	10.2%
	Information Technology	6.3%	6.3%
	Land	Not Assessed	Not Assessed

1.8 FINANCING STRATEGIES FOR INFRASTRUCTURE GAP

FINANCING STRATEGY

The Financing Strategy section of the Plan starts by summarizing the infrastructure financing strategy components followed by providing a financial overview as a precursor and context to the options for addressing the infrastructure funding gap that has been identified in each service area in order to achieve the identified current asset-related levels of service. The Financing Strategy section is perhaps the most important element of the Plan as it provides the approach to funding the needs of the asset base to achieve service delivery goals.

The current gap is identified at $168.0 million and projected to grow to $568.8 million by 2027. The plan assumes that the gap can be divided between property tax supported budgets and utility rate supported budgets. It assumes that updating the water & wastewater 20 year financial plans for the utilities will address the Sanitary and Stormwater infrastructure gap ($40.0 million). This lowers the projected amount that needs to be addressed in 10 years to $528.8 million. Any funding to reduce this remaining infrastructure gap and sustain existing services will be additional to the current revenues projected by the City.

Municipal revenue can come from property tax, government transfers, user fees or debt. The Plan provide various options to either eliminate or mitigate the infrastructure funding gap. Realizing that faster tax rate increases have a larger impact on the affordability of municipal taxation on the community. Considering the impracticality and unaffordability to completely eliminate the gap in this time period, the Plan provide options to mitigate the growth of the gap over the next 10, 25 ,50 & 75 Years. This provides Municipal Council with various options to help mitigate the gap while keeping tax increases at lower pace. Table 1.8 identifies the recommended years at which the annual funding gap is mitigated for four different revenue increase alternatives (assumed to begin in 2020) for the property tax budgets. It illustrates the differing infrastructure levy (or property tax increases) that would occur if the City decided to mitigate the growth of the Cumulative 10 year gap and finance 80% of the gap.

Table 1.8 Financial Sustainability Property Tax Based Funding Gap (80% City Finance)

Year when Financial Sustainability Occurs	Annual Infrastructure Levy
	Mitigate Cumulative 10 year Gap (80% City Financed)
2029 (Year 10)	**0.72%**
2044 (Year 25)	**0.33%**
2069 (Year 50)	**0.22%**
2094 (Year 75)	**0.18%**

The Plan suggests that the preferred choice is to anticipate 20% of the funding required will be sourced outside of a tax increase, while the other 80% will need to be sourced in the form of property tax increases. The plan suggest that the City should target financial sustainability between 10 years to 25 years, which could result in incremental tax increases between 0.72% to 0.33% respectively.

Municipal Council included strategies in its 2015-2019 Strategic Plan to achieve 'Robust Infrastructure' and 'Proactive Financial Management'. These strategies included managing the City's infrastructure gap and making sure the City's finances were well planned to prevent burdening future rate payers. It led to the creation of the Capital Infrastructure Gap Reserve Fund through the City's 2016-2019 Multi-Year Budget (MYB). Council has also approved the "Surplus/Deficit Policy" and "Assessment Growth Policy" that contribute one-time funding to the Capital Infrastructure Gap Reserve Fund. This actions aligns with the Province of Ontario's goals as outlined in O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure.

Figure 1.17 illustrates the projected 2014 CAM Plan infrastructure gap versus the 2019 CAM Plan infrastructure gap curve due to the adopted infrastructure gap mitigation strategies. The 2016-2019 MYB strategies to mitigate the 2014 CAM Plan projected infrastructure gap had a major contribution to the reduction of the actual assessed gap in the 2019 CAM Plan.

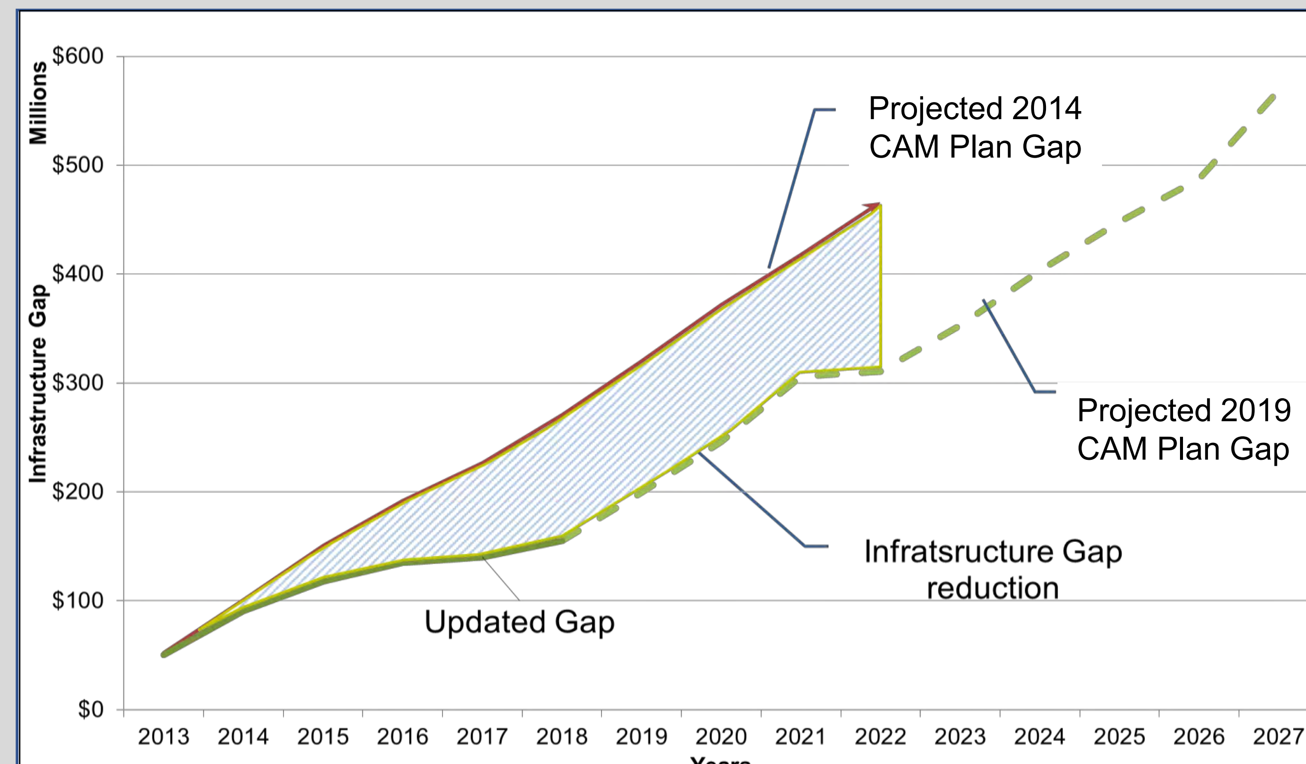


Figure 1.17 Projected 2014 CAM Plan vs 2019 CAM Plan Infrastructure Gap

1.9 RECOMMENDATIONS AND CONCLUSIONS

The following recommendations will ensure that the CAM Plan continues to help the City manage its $20.1 billion asset portfolio to provide sustainable service delivery to its citizens and keep compliant with the Ontario Regulations of Asset Management Planning. The key recommendations of the Plan are as follows:

1. **Continue to align the Corporate Asset Management Plan with the Corporate Strategic Plan:** 2019 CAM Plan is a reflection of best practices currently in place and has been developed to support proactive management of the Corporation's infrastructure to conform to the 2019-2023 Strategic Plan. The City's CAM Office is to continue to align the CAM Plan future updates with all future Strategic Plans.
2. **Continue to advance the Corporate Asset Management Program:** The CAM Program will standardize asset management practices across the corporation, connecting technical asset lifecycle strategies to customer-focused performance measures that quantify the levels of service being provided to the community in each service area.
3. **Enhance the Corporate Asset Management Plan:** The CAM Plan is a living document that will continue to reflect the evolution of asset management practices within the City. Over the next few years, the CAM Office will be working to enhance the CAM Plan and prepare for the next CAM Plan in 2022/2023. This will include working with staff in each service area to:
    - i. Ensure asset inventories are comprehensive and contain accurate condition and performance data.
    - ii. Operationalize advanced performance measures by collecting and analyzing new asset data.
    - iii. Analyze more complex (and more realistic) asset lifecycle strategies to understand the optimal mix of each lifecycle activity to achieve the proposed levels of service at the lowest lifecycle cost.
    - iv. Ensure Compliance with Phase 3 of the Ontario Asset Management Planning Regulatory Requirements. The Provincial Regulation O.Reg. 588/17 has specific requirements for CAM Plans that are phased in from 2018 to 2024. This CAM Plan meets all the requirements through to 2021 & 2023 for directly owned city assets, but some additional content is required by 2024. The City's CAM Office has developed a strategy to enhance the CAM Plan to meet the 2024 requirements, and it is important that the City maintains its commitment to providing the resources necessary to execute the CAM Program.
4. **Monitor the progress of the Corporate Asset Management Plan:** The CAM program will continue to monitor the progress of the CAM Plan and insure alignment with the Corporate Outcomes, Expected Results, and Strategies. As part of the Provincial regulation, the City is required to provide an annual progress review of the CAM Plan. The annual progress review will address the City's progress in implementing the CAM Plan and describe any factors impeding the ability to implement the CAM Plan (with associated strategies to mitigate impeding factors). Annual review of the progress of the CAM Plan, as described above, will enable more robust trending of performance measures over time. This is an important consideration to embed the elements of the CAM Program into 'business as usual' at the City, rather than being seen as a one-off exercise.
5. **Explore opportunities to incorporate the corporate asset management practices to the Boards & Agencies of the City as appropriate**: The CAM Office is planning to conduct an Asset Management maturity assessment for the boards and agencies to come up with the plans on how to incorporate and involve them in the process. The CAM Office recognizes that some boards and agencies will have higher level of Asset Management practices maturity than others in which each one will be dealt with differently.
6. **Engage the Public and Community Partners in the Asset Management Process**: A critical component of public engagement is a commitment to providing public access to as much of the data and evidence used in the CAM Program as feasible, while respecting privacy concerns. There has been previous efforts for public engagement at the City of London, which was done on an ad-hoc basis and to support several decision making processes such as budget priorities or other asset related issues. The CAM Office is planning to leverage existing public consultation initiatives and start encouraging residents, businesses, institutions, and other stakeholders to offer input in the City's asset management planning and the CAM program implementation. Additionally, the CAM Program is to effectively involve various stakeholders in the infrastructure conversation. This engagement is critical to ensuring that the desired levels of service reflect the values and priorities of the community, while balancing affordability and 'willingness to pay' considerations. To date, the CAM Program has effectively engaged with all relevant internal City stakeholders to obtain input into the CAM Plan. The CAM Office is planning to expand the coordination planning for asset management, where municipal infrastructure assets connect or are interrelated with those of our neighbouring municipalities or jointly-owned municipal bodies.

Section 1: Executive Summary

7. **Continue to explore opportunities to address the infrastructure gap through various financial means.** The following recommendations summarizes the key points to mitigate growth of the gap:

    i. Continue to pursue funding from external sources to address the funding gap.

    ii. Consistent with Council 2019-2023 Strategic Plan and the actions taken as part the 2016-2019 Multi-Year Budget - Strategic Investment Business Case #7, the Corporate Asset Management office will submit a business case through the 2020-2023 Multi-Year Budget process. This business case will increase the planned amount currently allocated to the Infrastructure Gap Reserve Fund with an additional amount increased each year. Considering the following criteria when providing an annual incremental tax levy increase:

    - Realizing that faster rate increases have a larger impact on the affordability of Municipal taxation on the community;
    - Mitigating the growth of the Cumulative 10 year gap and financing 80% of the gap option appears to be the preferred option;
    - The City target financial sustainability between **10 years to 25 years**, which could result in incremental tax increase between **0.72%** to **0.33%** correspondingly;
    - This financial sustainability range comes with an associated risk of debt financing costs or an increased risk of reduced services; and
    - The residual risk of the unaddressed infrastructure gap may be tolerable;

    It is then Recommended that the annual incremental tax increase would be at least **0.33%.**

    iii. Update the Water and Wastewater 20 year Financial plans, addressing the infrastructure gap identified in Wastewater. The 2019 Corporate Asset Management Plan relies on those 20 year Financial plans being updated and followed to address infrastructure requirements.

    iv. Where new Property Tax supported tangible capital assets are added to the City's asset base due to growth, the Corporate Asset Management office will submit an Assessment Growth business case (equivalent to the Recommended Annual Reinvestment Rates for the added asset category) to the applicable Capital Asset Renewal & Replacement Reserve Fund to ensure that the asset(s) going forward will have a funding source available in the future to replace or to incur major lifecycle repairs.

    v. Similarly for any Service Improvement business cases that will enhance or add new tangible capital asset, that the Corporate Asset Management office identify an additional contribution (based on the Recommended Annual Reinvestment Rates for the added asset category) to the applicable Capital Asset Renewal & Replacement Reserve Fund to ensure that the asset(s) going forward will have a funding source available in the future.

    vi. Continue to utilize one time funding made available through the application of the Surplus/ Deficit Policy and Assessment Growth Policy to reducing the infrastructure gap backlog.

Flexible Street – Dundas Street

Section 1: Executive Summary

CONCLUSION

There are no easy solutions to how the entire system works together to achieve an optimal delivery of services. Additional efforts are required to address the infrastructure gaps beyond what is currently planned. These efforts could include additional funding, level of service changes, etc. The City is developing a Corporate Asset Management Program that is making progress towards optimizing asset management practises in London. This document will guide efforts of the City to address the needs of our infrastructure.

As common terminology the word 'gap' is used in multiple contexts. A popular use that has been reported elsewhere by the City refers to total funding required to address operating and maintenance expenses as well as capital requirements. These funding requirements are used to develop budget projections. The infrastructure gap reported here deals strictly with current infrastructure assets but the information can be used to help support overall financial planning.

The concern over an infrastructure gap is not so much that it exists. In fact, maintaining a controlled "gap" is likely indicative of prudent financial management. A balance must exist between the amount of preventative and reactive measures used to address infrastructure concerns and how much risk of asset failure is tolerable.

At the time of this writing, in Canada, there is no standard or guidance to evaluate what is, or is not, an acceptable municipal infrastructure gap. In London's situation a $168 Million infrastructure gap compared to a $20.1 Billion asset base could be considered well managed. The City of London is widely regarded for its water quality, recreation facilities, network of parks, etc. Not to be overlooked the City of London has also received a Aaa credit rating since 1977; an illustration of its prudent financial management practices. The concern with the analysis presented in this report is that the current infrastructure gap is projected to increase over the next 10 years; indicating that projected investment in asset lifecycle initiatives does not sufficiently address the needs of our current infrastructure.

This report is presented from a conservative perspective. It does not forecast growth, service improvements, or the effects of inflation on our infrastructure base. Growth impacts are intended to be addressed by the City's operating principle that 'growth pays for growth'. Improvements and inflation are expected to be addressed by future rate changes.

Maintaining the status quo, or the "do nothing" option regarding projected investments will result in a projected infrastructure gap of $568.8 Million in ten years. Over 20 or 50 years this growth has the potential to escalate beyond our ability to manage effectively. As there is no intent to allow this to occur, further action is needed to address both the understanding and forecasted growth of the infrastructure gap.

Choices are available as to how the City can manage the infrastructure gap. The City can continue to deliver services at their existing levels by committing to make required investments thereby stabilizing or even eliminating the infrastructure gap. The City receives its funding through taxes, utility bills, user fees, transfer funding from upper tier governments, gifts, efficiencies and debt. Funding sources are limited and the City needs to manage its services within its means. The infrastructure gap needs to be addressed in an affordable well planned fashion and not simply be deferred onto future generations. However, paying for the gap is not the only opportunity.

The City can reduce levels of service to match its ability to pay. This is the realization that you get what you pay for. Generally there is an unwillingness to give up services currently enjoyed and a strong desire to improve services. There is also recognition that some services are essential and cannot be eliminated.

A third opportunity for the City is to find more efficient and effective ways of delivering services, including changing the asset mix that supports service delivery to the community. The City strongly supports this direction and regularly invests in improvements. One element of this third approach is the work underway to enhance our asset management practices.

The City has a long-standing practice of pursuing all possible means to achieve our service delivery goals and has been reasonably successful delivering quality services when compared to other municipalities. In effect the City adopts a blend of the three approaches outlined above.

Greenway Wastewater Treatment Plant – Greenside Ave.

Glossary

Asset: Non financial assets having physical substance that are acquired, constructed or developed and:

- are held for use in the production or supply of goods and services for rental to others, for administrative purposes or for the development, construction, maintenance or repair of other tangible assets;
- have useful economic lives extending beyond an accounting period;
- are to be used on a continuing basis; and
- are not for resale in the ordinary course of operations.

For the City, capital assets have the following characteristics:

- Beneficial ownership and control clearly rests with the City, and
- The asset is utilized to achieve City plans, objectives and services with the intention of being used on a continuous basis and is not intended for sale in the ordinary course of business.

Asset Management: The coordinated activity of an organization to realize value from assets.

CAM Plan: The City's Corporate Asset Management Plan which combines multi-disciplinary management techniques (technical and financial) over the life-cycle of municipal infrastructure assets to provide a specific level of service in the most cost effective manner and manage risks associated with municipal infrastructure assets. This typically includes plans to invest, design, construct, acquire, operate, maintain, renew, replace, and decommission assets.

CAM Program: A set of interrelated or interacting components of the City that establishes asset management policies and objectives and the processes needed to achieve those objectives. An asset management program also includes the organization structure, roles, responsibilities, business processes, plans, and operations of the Corporation's Asset Management practices.

Capitalization Threshold: The threshold represents the minimum cost an individual asset must have before it is to be recorded as a capital asset on the statement of financial position.

City: The Corporation of the City of London.

Community Partners: Entities such as Conservation Authorities, Emergency Medical Services' organizations, or utility companies where implementation of their mandate or corporate objectives would have an impact on municipal infrastructure assets and it is expected the City would be coordinating with them.

Consequence of Failure: A measure of the direct and indirect impacts on the city in the event of an asset failure.

Contingency Funding: Funding available for municipal infrastructure assets to address unforeseeable circumstances.

Core Municipal Infrastructure Asset: Defined by O.Reg 588/17, any municipal infrastructure asset that is a, Water asset that relates to the collection, production, treatment, storage, supply or distribution of drinking water; Wastewater asset that relates to the collection, transmission, treatment or disposal of wastewater, including any wastewater asset that from time to time manages stormwater; Stormwater management asset that relates to the collection, transmission, treatment, retention, infiltration, control or disposal of stormwater; Road; or Bridge or culvert.

Critical Asset: An asset for which the financial, business, or service level consequences of failure are sufficiently severe to justify proactive inspection, rehabilitation, or replacement, and is considered a municipal infrastructure asset.

Customer: Any person or entity who uses the municipal infrastructure asset or service, is affected by it or has an interest in it either now or in the future.

Functional Area: A grouping of City divisions or sections managing specific municipal infrastructure asset categories that deliver one or more City services.

Green Infrastructure Asset: Defined by O.Reg 588/17, means an infrastructure asset consisting of natural or human-made elements that provide ecological and hydrological functions and processes and includes natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces and green roofs.

Infrastructure Asset: All or part of physical structures and associated facilities that form the foundation of development, and by or through which a public service is provided to the city, such as highways, bridges, bicycle paths, drinking water systems, social housing, hospitals, courthouses and schools, as well as any other thing by or through which a public service is provided to the city.

Joint Municipal Water Board: Defined by O.Reg 588/17, means a joint board established in accordance with a transfer order made under the Municipal Water and Sewage Transfer Act, 1997.

Level of Service: The statement that describes the output or objectives the City intends to deliver to its customers.

Glossary

Maintaining Level of Service: The activities that would need to be undertaken to maintain the current levels of service being provided or established by the City to meet legislation requirement.

Municipal Infrastructure Asset: An infrastructure asset (core and non-core municipal infrastructure assets), including a green infrastructure asset, directly owned by a municipality or included on the consolidated financial statements of a municipality, but does not include an infrastructure asset that is managed by a joint municipal water board.

Public: Residential, commercial, industrial and institutional stakeholders, and any other stakeholders that rely on City owned municipal infrastructure assets.

Replacement Value: The cost the City would incur to completely replace a municipal infrastructure asset, at a selected point in time, at which a similar level of service would be provided. This definition can also be referred to as 'Replacement Cost'.

Tangible Capital Assets (TCA): A legislative reporting requirement specified by Section PS 3150 in the Public Sector Accounting Board Handbook to identify asset inventories, additions, disposals and amortization on an annual basis.

List of Acronyms

AMP: Asset Management Plan

BOD: Biological Oxygen Demand

CAM: Corporate Asset Management

CAM Plan: Corporate Asset Management Plan

CCTV: Closed Circuit Television

DC: Development Charges

ESA: Environmentally Significant Area

GIS: Geographic Information System

kW/ML: Kilowatt per Megaliter

LOS: Level of Service

PQI: Pavement Quality Index

RF: Reserve Fund

RV: Replacement Value

TCA: Tangible Capital Asset

UCC: Utility Coordination Committee

Section 2: Introduction

The City of London's (The City) infrastructure systems are the backbone of our community. They support a range of municipal services that enable residents, businesses and other London stakeholders to live, work and plan in our City. London's strategic community objectives are established through the City's Strategic Plan. This document establishes the vision, goals and objectives that guide the City's municipal government in a way that aligns with the core values of our community.

The City's Corporate Asset Management (CAM) Program is designed to enable the management of our infrastructure assets in a way that connects our strategic community objectives to day-to-day decisions related to when, why and how we invest in our infrastructure systems. There are four layers to our CAM Program which enable this connection as shown in Figure 2.1:

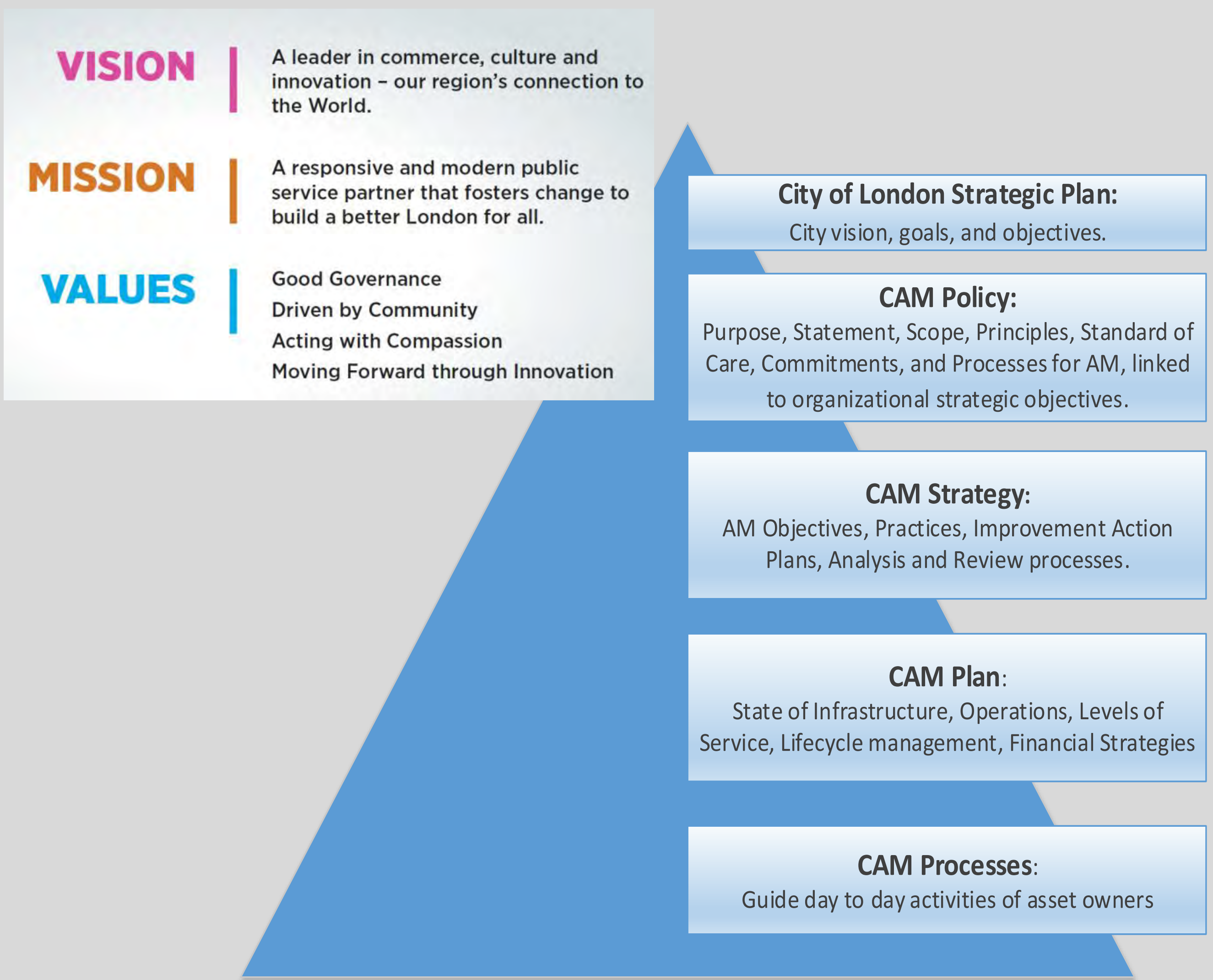


Figure 2.1 Structure of the CAM Program

1. The City's Strategic Plan sets the direction for the future. It identifies Council's Vision, Mission, Values, Strategic Areas of Focus, and the specific strategies that define how Council and Administration will respond to the needs and aspirations of Londoners . The Vision, Mission and Values in the Strategic Plan are used to develop the CAM Policy.
2. The CAM Policy describes the rationale to planning, designing, constructing, acquiring, operating, maintaining, renewing, replacing and disposing of the City's municipal infrastructure assets in a way that ensures sound stewardship of public resources while delivering effective customer service. The Policy also identifies the roles and responsibilities of staff who make infrastructure-related decisions to provide a clear governance structure to ensure that other elements of the CAM Program (CAM Strategy, CAM Plan, CAM Processes) align with the CAM Policy and Strategic Plan. The CAM Policy is a new requirement of Ontario Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (refer to Section 2.2 for an overview of this new Regulation).
3. CAM Strategy describes the approach to developing an Asset Management system that enables the line-of-sight from tactical decisions made in the CAM Plan and CAM Processes to the principles and commitments identified in the CAM Policy. The CAM system is an integrated set of processes that work together to create connections between service areas, and is comprised of strategies related to: data management levels of service, risk management, asset lifecycle management, integration, communication and governance. These connections enable staff across the organization to make more holistic infrastructure-related decisions that consider factors beyond their immediate function.

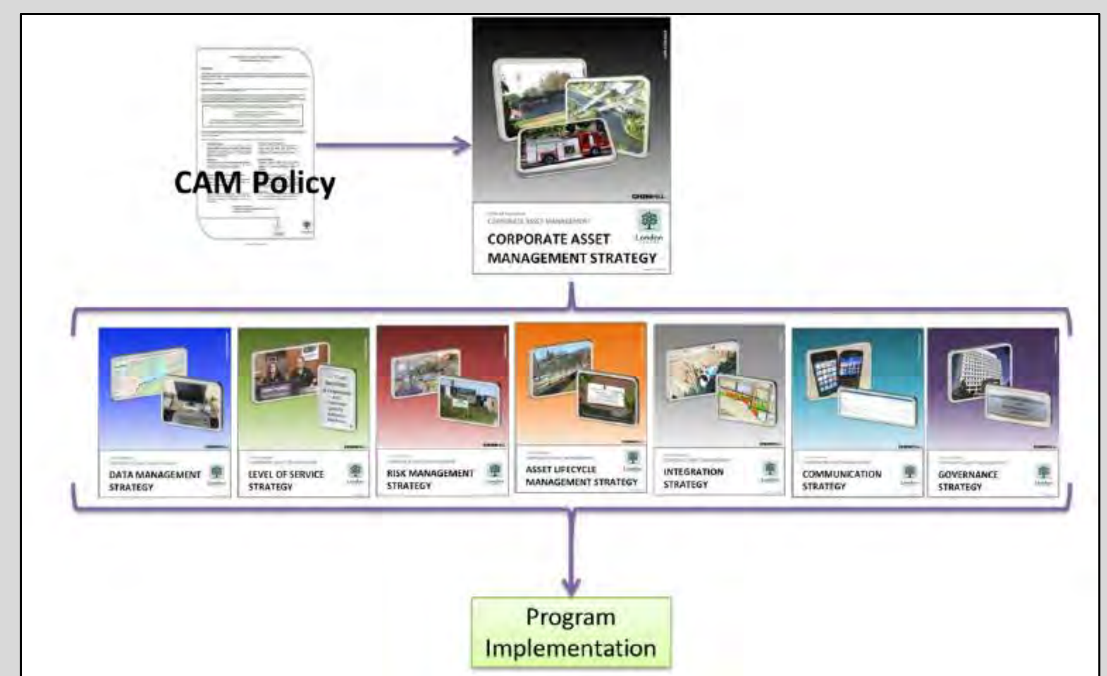


Figure 2.2 Corporate Asset Management Strategies Overview

Section 2: Introduction

2.1 SUPPORTING THE CITY OF LONDON'S GOALS THROUGH OUR CAM PROGRAM

4. The CAM Plan sets out how London's infrastructure will be managed to achieve the commitments and principles outlined in the CAM Policy. This is accomplished by:
   - Understanding the current state of our infrastructure systems.
   - Measuring and monitoring level of service (LOS) metrics that are established by staff to enable a quantitative connection between aspects of our infrastructure systems and the degree to which the systems are achieving the objectives laid out in the CAM Policy.
   - Developing a relationship between the asset lifecycle management strategies executed by staff (i.e. how we operate, maintain, rehabilitate or replace assets) and the LOS metrics. This relationship will detail the method in which the lifecycle management strategies will impact the LOS metrics in the future and enable staff to determine the optimal lifecycle management strategies to achieve the desired LOS metrics.
   - Establishing a financial strategy to fund the expenditures that are required to achieve the desired LOS metrics.

   The CAM Plan has been designed to ensure that it is compliant with the requirements of Ontario Regulation 588/17 - Asset Management Planning for Municipal Infrastructure. Refer to Section 2.2 for an overview of this new Regulation.
5. The CAM Processes guide the day-to-day activities of staff who are responsible for managing our infrastructure systems. This step ensures that the CAM Program is embedded and integrated throughout the organization, so it becomes part of every process undertaken by City staff.

2.2 PROVINCIAL ASSET MANAGEMENT PLANNING REQUIREMENTS

This CAM Plan builds upon AM activities that have been developing in the City over the past decade. London's AM journey began in 2008 when Canada's Public Sector Accounting Board (PSAB) established new requirements for municipalities to practice Tangible Capital Asset (TCA) accounting. This new accounting process resulted in the development of the first comprehensive inventory of all assets owned by the City.

In 2012, the Province published 'Building Together: Guide for Municipal Asset Management Plans' to encourage and support municipalities in Ontario to develop AMPs in a consistent manner. The Building Together guide describes a general approach to structuring AMPs and provides insight into the content that should be included in sections related to the State of Local Infrastructure, Levels of Service, Asset Lifecycle Management Strategies, and Financing Strategies.

Building Together outlines the information and analysis that municipal asset management plans are to include and was designed to provide consistency across the province for asset management. To encourage the development of CAM Plans, the Provincial and Federal governments also made an AMP a prerequisite to accessing capital funding grants.

In 2015, Ontario passed the Infrastructure for Jobs and Prosperity Act which affirmed the role that municipal infrastructure systems play in supporting the vitality of local economies. After a year-long industry review process, the Province created Ontario Regulation 588/17 - Asset Management Planning for Municipal Infrastructure under the Infrastructure for Jobs and Prosperity Act . O.Reg. 588/17 further expands on the Building Together guide, mandating specific requirements for municipal AM Policies and AM Plans, phased in over a five-year period. The following points summarize the general requirements and timelines of O.Reg. 588/17:

- By July 1, 2019 the City requires an AM policy that articulates specific principles and commitments that will guide decisions around when, why and how money is spent on infrastructure systems.
- By July 1, 2021 the City's requires an AMP that documents the current levels of service being provided and the costs to sustain them for the City's water, wastewater, stormwater, road and bridges infrastructure systems (i.e. 'core' assets per O.Reg. 588/17).
- By July 1, 2023 the City requires an AMP that documents the current levels of service being provided and the costs to sustain them for all infrastructure systems in the City.
- By July 1, 2024 the City requires an AMP that documents the current levels of service being provided, the costs to sustain the current levels of service, the desired levels of service, the costs to achieve the desired levels of service, and the financial strategy to fund the expenditures necessary to achieve the desired levels of service for all infrastructure systems in the City.

This CAM Plan is compliant with the July 1, 2021 and July 1, 2023 requirements of the regulation. Furthermore, it also includes some components of the July 1, 2024 requirements.

This CAM Plan is the second iteration produced through the City's CAM Program. It builds upon the first CAM Plan that was published in 2014, following the same overall approach while now also complying with new Provincial regulatory landscape. The purpose of the CAM Plan is to:

- Set out our plan for managing our infrastructure assets to ensure they can provide services at levels that meet our community and corporate objectives.
- Forecast the expected impact that our 2020-2023 budget will have on the state of our infrastructure assets.
- Understand the funding gaps that exist in our infrastructure systems if the forecasted state of infrastructure asset based on our 2020-2023 budget are not meeting our objectives.
- Comply with Ontario Regulation 588/17 – Asset Management Planning for Municipal Infrastructure.

2.3 DEVELOPING THE CAM PLAN

This CAM Plan is the culmination of efforts from staff across our organization who are involved with managing infrastructure assets, including finance staff involved with funding capital projects and operating programs, technical staff involved with planning and executing the construction of infrastructure assets, and on-the-ground staff who operate and maintain infrastructure assets. The CAM Plan was developed using largely the city's internal CAM staff, with external support from consultant that was leveraged during staff transitions in the CAM Office.

Table 2.1 Corporate Asset Management (CAM) Plan Resources

Teams	Members
CAM Office	4
Strategic Management Team • **City Manager** • **Managing Directors**	14
CAM Steering Team • **Service Area Directors** • **Service Area Managers** • **Management Staff**	15
CAM Network Team • **Service Area Managers** • **Management Staff** • **Subject Matter Experts**	140+

2.4 CONTINUALLY IMPROVING THE CAM PLAN

Moving forward, we will be producing a new CAM Plan aligning with our multi-year budget cycle. The CAM Office will be continually improving various elements of our CAM Program by advancing our CAM Strategy, which will in turn increase the competency of our AM system. This will enable us to create more sophisticated CAM Plan's to accompany future budgets. Some of these improvement activities include:

- A living city-wide asset registry in a formal hierarchy for use by all city staff. It will include asset management parameters and conventional asset parameters such as description, location, size, etc.
- A city-wide level of service registry in a formal hierarchy for use by all.
- A city-wide risk registry for use by all.
- Modeling tools for level of service, risk and optimized decision-making.
- A computerized system or systems that enable all of the above in a user friendly fashion allowing for the analysis of options during decision-making.
- Documentation templates for reports, plans, cases, etc. to ensure the considerations of asset management are embedded in day-to-day activities.
- Procedures that embed asset management practices.

Please refer to our CAM Strategy document for more details on our specific actions or initiatives to advance our CAM Program.

Table 2.2 Timeframes and Frequency for Update

Document	Frequency
AM Policy	Every 5 years
Corporate Asset Management Plan	• Annual progress review /update • Full re-evaluation every 4 years

Section 2: Introduction

2.5 CORPORATE ASSET MANAGEMENT PLAN SCOPE

This CAM Plan covers the majority of infrastructure assets that provide services to our community. The City's approach is to take a service-focused perspective to the CAM Program, and therefore the various infrastructure systems are described in terms of services & service areas rather than asset categories.

Table 2.3 Assets Included in the Corporate Asset Management Plan

Program Area	Service(s)	Assets
Water, Wastewater Services	**Water**	Water transmission and distribution mains, appurtenances (service connections, valves, hydrants, chambers, PRV), water meters, pump stations (including re-chlorination), bulk water stations, storage reservoirs and wells.
	Wastewater - Sanitary	Sanitary systems for the collection and treatment of residential, commercial and industrial wastewater including local sewers, trunk sewers, forcemains, wastewater treatment plants & equipment, pumping stations & equipment.
	Wastewater - Stormwater	Stormwater conveyance systems including storm sewers and trunk sewers. Stormwater management facilities including wet/dry facilities, dissipation pools, online flood & erosion control facilities; stormwater green infrastructure such as drywells and bioretention cells with or without underdrain; and minor treatment facilities (oil/grit separators).
Transportation	**Roads & Structures**	Roadways include sidewalks, local streets, primary and secondary collectors, arterials and City-owned expressways and freeways with the inclusion of road base, asphalt, curb and gutter and traffic islands. Road structures include bridges, footbridges, major/minor culverts, pedestrian tunnels, major retaining walls and noise walls.
	Traffic	Traffic assets include street lighting units, vehicular & pedestrian signals, regulatory & informative signage to control traffic and ensure reliable, efficient and safe transportation of both pedestrian and vehicular traffic.
	Parking	Pay stations, pay station shelters, parking meters, surface lots and stalls in surface lots (both managed and owned) provide controlled short-term on-street parking and long-term off-street parking to supply business, commercial, institutional and entertainment facilities.
Environmental Services	**Solid Waste**	Diversion of waste includes the Material Recovery Facility & equipment, Enviro Depots, Household Special Waste Depot. Disposal of waste includes the W12A Buildings (including site works & equipment), W12A Stormwater Management Ponds, W12A Leachate Collection System, W12A Landfill Gas Collection System, W12A Land & On-Site buffer, W12A Off-Site buffer lands, closed landfill with equipment locations (active mechanical systems) and closed landfill locations (active & passive).

Section 2: Introduction

Table 2.3 (Continued) Assets Included in the Corporate Asset Management Plan

Program Area	Service(s)	Assets
Parks, Recreation & Neighbourhood Services	Parks	Operation and maintenance of a network of parks pathways and facilities as well as other parks tangible assets. Parks linear assets include Thames Valley Parkway (including footbridges), multi-use pathways (including footbridges), park roads and trails. Park amenities include play structures (including exercising stations), soccer fields, baseball diamonds, outdoor tennis courts, pickleball, cricket pitch, synthetic turf football fields, skateboarding facilities, volleyball, basketball courts, swing sets, multi-use pads, off-leash dog park and community gardens. Park facilities include bandshells, clubhouse and buildings, pavilions, shelters, stadium, washrooms & concession, facilities site works.
	Recreation	Facilitation of active and passive activities and opportunities for structured and spontaneous play, including recreation site works. Arenas & equipment include arenas and outdoor ice rinks. Aquatics & equipment includes outdoor community pools, wading pools, spray pads and indoor pools. Community centres & equipment includes community centres, indoor tennis courts, T-Block and the J.A. Building, the Storybook Gardens attraction and senior centres & equipment. Golf assets includes the 18-hole courses, clubhouses, service buildings, washrooms and concessions
	Urban Forestry	Tree inventory includes street trees within road allowances, manicured park tress in manicured portions of parks, and woodland tress including trees in woodlands or wooded portions of parks.
Protective Services	Fire	Stations & Facilities include fire stations & sites, training tower, training building, storage garage and fueling stations. Vehicles & equipment include front line vehicles, non-emergency vehicles & equipment, fire-fighting apparel & light equipment, and communication equipment & software.
	Corporate Security & Emergency Management	One Voice Communication System (infrastructure and communication system), Emergency Operation Centre and equipment, security operation equipment and public safety program.
Social and Health Services	Long Term Care	Dearness Home long-term care facility providing its residents with respite, medical, nursing, personal, therapeutic and social work services. This includes the Dearness Retirement Home Building and site works, as well as equipment for food services, nursing, recreations services and other building equipment.
Corporate, Operation & Council Services	Corporate & Cultural Facilities	Corporate facilities include administration buildings, main centres and other facilities such as salt domes and storage buildings. Cultural facilities include heritage, arts and entertainment, public art monuments and site works.
	Fleet	Vehicles range from light, medium and heavy, and includes cars, mini vans, SUVs, pick-up trucks, 350 & 450 Series Utility Trucks, Small Aerial Units, packers, dump trucks, street sweepers, flushers and tanker trailers. Equipment ranges from light, medium and heavy off-road and on-road equipment including job trailers, farm tractors, trackless attachments, mowers, snow plow blades and wings, float trailers, trackless S/W machines, sanders, aerial lift units, front end loaders, snow blowers and road graders.
	Information Technology	IT infrastructure includes network, access points, switches routers, storage and backup system, servers, blade enclosures, F5 Load Balancers, phone systems, ITS Fibre Network. Applications & software includes enterprise applications and enterprise software. End User Devices & Applications include desktops, laptops, cellphones, iPads and IT Equipment (New Council Chambers and Committee Room).
	Land	Park land and natural areas, road allowance, general government, closed landfill & natural methane areas, industrial and stormwater.

2.6 GROWTH PLANNING

There are two primary factors that impact the growth of the City's infrastructure systems:

1. Population growth resulting in additional assets, such as new roads, watermains, and facilities to service new subdivisions.
2. Service Improvement to provide a higher level of service resulting in the new/larger assets (i.e. the construction of new stormwater management assets to provide higher service levels in areas that have existing stormwater infrastructure).

Both factors are considered by staff in each service area as part of their decision-making processes.

The planned population increase for London is provided in Figure 2.3. It is apparent that the City's population is expected to increase to over 450,000 people by 2035, which is an average growth rate of approximately 5%. Forecasted growth in industrial and institutional employment lands are expected to be at generally the same rate.

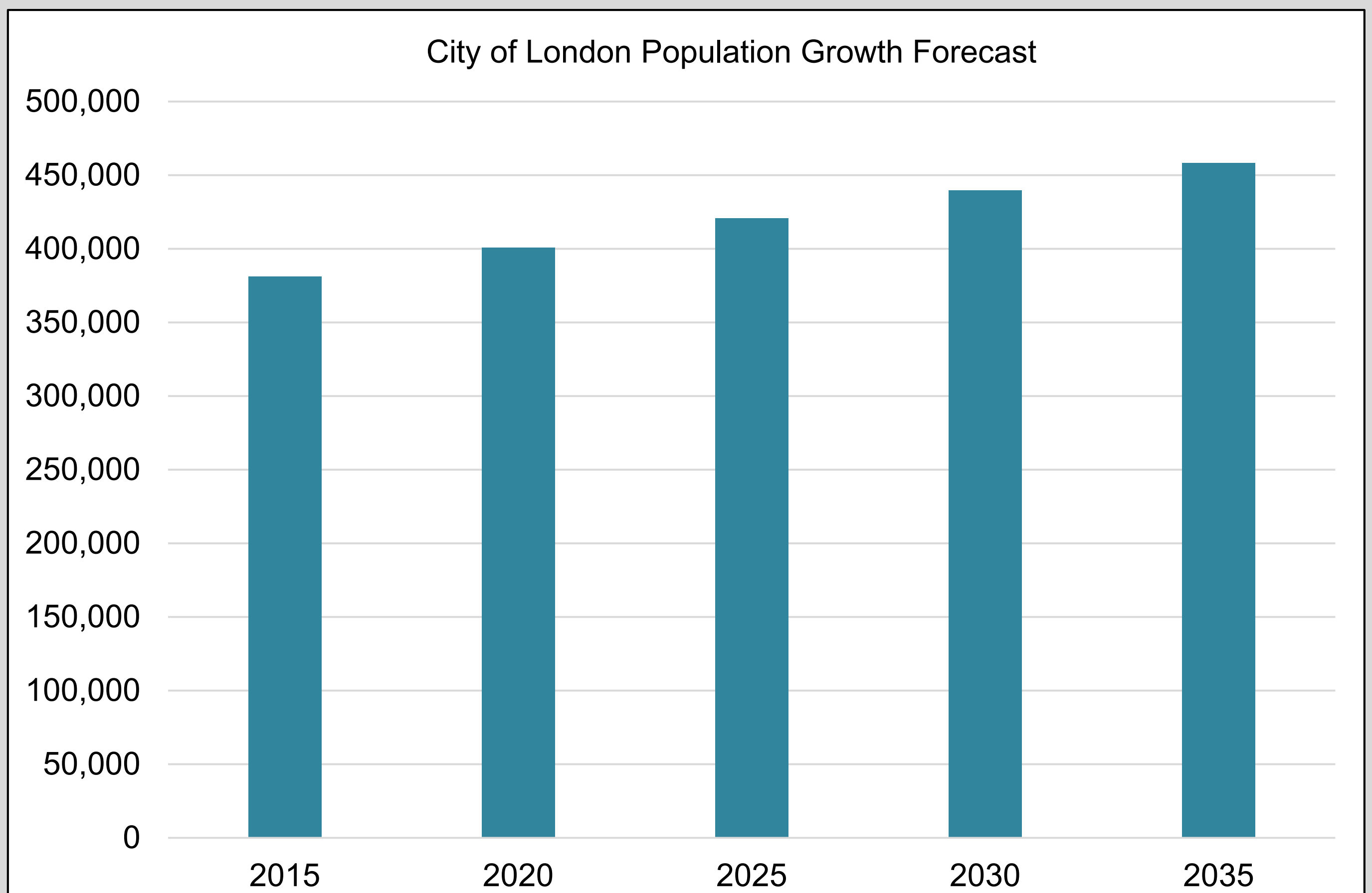


Figure 2.3 City of London Population Growth Forecast

COORDINATION WITH LAND USE PLANNING

The City's infrastructure systems should be expected to grow at approximately the same rate as population, however a push toward more intensification (as opposed to sprawl development) may result in the growth rate of infrastructure systems being less than population/employment growth rate. The CAM Program includes opportunities to coordinate AM planning processes with land use planning processes to ensure that the infrastructure systems that are built to service new growth can be sustained over the long term.

Byron Pool - Norman Ave

Section 2: Introduction

2.7 COMMUNICATION AND ENGAGEMENT STRATEGY

Municipalities across Canada are increasingly engaging their citizens in helping staff develop recommendations - and Council make decisions - about their strategic direction and priorities for resource allocations. This is particularly true in these times of competing priorities and limited resources.

The most effective citizen engagement strategy is one whereby all of a municipality's citizens (or a representative cross section of them) can provide their views and opinions to council in a statistically valid way.

2.7.1 Approach to Community Engagement

To date, the City of London has completed various community engagement activities including customer satisfaction surveys. These surveys provided feedback that could be measured against Level of Service metrics (LOS) and measure information such as the percentage of visitors/residents that had a good or excellent experience while using a particular service.

These results are reflected in the LOS tables, provided in the each service area chapters.

The City's approach to community engagement will build on the existing community engagement activities completed thus far. This approach will leverage community engagement to inform the public as well as to obtain feedback. The City's community engagement plan will be most in line with the "consult" category in the International Association for Public Participating spectrum of public participation (Table 2.3).

Consultation with the community is a key component of the City's Asset Management System. It is important to note that consultation should drive community input for consideration by City staff, but should not necessarily require staff to make decisions regarding the CAM Plan that are directly related to the feedback received.

The stakeholders engagement can be completed through a number of different forums. The appropriate method of engagement will be selected based on the details of the need for community engagement.

Examples of community engagement methods include:

- Education videos (e.g. Budget Basics, Asset Management Planning, etc.)
- Online Surveys;
- Online Forums;
- Public Meetings or Open Houses; and
- Focus groups.

Table 2.4 The International Association for Public Participation (IAP2) spectrum

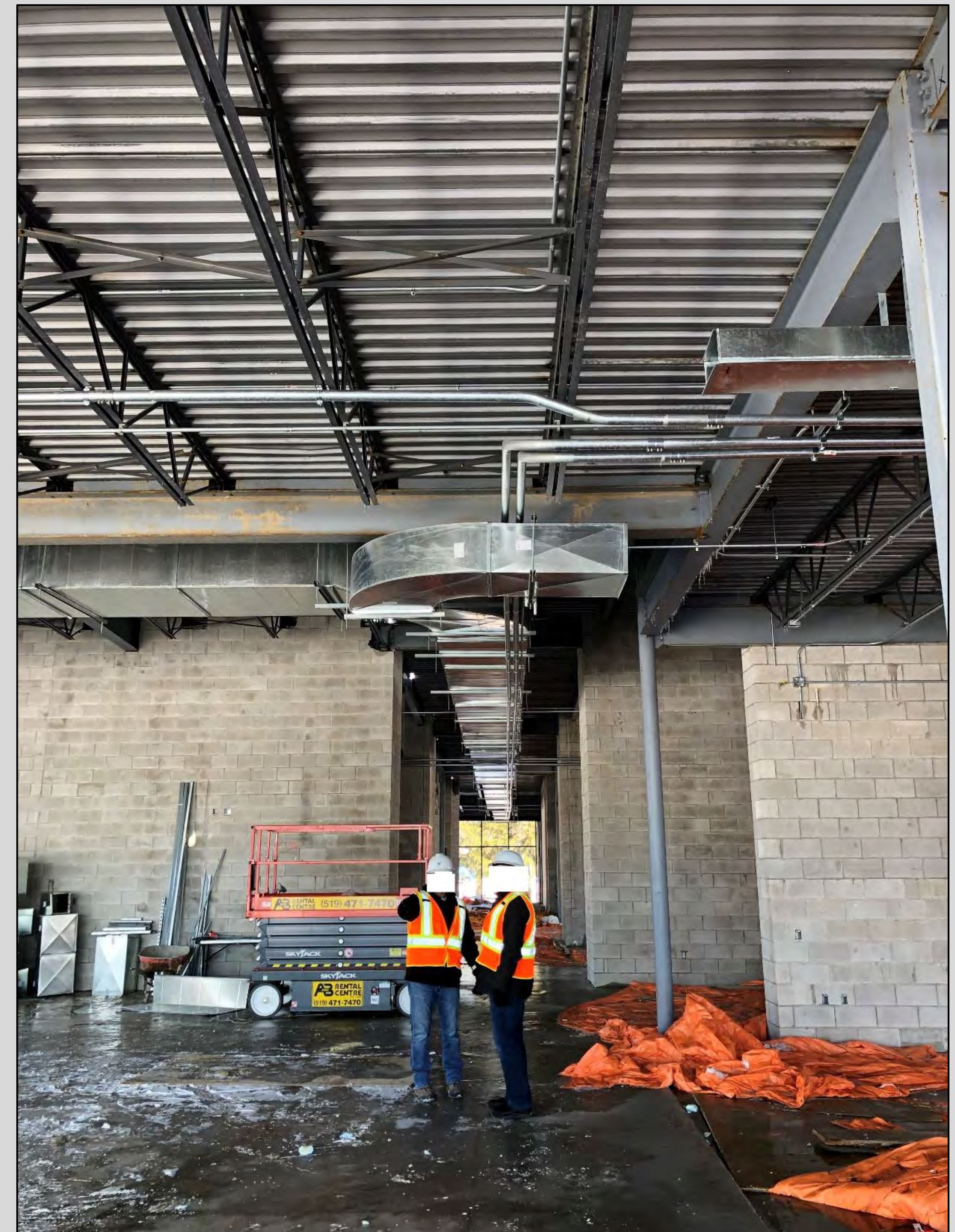
Increasing Level of Public Input

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decisions.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

2.8 ASSET MANAGEMENT PLAN ASSUMPTIONS AND LIMITATIONS

The following points summarize the assumptions and limitations of this CAM Plan;

- The scope of this Plan covers the assets directly owned by the City of London. There are significant services divested to Boards and Agencies which are not covered in this Plan but are important to London and its citizens such as London Police, London Transit Commission, Social Housing, Libraries and more. These services are expected to be incorporated into future plans as suggested by the new O.Reg 588/17.
- This CAM Plan is compliant with the 2021 and 2023 requirement of O.Reg. 588/17 for directly owned city assets. Additional effort will be required by the City to establish the proposed Level of Services (and associated costs impacts) to meet the 2024 requirements.
- The City has not implemented an asset risk management strategy although one has been drafted and is planned for full implementation over the next few years. Nevertheless some asset groups have a preliminary asset risk model developed.
- The City addresses condition information in three ways.
    - i. Condition may be technically assessed and reported on in a quantifiable technique. This method is the most accurate and most expensive (e.g. Pavement Quality Index).
    - ii. Condition may be assumed based on age and estimated useful life.
    - iii. Finally, condition may be based on the expert opinion of staff using the asset.
- Restoration costs allocations between Core assets (i.e. Road, Water, Sanitary and Storm) will continue historic practices of integration (Corridor Rehabilitation) maximizing cost efficiency.
- Unexpected events (e.g. climate change, weather patterns) will not disrupt infrastructure replacement and renewal projects over the period of analysis.
- The projected capital budgets and expected available reserve funds will occur as planned over the period of analysis. Generally, the current operating budget is sufficient to meet current operating needs (unless specifically known).



East Community Centre during construction - Churchill Ave.

Section 3: Overview of Service Area Sections

3.1 STRUCTURE OF THE CAM PLAN

The CAM Plan is structured to provide consistency to stakeholders who are engaged with the document. Description of the CAM Plan sections is provided below and illustrated in figure 3.1.

1. An Introductory Section outlining the City's Vision, mission and Values. It also provides an overview of the CAM program, Ontario regulations for Asset Management Planning, the CAM Plan scope, etc.
2. A brief section overview describes the six parts that are documented for each service area (asset category)
   - State of infrastructure
   - Levels of Service
   - Asset lifecycle management strategy
   - Forecasted Infrastructure Gap
   - Discussion
   - Conclusions
3. A series of separate sections for each infrastructure service area reviews the content for each of the six major Parts list above.
4. A financing strategy section setting out the approaches to ensuring that the appropriate funds are available and provides multiple alternatives.
5. A Conclusion and Recommendations section aggregates the CAM Plan findings into an overall picture and provide recommendations

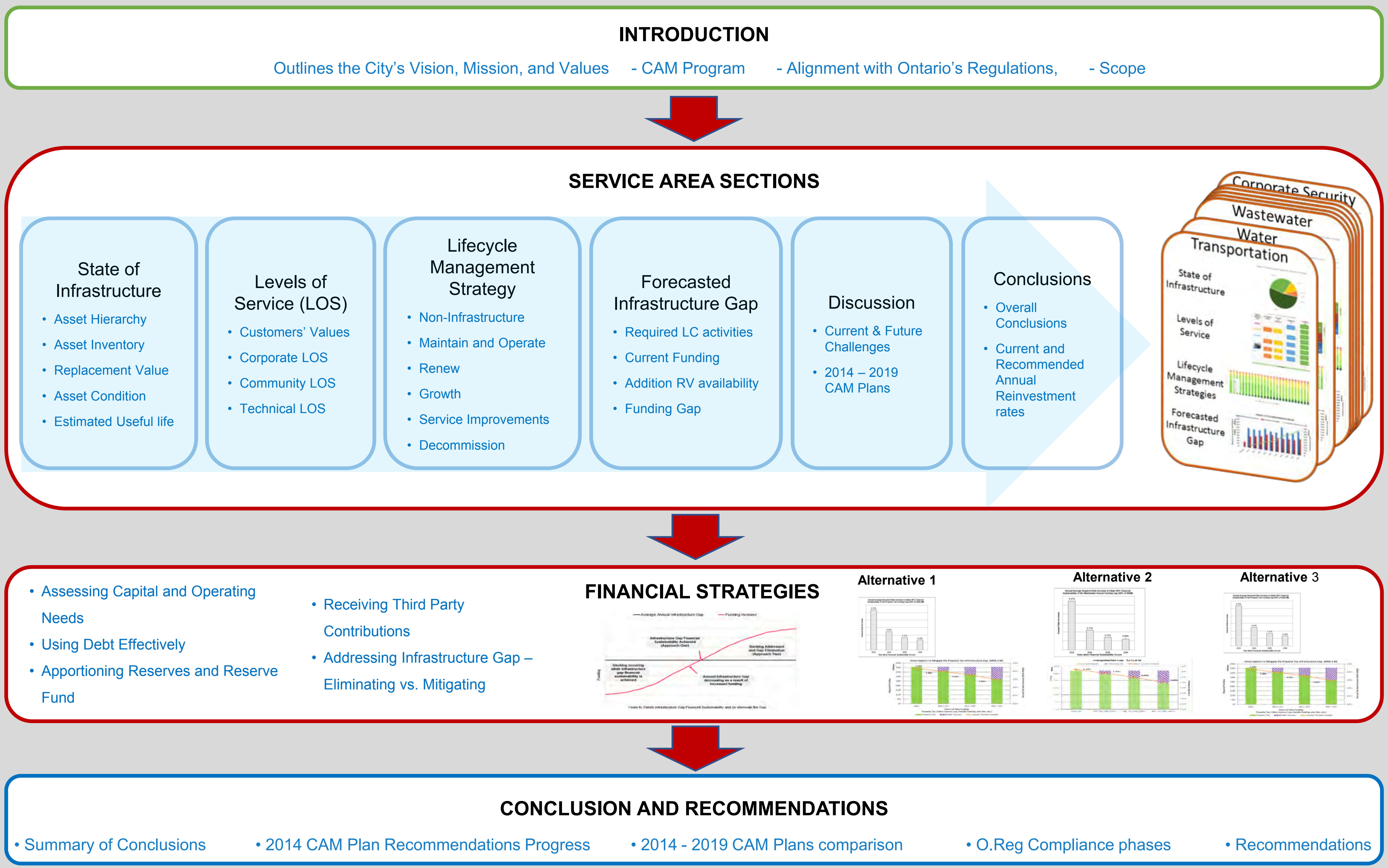


Figure 3.1 Corporate Asset Management (CAM) Plan Structure

Section 3: Overview of Service Area Sections

Part 1 – State of Local Infrastructure

The State of Local Infrastructure part for each Service Area includes the following information:

1. A summary of the inventory of assets that support the services area, including quantities and replacement costs.
2. An estimate of the replacement value of the assets. Not all of our assets are replaced (i.e. some are continually rehabilitated), but a replacement value estimate provides a foundational benchmark to understand the magnitude of the infrastructure that supports each service area.
3. A summary of the average age and an age distribution as a proportion of estimated useful life of the assets that support the service area.
4. An overview of the proportion of the current condition of the assets that support each service area (i.e. % of assets in very good through very poor condition (or not assessed) weighted by replacement value).
5. A description of the data sources used to populate the State of Local Infrastructure information, including any relevant condition assessment policies/practices.

Condition ratings were given to every asset using a five-point rating scale as shown in Table 3.1. A five-point rating scale was used to align with that employed by the National Infrastructure Report Card produced by the Federation of Canadian Municipalities (FCM), the Canadian Society for Civil Engineering (CSCE), and the Canadian Construction Association (CCA). In addition to providing a sound basis for assessment, this will allow us to benchmark the results against the values presented in this document.

Service London Counter – Bostwick Centre

Table 3.1 Condition Scale and Definitions

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

Section 3: Overview of Service Area Sections

Part 2 – Levels of Service

This part of the CAM Plan documents the levels of service and associated performance metrics for each service area. Levels of service (LOS) tables for each service area are developed and maintained through discussions with staff in all service areas that support the provision of the respective service area. The structure of all the LOS tables is the same for each service area. Major components of the tables are: identifying customer values, corporate LOS objectives, customer/council focused performance measures, and technical focused performance measures.

The LOS measures include mandatory metrics that are prescribed by O.Reg. 588/17. The customer and technical performance measures include both the current performance, as well as a proposed future performance target. Each service area section also discusses any external trends or issues that may affect expected levels of service or our ability to meet them (e.g., new accessibility standards, climate change impacts).

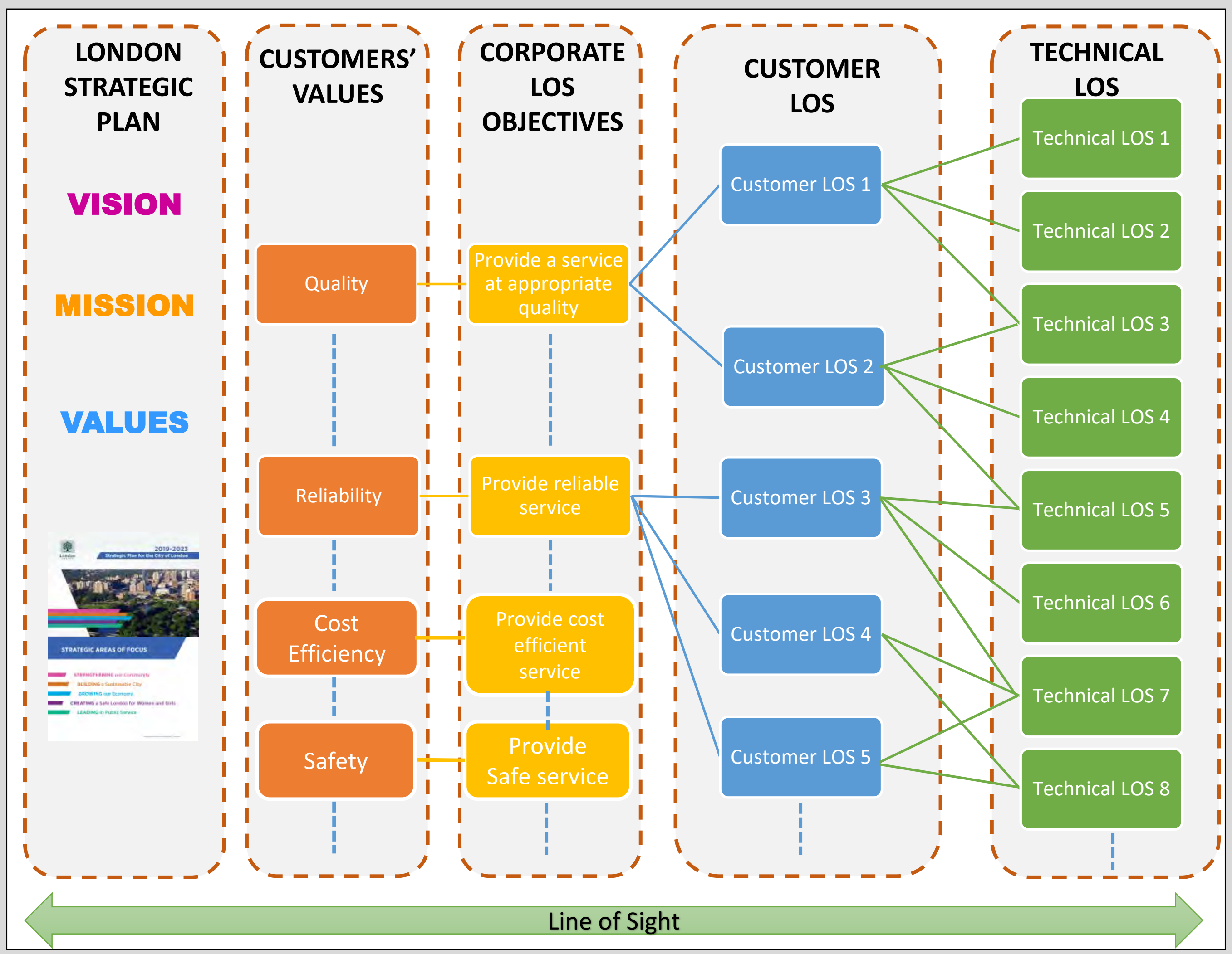


Figure 3.2 Level of Service Hierarchy

OVERVIEW OF LEVELS OF SERVICE TABLES

The LOS tables are structured as follows (see Figure 3.2):

1. A corporate LOS statement above the tables that briefly describes the kind of service that will be provided to residents. For example, the service statement for water is “efficiently providing safe, high quality and reliable water services with adequate pressure and flow.”
2. The column headings consist of Customer Value, Corporate LOS Objective, Customer Performance Measures (with current performance & target performance), and Technical Performance Measures (with current performance & target performance). Each of these headings is defined as follows:
   - Customer Value: a phrase that describes attributes of the service being provided, e.g. cost efficient, safe, reliable, etc. These descriptions cover all aspects of the service and be easy for the customer/public to understand and recognize.
   - Corporate LOS Objective: a short sentence that describes the outputs of the Customer Value. There may be one or multiple LOS statements written for each Customer Value (service attribute). The output clearly states customer standards and is measurable.
   - Customer Performance Measures: quantifiable metrics expressed in non-technical terms that describe the general public’s understanding of services being provided by infrastructure systems. Customer performance measures are typically related to the service that is provided by the overall system supporting the service delivery, rather than the specific assets. It should be noted that customer performance measures can also be referred to as 'community', 'corporate' or 'strategic' performance measures.
   - Technical Performance Measures: quantifiable metrics applied against assets and overall systems that connect highly technical subject-matter specific considerations to the Customer Performance Measure. The following points describe the main categories of Technical Performance Measures:
     - Legislated/regulated – performance measures that the municipality is legislated to achieve, such as wastewater quality targets.
     - Service delivery best practices – performance measures that are based on meeting the City’s service delivery objectives.
     - Industry standards – performance measures that are based on the industry standards for how infrastructure is designed or managed.
3. The rows of the LOS tables consist of different customer values such as cost efficient, safe, quality, reliable, scope and environmental stewardship. This enables staff to develop a holistic perspective on all aspects of a service area that is valued by our community, and to develop the performance metrics accordingly.

Section 3: Overview of Service Area Sections

POPULATING THE LEVELS OF SERVICE TABLES

Current Performance: The current performance is identified/calculated for all metrics for which data is available.

Target Performance: for some metrics a target performance has been established by staff. In some cases this is a more generic target that uses an up/down arrow, while in others a more specific target is included. It should be noted that by July 1, 2024 our Amp will be required to identify targets for each LOS metric that we have identified in our LOS tables.

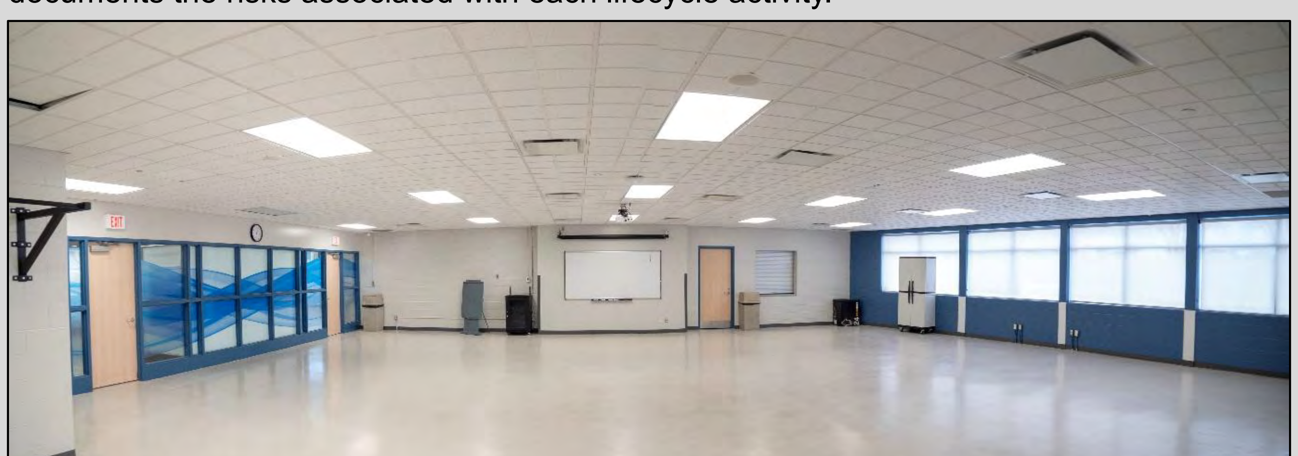
TRENDING PERFORMANCE

We strive to maintain consistency in our LOS tables. This enables us to complete trending over time to understand how changing our lifecycle management strategy or expenditure levels are impacts our LOS metrics.

Part 3 – Asset Lifecycle Management Strategy

The asset lifecycle management strategy is the set of planned actions that will enable the assets to provide the desired levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost (e.g., through preventative action). This part of the CAM Plan describes the asset lifecycle activities applied to the asset category, the optimal budget to achieve the ideal condition profile to maintain the current LOS, and the condition profile expected from the current budget. The approach to these three areas is described below.

1. The asset lifecycle management activities are the range of actions funded through the operating or capital budget that are practiced on the asset category. Asset lifecycle activities are generally grouped into the categories in Table 2.5. Each service area section also documents the risks associated with each lifecycle activity.



Canada Games Aquatic Centre - Wonderland Road N.

Table 3.2 Typical Asset Lifecycle Activities

Lifecycle Activity	Description	Examples
Non-Infrastructure	Actions or policies that can lower costs or extend asset life	Better integrated infrastructure planning and land use planning, demand management, process optimization, managed failures
Maintenance	Regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events	Sewer spot repairs, fixing potholes
Rehabilitation	Significant treatments designed to extend the life of the asset.	Structural lining of sewers, road resurfacing
Replacement	Activities that are expected to occur once an asset has reached the end of its useful life and renewal/ rehabilitation is no longer an option	Vehicles replacement, road reconstruction
Disposal	Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality	Salvage of equipment
Growth/Service Improvement	Planned activities required to extend services to previously unserviced areas - or expand services to meet growth demands	New recreation centre to service new subdivision

2. The Optimal Budget to maintain the LOS provided by each asset category is forecasted by analyzing the cost of the lifecycle activities that are required to achieve the ideal condition profile. Many of the LOS metrics are not feasible to confidently forecast on an individual basis, and therefore the approach to understand the cost to sustain the current LOS is to achieve the Ideal Condition Profile over the future 20-year planning horizon. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

Part 3 – Asset Lifecycle Management Strategy (Continued)

Each lifecycle activity has planned actions and risks associated with the respective activity. Table 3.3 includes illustrative examples of planned actions and risks, but it not intended as a comprehensive list.

Table 3.3 Example Actions and Risks Associated With Asset Lifecycle Activities

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Examples of Generic Asset Management Practices or Planned Actions**	**Examples Generic Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions	• Changes to Levels of Service (LOS) • Developing Corporate Asset Management program • Improvements to employee capabilities, communications, training, etc.	• Service Provision Changes • Asset management plans or proposed network solutions not followed • Plans/Reports/Recommendations • Lack of a realization of the benefit from the activity (i.e. the life is not extended or the cost of managing an asset increases rather than decreases)
Maintenance Activities	• Scheduled preventative maintenance programs for the majority of assets • Scheduled inspection programs for key assets	• Completing planned maintenance activities while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure.
Renewal/Rehab Activities	• Adopt the latest technology that maintains the current level of service.	• Incorrect assumptions regarding improved expected useful life after rehabilitation.
Replacement/Construction Activities	• Adopt the latest technology that maintains the current level of service.	• Cost over-runs during large, complex design and construction projects.
Disposal Activities	• Dispose of assets under the applicable regulation and environmental standards	• Lack of planning and funding may limit the options to efficiently replace existing and add new capacity.
Service Improvement Activities	• Adopt the latest technology that enhances the current level of service.	• Service improvement is either not required or incorrectly assessed
Growth Activities	• Assumption of subdivisions, commercial and industrial extensions, local improvements, etc.	• Incorrect asset size will cost more money and may cause operational challenges (too large asset), or may result in the need to prematurely expand the asset (too small asset).

Section 3: Overview of Service Area Sections

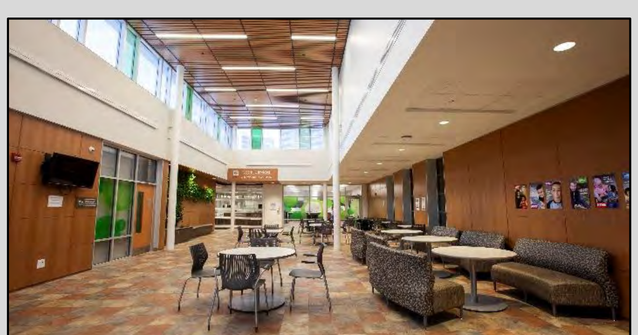
Part 3 – Asset Lifecycle Management Strategy (Continued)

The cost of identified Lifecycle activities are summarized in Tables 3.4 and 3.5. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years.

Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Table 3.4 Typical Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Service Area	Budget Type	Asset Type	Current Funding (000's) (Average annual Activity Currently Practiced)
Service Area X	Operating Budget (Non-Infrastructure and Maintenance and Operating Activities)	Asset Type 1	$A
		Asset Type 2	$B
		Total	**$A + $B**
	Lifecycle Capital Budget (Rehabilitation, Renewal, Replacement, and Disposal Activities)	Asset Type 1	$M
		Asset Type 2	$N
		Total	**$M + $N**
	Service Improvement Budget	**Total**	**$Y**



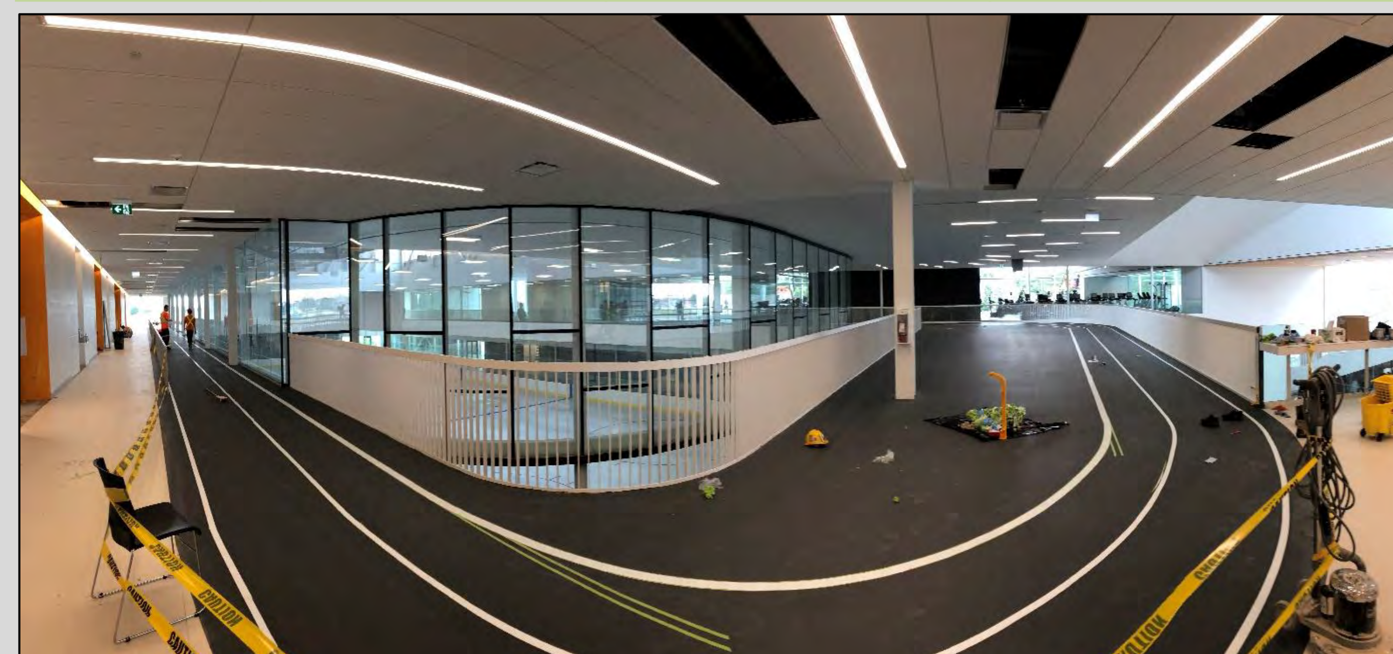
South London Community Centre - Jalna Blvd.

Sand/Salt Dome – Exeter Operation Centre

Growth activities are based on the approved 2019 DC Background Study.

Table 3.5 Typical Expected Growth Budgets (Operating and Significant Operating Costs)

Service Area	Budget Type	Activity Type	Expected Funding (000's) (Average annual Activity Expected over 10 year period)
Service Area X	Growth (Capital Budget and Significant Operating Costs)	Asset Type 1 (Operating)	$C
		Asset Type 1 (Capital)	$D
		Asset Type 2 (Operating)	$E
		Asset Type 2 (Capital)	$F
		Total	**$C + $D + $E + $F**



Bostwick Centre during construction - Southdale Road W.

Part 3 – Asset Lifecycle Management Strategy (Continued)

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE - EXAMPLE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is not sufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 3.3 presents the condition profile for the next 20 years based in the current budget.

OPTIMUM BUDGET CONDITION PROFILE - EXAMPLE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the level of service metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. Figure 3.4 presents the condition profile for the next 20 years based in the optimal budget.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual optimal expenditure to maintain the current condition profile.

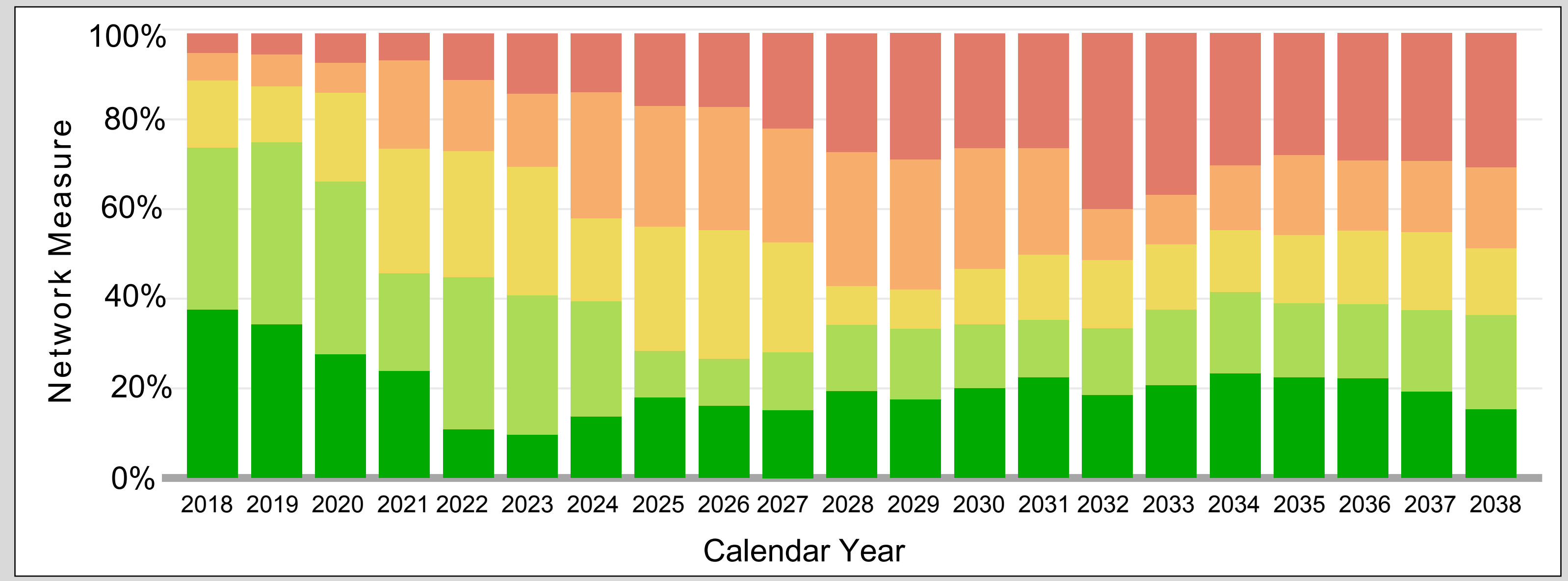


Figure 3.3 Projected 20-year Current Budget Condition Profile (Example)

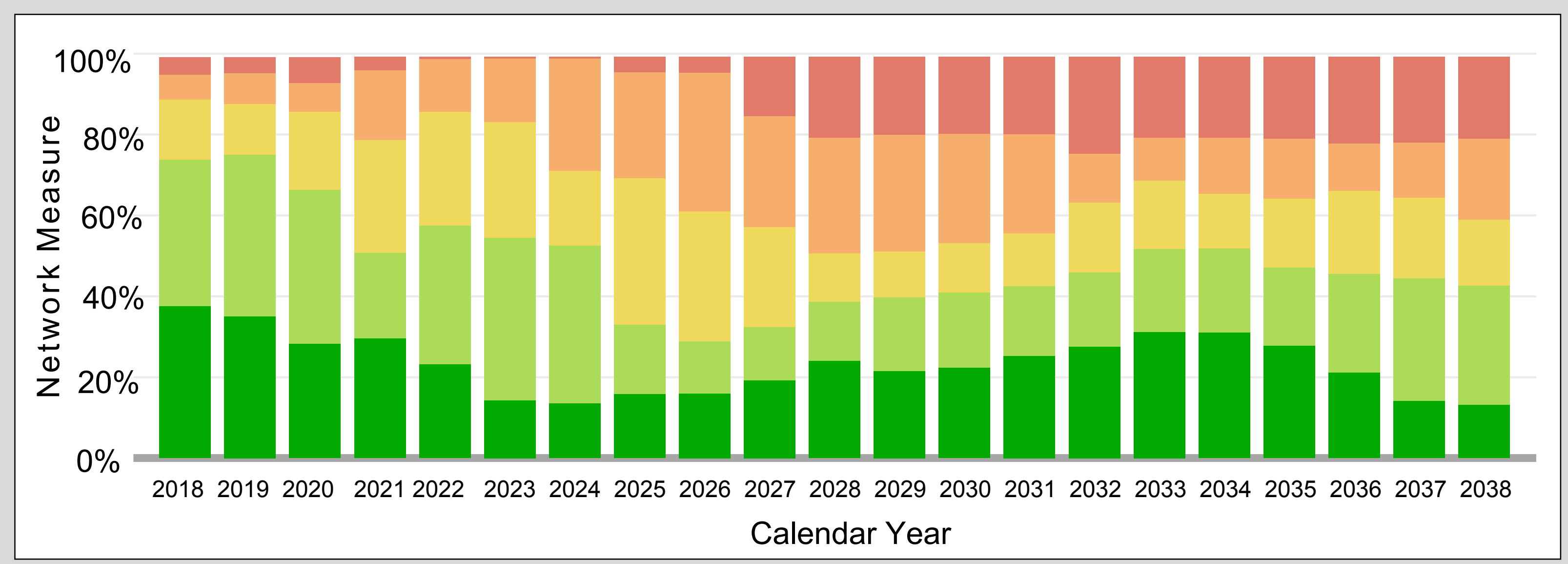


Figure 3.4 Projected 20-year Optimal Budget Condition Profile (Example)

Part 4 – Forecasted Infrastructure Gap

The results of the analysis of the optimal expenditure profile to achieve the Ideal condition profile is compared against current expenditure levels to establish the forecasted infrastructure funding gap. This analysis uses a combination of data from the City's operating and capital budgets, as well as work completed by subject matter expert staff who support each service area. The typical results of this analysis are provided in Table 3.6 and presented in a graph as seen in Figure 3.5.

Table 3.6 Typical Funding Gap Analysis Approach

Activity	Optimal Expenditure (000's) (Average annual Activity to Maintain Current LOS)	Current Funding (000's)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's)
Rehabilitation	Average Annual Funding in Capital Budget	Average Annual Expenditures of Optimal Expenditure Profile	Estimated Average Annual Availability	Average Annual
Replacement				
Total	$X	$W	$Y	$W - $X + $Y

Wonderland Road N and Sunningdale Road W. Intersection

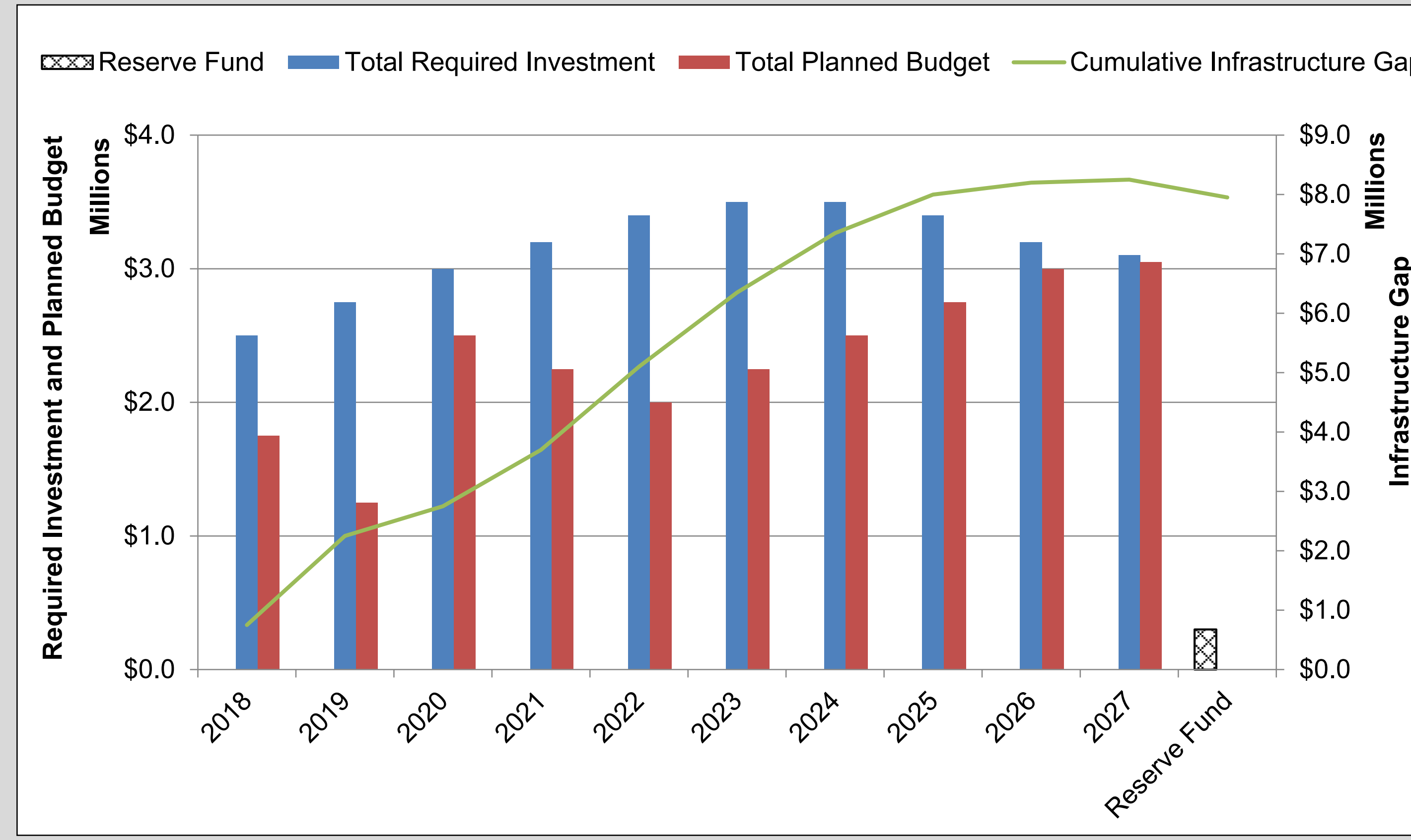


Figure 3.5 Typical Funding Gap Chart (Example)

Bridge - Highbury Avenue Overhead at CN Rail

Section 3: Overview of Service Area Sections

Part 5 – Discussion

Discussions of the current and future challenges of the service, its infrastructure gap, and comparison to the 2014 Asset Management Plan are performed. Figure 3.6 compares the service condition profile from 2014 to 2019 CAM Plan. Figure 3.7 provides a visual of the ten year funding gap with supplementary information showing the funding gap split by Asset Type. Table 3.7 summarizes state of infrastructure and funding gap data, and compares the current annual reinvestment rates to recommended annual reinvestment rates.

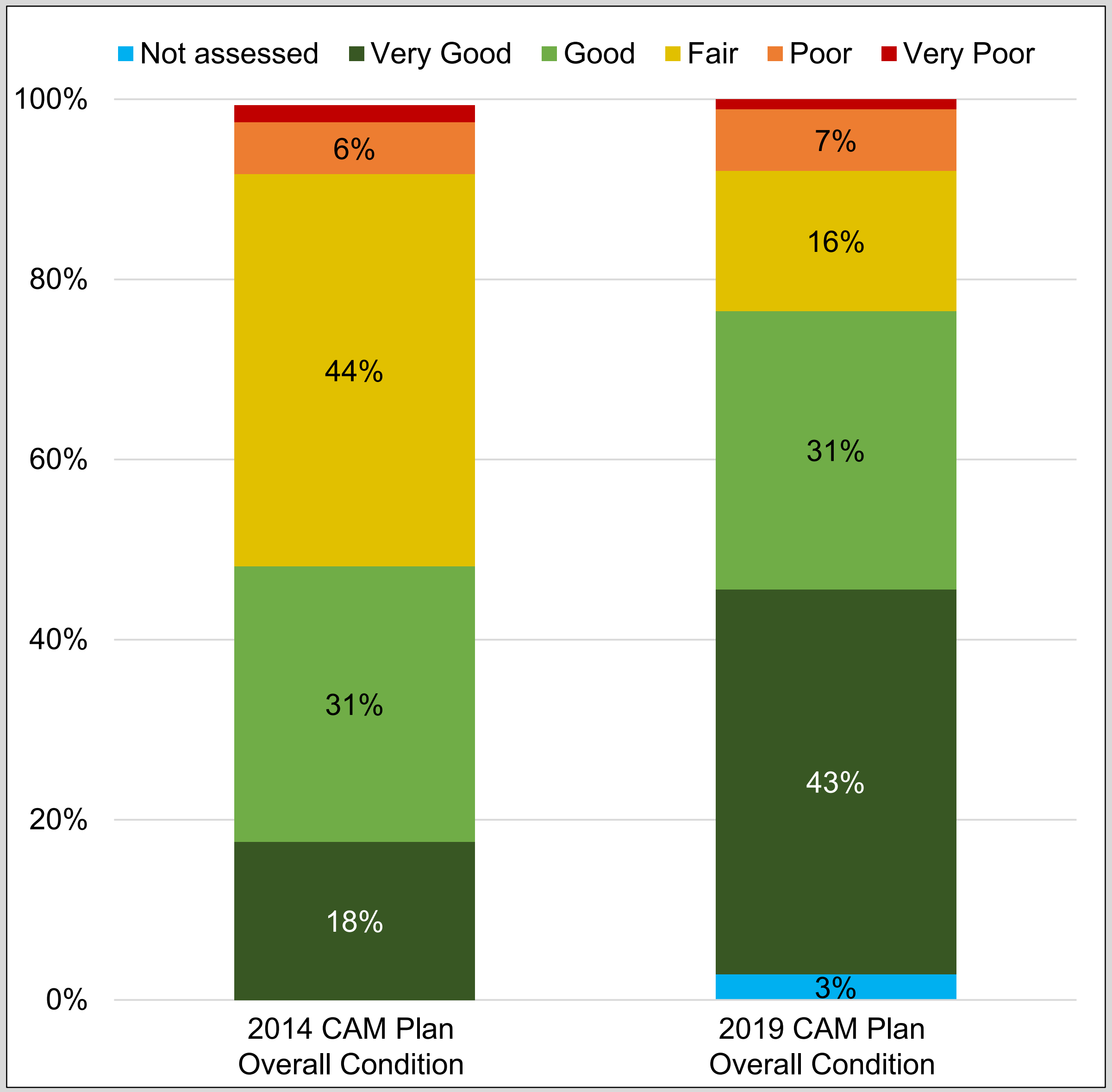


Figure 3.6 2014 CAM Plan to 2019 CAM Plan Condition Summary (Example)

Part 6 – Conclusions

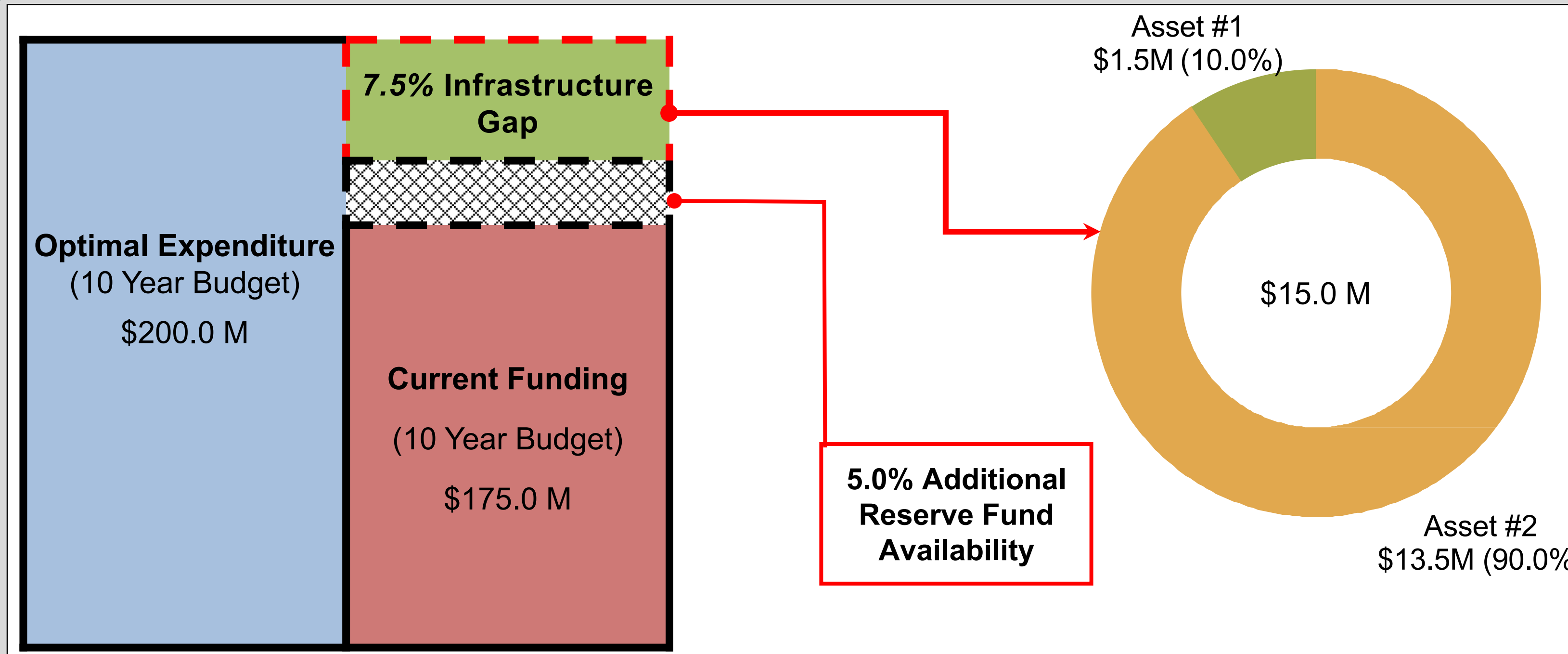


Figure 3.7 Cumulative 10 Year Infrastructure Gap (Example)

Table 3.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Example)

City of London Example Assets						
Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Type #1	$100.0		None identified	$0.5	0.2%	1.0% to 1.3%
Type #2	$50.0		None identified	$1.0	1.2%	1.7% to 2.0%
Total	**$150.0**		**None identified**	**$1.5**	**0.5%**	**1.0% to 1.4%**

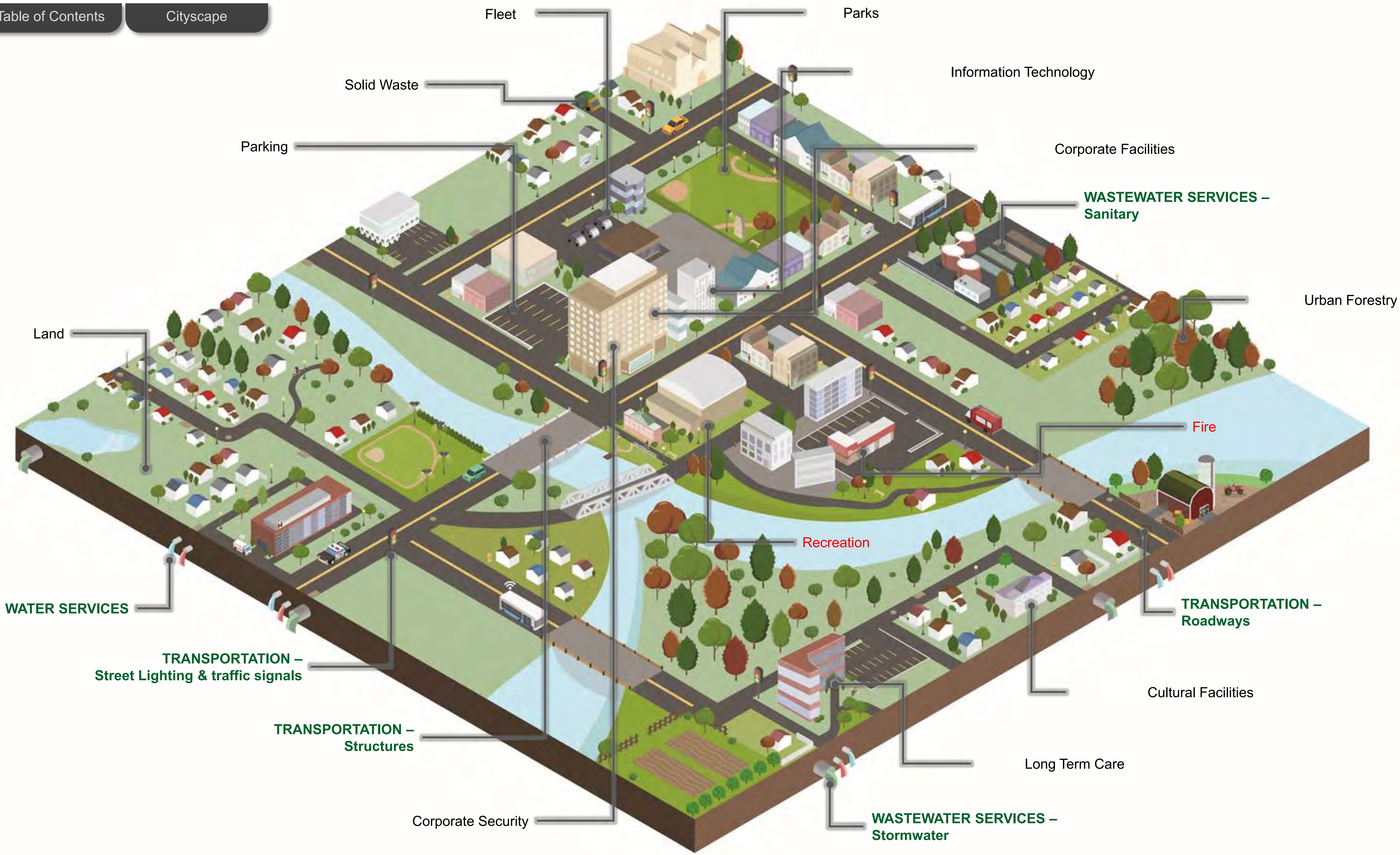


Figure 3.8 City Scape

Section 4: Water

Quick Facts
1,603 kilometers of water mains
5 Water Reservoirs
9 Pumping Stations
117,384 Water Meters

Replacement Value	$5.869 Billion
Condition	Good

10 Year Gap	None
City-Wide Infrastructure Gap Contribution	None

No Infrastructure Gap Identified

Section 4: Water

4.1 STATE OF LOCAL INFRASTRUCTURE

The City of London supplies safe, clean, high-quality water to the residents and businesses of London. This involves managing a reliable water system capable of providing sufficient quality, flow and pressure to satisfy drinking, recreational, irrigation, sanitary, fire protection, and business needs. Treated drinking water is purchased from the Lake Huron and Elgin Area Water Supply Systems, which draw water from Lake Huron and Lake Erie respectively. Drinking quality water is pumped from the treatment plants at each lake into the City where it is distributed and metered to all the water customers while meeting pressure, flow and quality standards. This requires an extensive network of infrastructure valued at approximately $5.9 Billion, which is operated and maintained by the City of London.

South East Reservoir – Highbury Ave. S

4.1.1 Asset Inventory & Valuation

Water assets are managed and maintained to meet provincially issued system and facility operating permits, as well as City of London technical targets for performance and reliability. Valued at approximately $5.9 Billion, this extensive network of assets can be grouped into two types: Linear; and, Water Facilities. They are further divided, ranging from transmission mains to wells.

It is also noted that this replacement value is considered as if this service area would be replaced on a complete and standalone basis. In practice, the City's Core services (Transportation, Wastewater Sanitary, Wastewater Storm, and Water) coordinate to ensure cost efficiencies to maintain the current level of service at the lowest cost. While the Core chapters are presented separately, they should be read and considered as whole when considering their infrastructure lifecycle needs.

South East Reservoir Interior – Highbury Ave. S

Section 4: Water

4.1.1 Asset Inventory & Valuation (Continued)

Table 4.1 Asset Inventory & Valuation (Water Services)

Asset Type	Asset*		Inventory	Unit	Replacement Value (000's)
Linear	Transmission Mains (>= 416 mm diameter)		206	Km	$631,895
	Distribution Mains (< 416 mm diameter)		1,397	Km	$3,286,542
	Appurtenances	Service Connections	119,152	Ea.	$1,429,824
		Valves	13,619	Ea.	$122,571
		Hydrants	7,041	Ea.	$52,808
		Chambers (associated with <= 450mm main diameter)	222	Ea.	$22,200
		Chambers (associated with > 450mm main diameter)	335	Ea.	$119,600
		PRV	13	Ea.	$2,600
	Water Meters		117,384	Ea.	$33,575
Water Facilities	Pump Stations (Incl. Rechlorination)		9	Ea.	$74,742
	Bulkwater Stations		8	Ea.	$760
	Storage Reservoirs		5	Ea.	$90,792
	Wells		7**	Ea.	$800
Total					**$5,868,709**

* Note that administrative, maintenance and storage buildings are maintained by the City's Facilities group. Fleet and associated equipment is provided and serviced by Fleet Management Services and are dealt with in the Fleet section. Land is also excluded from this asset pool and dealt with in the Land section.

**Note that wells are in decommissioning process and expected to be complete approximately 2020.

The water infrastructure is grouped into Water Linear (pipes, appurtenances and meters) and Water Facilities (pumping stations, bulkwater stations, storage reservoirs, and wells). Water assets are managed and maintained to meet provincial drinking water quality requirements. Along with City of London technical targets for performance and reliability, the utility adheres to its accreditation requirements through the Council-endorsed Drinking Water Quality Management Standard - Operational Plan.

Water Linear assets are the largest of the inventory categories and include the pipes, appurtenances like valves, chambers, fire hydrants and meters. Pressure Reducing Valves (PRV) are tracked as their own category given the critical nature of these valves. London implements a variety of initiatives in order to maintain the water linear assets in an acceptable condition.

Watermain rehabilitation programs include cleaning/lining and cathodic protection. These programs are run on an ongoing basis and are funded annually. Pipe lining focuses on cast iron watermains, where cathodic protection is applied to ductile iron watermains. Optimized water chemistry, and external corrosion mitigation methods are also used to minimize failures.

Valve Chamber

4.1.1 Asset Inventory & Valuation (Continued)

Watermain renewal efforts are targeted towards cast iron watermains, as they are prone to internal corrosion which has a significant impact on both the quality of the water and the hydraulic capacity of the pipe. The majority of the cast iron pipe is replaced with PVC. By following the 20 Year Water Financial Plan, the majority of the cast iron water mains will be renewed by the mid to late 2030's and cast iron breaks will be substantially eliminated. Although watermain renewal is prioritized by break history, age, material and capacity to support revitalization/growth amongst other factors using a Microsoft Access based program called WCAP, coordination with Wastewater and Stormwater linear asset replacement is often what drives the project. The coordination with the other Environmental Engineering Services allows for significant cost savings in restoration. The City of London also undertakes monitoring techniques to check for leaks and help identify potential areas of risk. The monitoring technique uses an acoustic fibre optic (AFO) system and has been installed in the majority of the City's large concrete transmission mains. Free swimming condition assessment tools are also used for monitoring in addition to AFO.

Water Meters are planned for replacement through an accelerated program at approximately 12,000 meters per year in order to eliminate the backlog of meters that have exceeded their useful life, and achieve a level of sustainability. The inventory of remote reading meters is relatively young but ever-increasing, recently becoming standard installation hardware. They are checked, recalibrated, and/or replaced based on manufacturer recommendations.

Water Facilities include pump stations, storage reservoirs and a few backup wells. These water facilities are assessed on an individual and planned basis through a mix of normal maintenance and engineering studies.

Sunningdale Water Pumping Station

4.1.2 Age Summary

Figure 4.1 shows the Water average asset age as a proportion of the average useful life by asset. Asset ages have been established using data from the City's geomatics (GIS) database, consultant reports, and Tangible Capital Asset database.

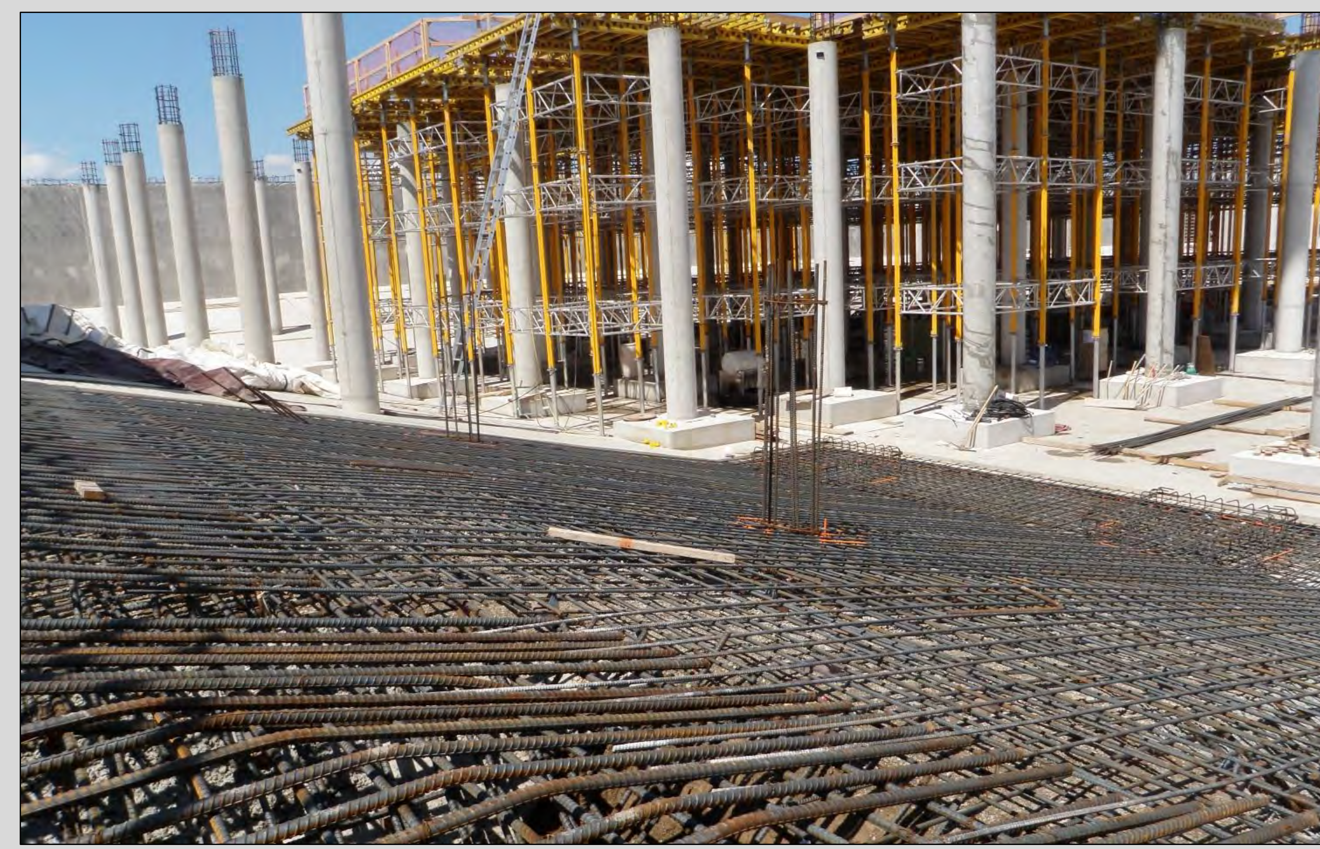
The **watermain** infrastructure is approximately one-third to one-half through the expected useful life. Detailed construction date information exists, and the average age is reflective of 80% of the watermain network being less than 55 years of age.

Limited **appurtenances** installation dates exist. The limited installation date is reflective of watermain age (and condition), and would generally be the deciding factor in replacing or rehabilitating watermain (and associated appurtenances) assets.

Detailed **water meters** data exists with the assets one quarter through their expected useful life.

Storage reservoir average age is representative of two reservoirs built the past 25 years, two built approximately 55 years ago, and one reservoir approximately 90 years ago.

Bulk Water Station age indicates the assets are in the last one-quarter of their age. Pump stations on average are two-thirds through their asset life.



SE Reservoir Construction Process

4.1.2 Age Summary (Continued)

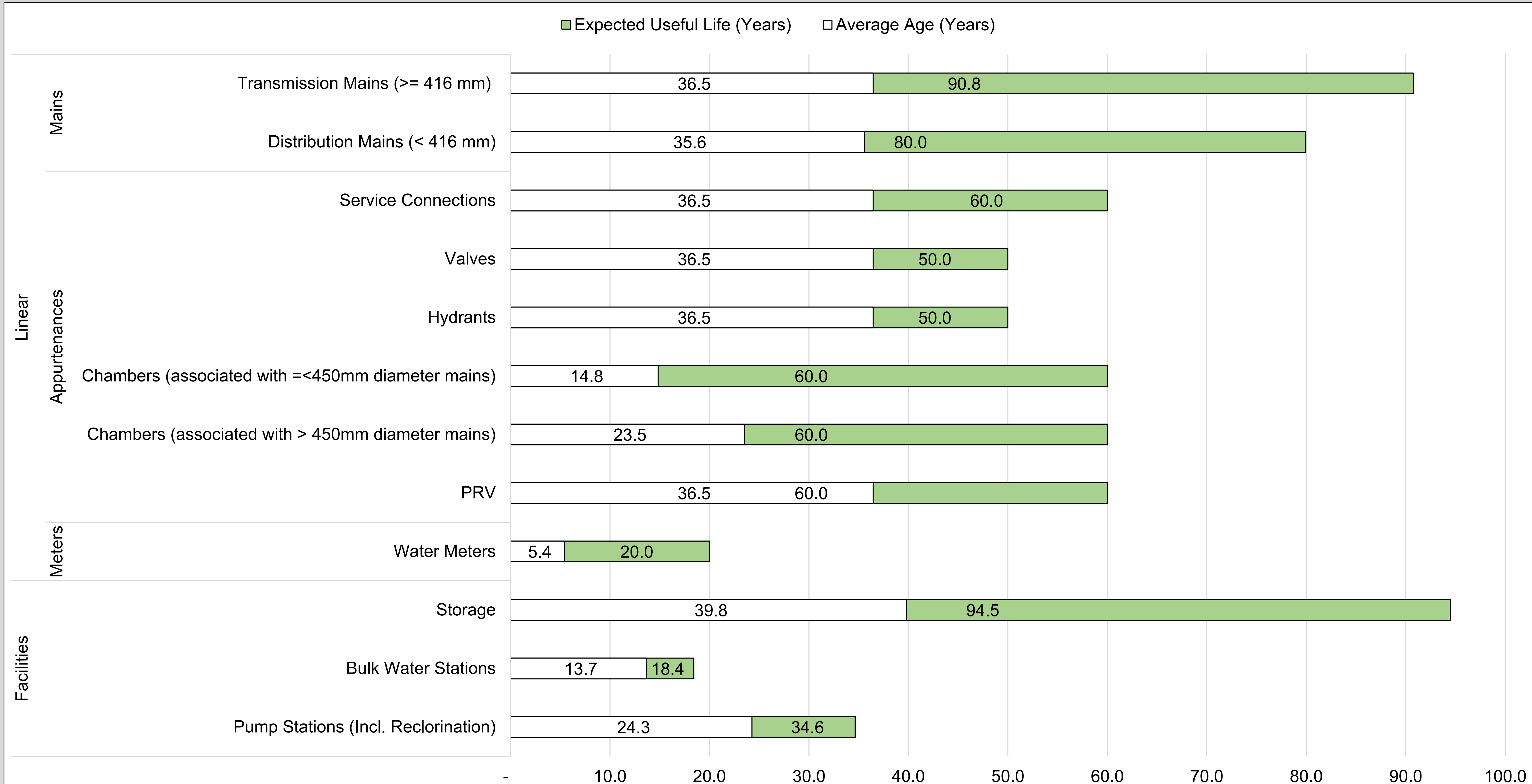


Figure 4.1 Average Asset Age as a Proportion of Average Useful Life (Water Services)

4.1.3 Asset Condition

The Water service area has nearly 93% of assets in **Fair**, **Good**, or **Very Good** condition. The remainder are approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The City's Water assets are overall in fair to good condition, indicating that they are meeting current needs but are aging and may require attention.

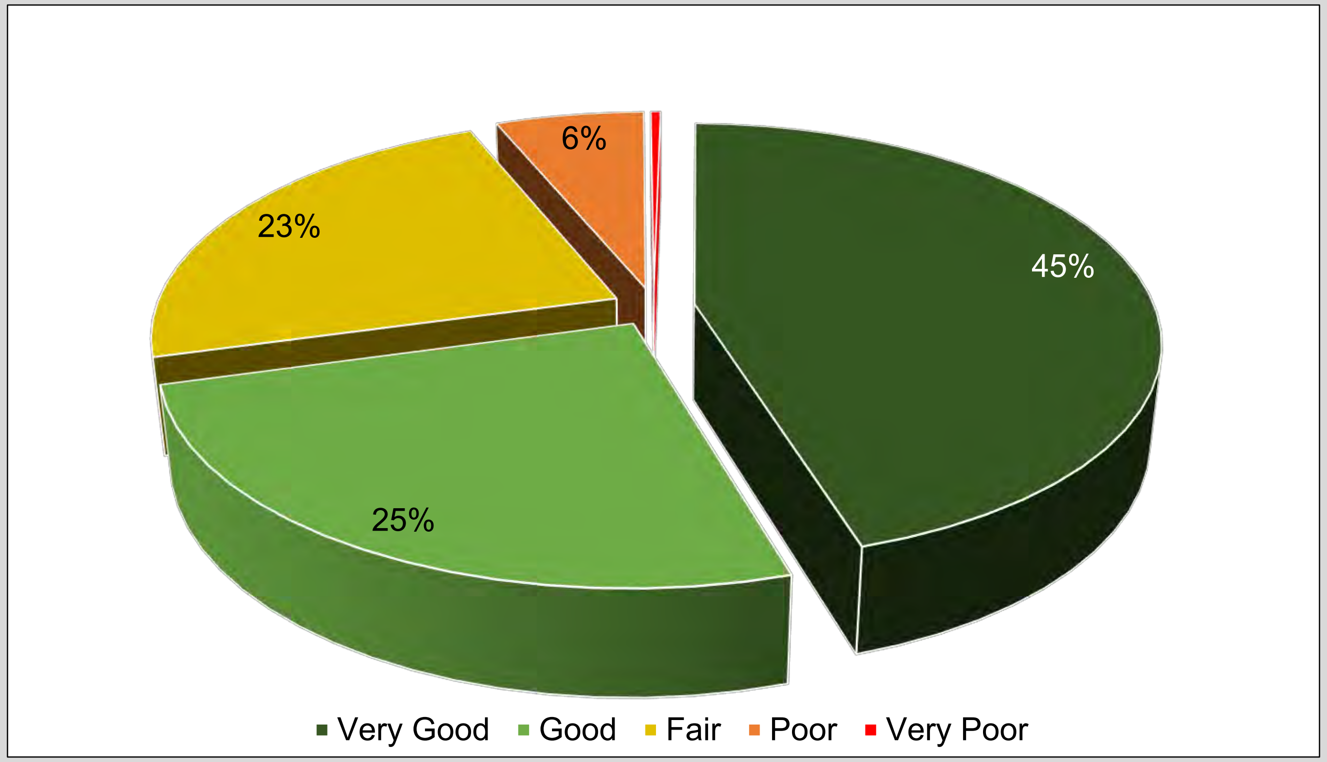


Figure 4.2 Asset Condition Summary (Water Services)*

***Amounts subject to rounding**

Asset conditions have been established using data from the City's geomatics (GIS) database; and, internally developed watermain condition models, consultant reports, and expert opinion.

Watermains represent the bulk of the value of the water asset base and are rated in **Fair**, **Good**, or **Very Good** condition. The remainder are approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The continuing focus on the renewal of cast iron mains is necessary to meet the City's service goals.

Appurtenances condition are based on linear asset condition, thus, are in similar condition and investment requirement timeline.

Water Meters are nearly all in **Fair**, **Good**, or **Very Good** or better condition and managed to ensure integrity and sustainability of the billing process. The condition assessment is based on the age and expected useful life of the water meters.

Water Facilities (pump stations, storage reservoirs and bulkwater stations) are split between **Good** and **Very Poor** condition. This assessment is based on a combination of consultant reports and expert opinion. It is consistent with storage reservoirs either being relatively recently constructed (last 25 years) or construction dates of both approximately 55 years ago and over 90 years ago. Pumping Stations, while currently in a **Good** condition, would deteriorate if the needs identified through consultant reports are not met. The majority of Bulkwater stations are in **Very Poor** condition given they are nearing the end of their expected useful life, and thus require replacement over the next 10 years. Given that wells are not in use and to be disposed of within several years, their condition rating is considered not applicable.

Pipe Diver used to inspect live watermains

4.1.3 Asset Condition (Continued)

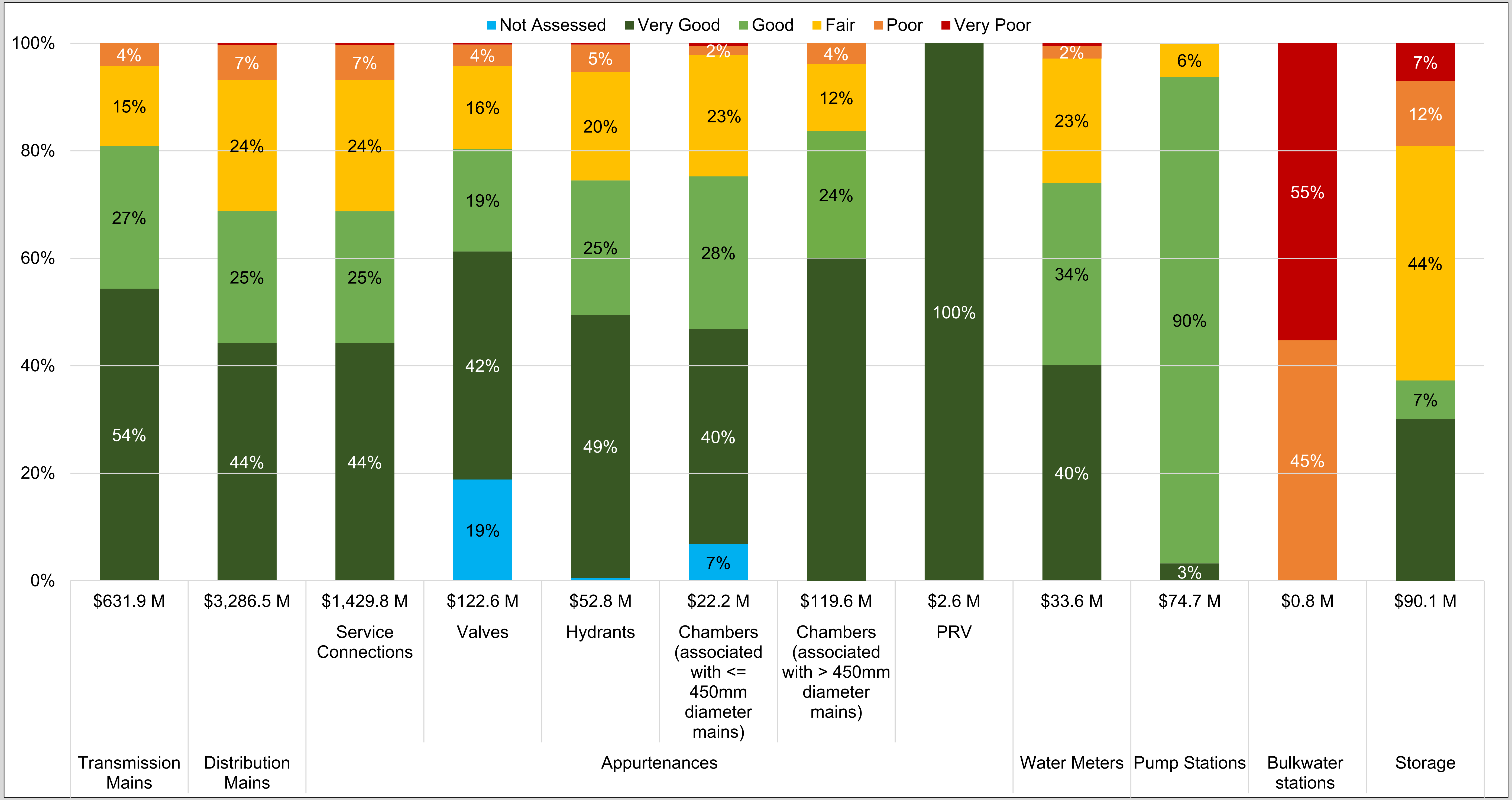


Figure 4.3 Asset Condition Detail (Water Services)

4.2 LEVELS OF SERVICE

O. Reg. 588/17 requires legislated community levels of service for core assets. Community levels of service use qualitative descriptions to describe the scope or quality of service delivered by an asset category. Examples of legislated community levels of service include a map showing areas of the municipality that are serviced by the water and wastewater system. In this example, a map provides an illustrative view of the extent of the services provided through the infrastructure assets.

O. Reg. 588/17 also requires legislated technical levels of service for core assets. Technical levels of service use metrics to measure the scope or quality of service being delivered by an asset category. Examples of technical levels of service include the percentage of urban properties serviced by the municipal water and wastewater system. Technical levels of service for core assets are provided below.

The following are performance measures in the LOS Table that are O.Reg 588/17 requirements for wastewater (or Water) assets. References are provided to show where O. Reg 588/17 requirement has been attained:

Table 4.2 O.Reg 588/17 Levels of Service Metrics (Water Services)

Customer Level of Service	Technical Level of Service
Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system. **(Table 4.3 and Figure 4.4)**	Percentage of properties connected to the municipal water system **(98% - Table 4.3)**
Description, which may include maps, of the user groups or areas of the municipality that have fire flow. **(Table 4.3 and Figure 4.4)**	Number of properties where fire flow is available **(98% - Table 4.3)**
Description of boil water advisories. **(Table 4.3)`**	Number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system **(0 - Table 4.3)**
Description of service interruptions. **(Table 4.3)**	Number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system **(206.9 - Table 4.3)**

OTHER LEVELS OF SERVICE PERFORMANCE METRICS

Other LOS performance measures are related to Corporate Values of Scope, Cost Efficiency, Safe, Quality, Reliability, and Environmental Stewardship. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Table 4.4.

Well Decommissioning Process

Section 4: Water

Table 4.3 O. Reg 588/17 Required Levels of Service Metrics (Water Services)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Reliable	Providing water services with minimal interruptions	Description of boil water advisories and service interruptions	No boil water advisories during the 2017 calendar year, and service interruptions typically occur from watermain breaks.	Not Applicable
Scope	Providing adequate water services to the community	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system.	See Map in Figure 4.4 of Water Service Area Chapter	Not Applicable
		Description, which may include maps, of the user groups or areas of the municipality that have fire flow.	See Map in Figure 4.4 of Water Service Area Chapter	Not Applicable
		% of residents satisfied with water services*	92%	

*It is noted this metric is not Regulation-required but included in this list given is has the same Customer Value as Regulation-required metrics.

Fire Hydrant

No Change | Positive Upward | Positive Downward

Section 4: Water

Table 4.3 (Continued) O. Reg 588/17 Required Levels of Service Metrics (Water Services)

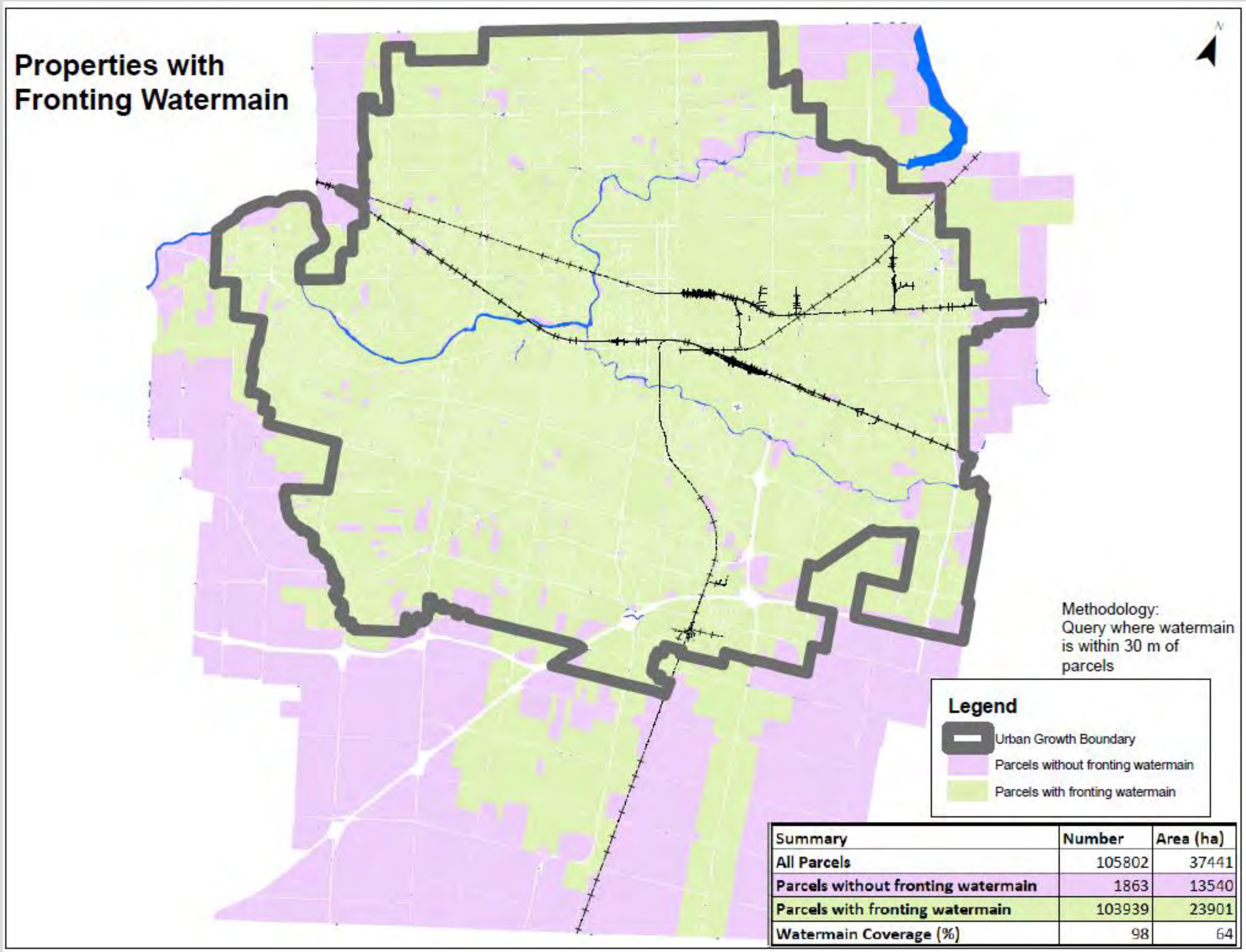
Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing water services with minimal interruptions	Number of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system	0	No Change
		Number of connection-days per year due to water main breaks compared to the total number of properties connected to the municipal water system	206.9 connection days to 97,300 connected to the municipal water system	Positive Upward
Scope	Providing adequate water services to the community	Percentage of properties where fire flow is available	98%	Positive Upward
		Percentage of properties connected to the municipal water system	98%	Positive Upward

Historic Wooden Watermain

No Change | Positive Upward | Positive Downward

Section 4: Water



Summary	Number	Area (ha)
All Parcels	105802	37441
Parcels without fronting watermain	1863	13540
Parcels with fronting watermain	103939	23901
Watermain Coverage (%)	98	64

Figure 4.4 Map outlining percentage of City which has water connectivity and fireflow connectivity

Section 4: Water

Table 4.4 Levels of Service Metrics – Foundational and Advanced (Water Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing water services in an efficient manner	Annual operating cost to provide water service ($/household)	$223	↔
Safe	Water system supports community fire protection	Percentage of City owned Hydrants with sufficient fire flow by hydrant	99.2%	↔
	Water system provides safe potable drinking water	Percentage compliance with all applicable water quality regulations	84.1%	↑
Quality	Providing high quality water to residents	Number of complaints due to rusty/discoloured water	62	↓
Reliable	Providing water services with minimal interruptions	Percentage of water assets in fair or better condition	93%	↑
		Percentage of customers where service is interrupted above target frequency	0.12%	↓
		Percentage of watermain breaks repaired in less than 6 hours	94.2%	↔
Environmental Stewardship	Providing a water service that is environmentally conscious	Residential water consumption L/cap/day	188 L/cap/day	↓

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 4: Water

Table 4.4 (Continued) Levels of Service Metrics – Foundational and Advanced (Water Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing water services in an efficient manner	Operating budget for water services	$39,356,581	
		Water linear (Mains + Appurtenances) Reinvestment Rate	0.45%	
		Water Meter Reinvestment Rate	4.6%	
		Water Facility Reinvestment Rate	1.2%	
Safe	Water system supports community fire protection	Percentage of red hydrants/Total # of hydrants	1.8%	
	Water system provides safe potable drinking water	Percentage of Water sampling meeting Regulatory requirements	99.9%	100%
		Number of lead services replacements per year	350	500
		Number of boil water advisories	0	
Quality	Providing high quality water to residents	Percentage of system serviced by sources that provide substandard water	0	
		Percentage of system that is unlined CI/DI	26%	

No Change **Positive Upward** **Positive Downward**

Section 4: Water

Table 4.4 (Continued) Levels of Service Metrics – Foundational and Advanced (Water Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TEHCNICAL LOS TARGET
Reliable	Providing water services with minimal interruptions	% of watermains in poor or very poor condition	6%	↓
		% of water meters in poor or very poor condition	3%	↓
		% of facility assets in poor or very poor condition	11%	↓
		# of leaking services fixed	228	↑
		# of watermain breaks	86	120
		# of watermain breaks/100 km	5.5	↑
		# of watermains susceptible to freezing	0	↔
Environmental Stewardship	Providing a water service that is environmentally conscious	Infrastructure Leakage Index (ILI)	2.2	↓
		Energy consumption – kW per ML supplied	187.4	↔

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

4.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

4.3.1 Lifecycle Activities

Table 4.6 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Water assets:

Table 4.5 Current Asset Management Practices or Planned Actions (Water Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	***Linear (Mains, Appurtenances, or Meters) and Water Facilities (Pump Stations, Reservoirs)*** • Encouragement of conservation of water and energy through policy, procedures, public outreach, etc. • Management of water chemistry to reduce corrosion. • Coordination efforts to optimize construction between city projects and external parties (UCC).	• Refer to Appendix B.
Maintenance Activities Including regularly scheduled inspection and maintenance or more significant repair and activities associated with unexpected events.	***Linear (Mains, Appurtenances, or Meters)*** • Scheduled preventative maintenance programs including air and vacuum valve maintenance program. • Scheduled inspection programs for key assets – e.g. leak detection and pipeline detection. • Continuous condition monitoring for key assets through Acoustic Fibre Optic Monitoring. • 24 hour maintenance response capability. • Reactive maintenance for significant portion of asset inventory. ***Water Facilities (Pump Stations, Reservoirs)*** • Refer to Appendix B.	• Refer to Appendix B.

Table 4.5 (Continued) Current Asset Management Practices or Planned Actions (Water Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset	***Linear (Mains, Appurtenances, or Meters)*** • Watermain rehabilitation based on the current condition of the pipe: ○ Structural Re-lining. ○ Cathodic protection (anode program). • Water meter rehabilitation would generally not be performed – the asset would be replaced. ***Water Facilities (Pump Stations, Reservoirs)*** • Water facilities are rehabilitated based on facility inspection reports.	• Incorrect assumptions regarding improved expected useful life after rehabilitating a main. Specifically, the estimated service life of a full length cure-in-place pipe is still not well founded in the scientific literature as it is a comparatively new process (developed over the past two decades).
Replacement/ Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	***Linear (Mains, Appurtenances, or Meters)*** • Watermain replacement is based on the condition rating of the infrastructure and the infrastructure needs of other service areas. In most cases, once the pipe has been inspected and given a condition rating, city staff can determine the best method for replacement: ○ Complete open-cut replacement. ○ Horizontal directional drilling (HDD). • Lead service replacement program. • Water meter replacement using newer technology that maintains the current level of service. • Coordinate with wastewater, roads projects and through UCC. ***Water Facilities (Pump Stations, Reservoirs)*** • Water facilities replaced based on facility inspection reports which recommend replacing pumps, valves, roofs, etc.	• Refer to Appendix B.

Table 4.5 (Continued) Current Asset Management Practices or Planned Actions (Water Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	***Linear (Mains, Appurtenances, or Meters)*** • Watermains are either removed during construction or are disconnected and abandoned in place depending on the construction circumstances. Abandoned mains are capped and/or grouted to protect other infrastructure. • Data on active and abandoned watermains is stored in GIS. GIS tracks the asset status (i.e. active, abandoned, and/ or removed). ***Water Facilities (Pump Stations, Reservoirs)*** • Water facilities disposal: ○ Equipment removed. Land reused or sold. ○ Equipment disposed or inventoried as spare parts, no cost recovery.	• Lack of planning and funding may limit the options to efficiently replace existing and add new capacity. • Cost increases resulting from unexpected health concerns resulting from disposal (such as uncovering asbestos pipe).
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	***Linear (Mains, Appurtenances, or Meters)*** • Increased capacity and water quality for watermains as a result of cleaning and structural lining. • Replaced watermains are increased in size as appropriate to improve flow, pressure, and reliability along the watermain and in the greater area. ***Water Facilities (Pump Stations, Reservoirs)*** • In some cases pumps can be modified to change the flow curve in a way that improves operations, efficiency, and pump life.	• Refer to Appendix B.

Section 4: Water

Table 4.5 (Continued) Current Asset Management Practices or Planned Actions (Water Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	***Water – All*** • Capital growth projects are identified by Development Charges and Water (subject to *Development Charges Act, 1997* requirements and City of London policy). • Undertake Environmental Assessments. • Assumption of subdivisions, commercial and industrial extensions, local improvements, etc. • Interim works (typically one to ten years) built to provide temporary service pending construction of permanent infrastructure assets. For water services, these are usually temporary overland water systems (temporary fire hydrants, water service connection and overland water piping). ***Linear (Mains, Appurtenances, or Meters)*** • Projects relate to extensions and expansions. ***Water Facilities (Pump Stations, Reservoirs)*** • Projects typically relate to pump stations process upgrades. • Interim work generally needed for Water pump stations.	• Refer to Appendix B.

Risks described above are compared to current lifecycle and service improvement funding, and any identified growth budgets in the 2018-2027 period.

4.3.1 Lifecycle Activities (Continued)

Table 4.6 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Service Area	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Water (Linear and Facilities)	Operating Budget*	**Total (Mains, Appurtenances, Meters, and Water Facilities)**	**$38,765.0**
	Lifecycle Capital Budget**	Mains and Appurtenances	$25,427.3
		Meters	$1,560.0
		Water Facilities	$2,027.8
		Total	**$29,015.1**
	Service Improvement Budget	**Total (Mains, Appurtenances, Meters, and Water Facilities)**	**$706.0**

Current funding presented for operating budgets presented is the average of budgeted 2016 and 2017 fiscal years.

Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

* Non-infrastructure solutions and maintenance/operating

** Rehabilitation, Renewal, Replacement, and Disposal Activities

Table 4.7 Expected Growth Budgets (Capital and Significant Operating Costs)

Service Area	Budget Type	Activity Type	Expected Funding (000's) (Average annual Activity Expected over 10 year period)
Water (Linear and Facilities)	Growth Capital Budget and Significant Operating Costs	Growth Capital – Linear	$4,797
		Growth Capital – Water Facilities	$332
		Significant Operating Costs – Mains and Water Facilities	$322
		Total	**$5,451**

Growth activities are analyzed using the draft 2019 DC Background Study. We note that the asset management plan has been completed prior to the finalization of the draft DC Background Study. Thus, any growth needs as identified in the draft 2019 DC Background Study are assumed to be approved for purposes of the CAM Plan, but could be revised.

Proposed needs are split approximately 94% Watermains and 6% Water Facilities (Pumping Stations).

Watermain needs are either identified for intensification projects, which include industrial oversizing, built area works, and high and low level systems, infill and intensification nodes.

The remainder of growth needs for Arva pumping station.

4.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is not sufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 4.5 presents the condition profile for the next 20 years based in the current budget.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the level of service metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. Figure 4.6 presents the condition profile for the next 20 years based in the optimal budget.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

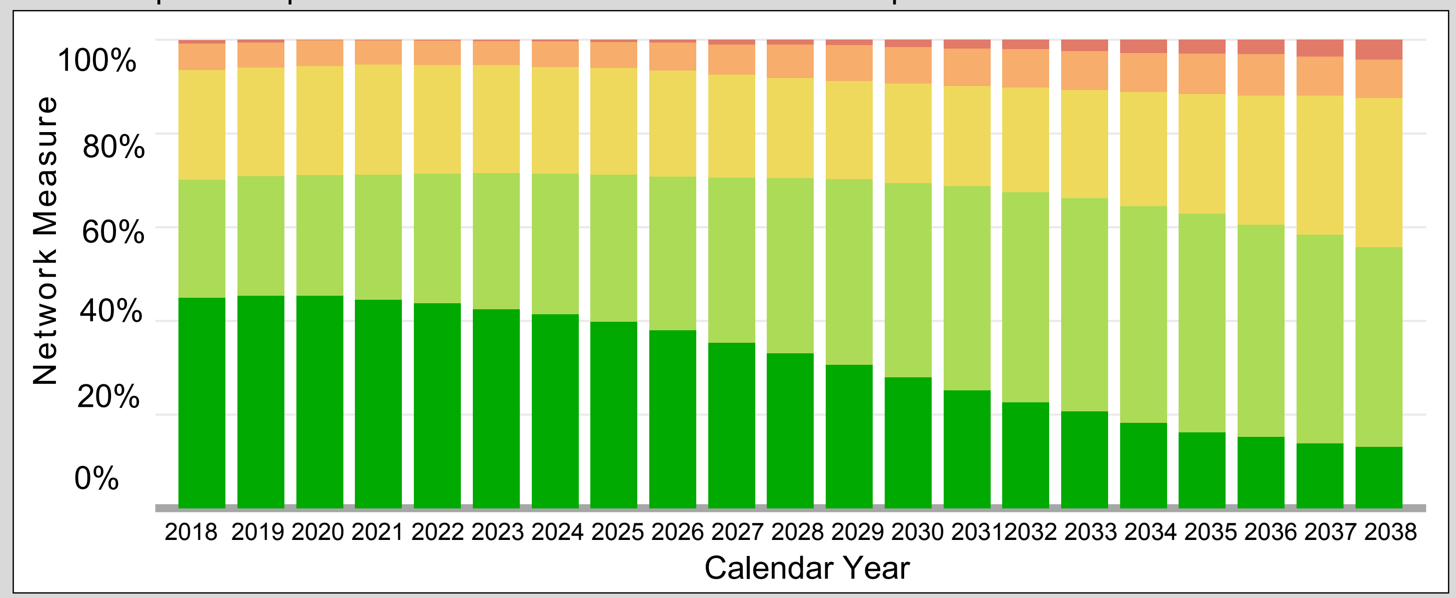


Figure 4.5 Projected 20-year Current Budget Condition Profile (Water Services)

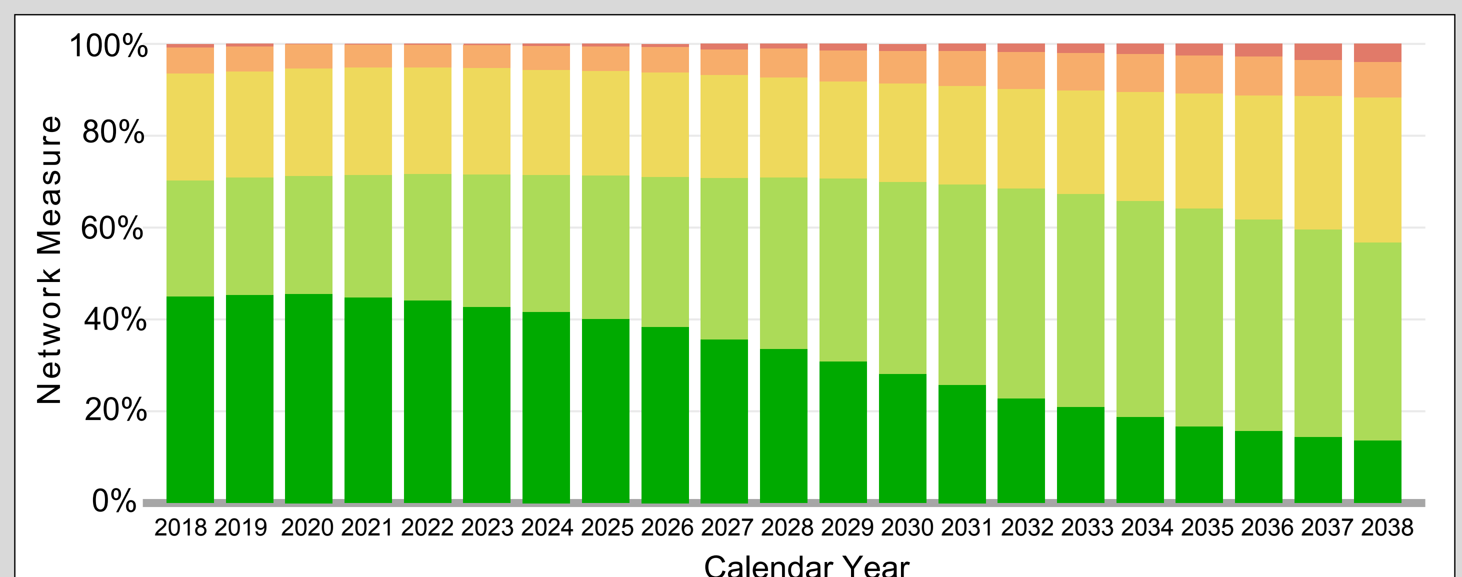


Figure 4.6 Projected 20-year Optimal Budget Condition Profile (Water Services)

Section 4: Water

4.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 4.8. The analysis documented is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Table 4.8 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Water Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Water Linear and Facilities	Lifecycle Capital Budget	Mains and Appurtenances	$25,427.3	$25,453.5	$614.9	**No Funding Gap**
		Meters	$1,560.0	$1,678.7		
		Water Facilities	$2,027.8	$2,497.7		
		Total	**$29,015.1**	**$29,630.0**	**$614.9**	

South East Reservoir Exterior – Highbury Ave. S

Section 4: Water

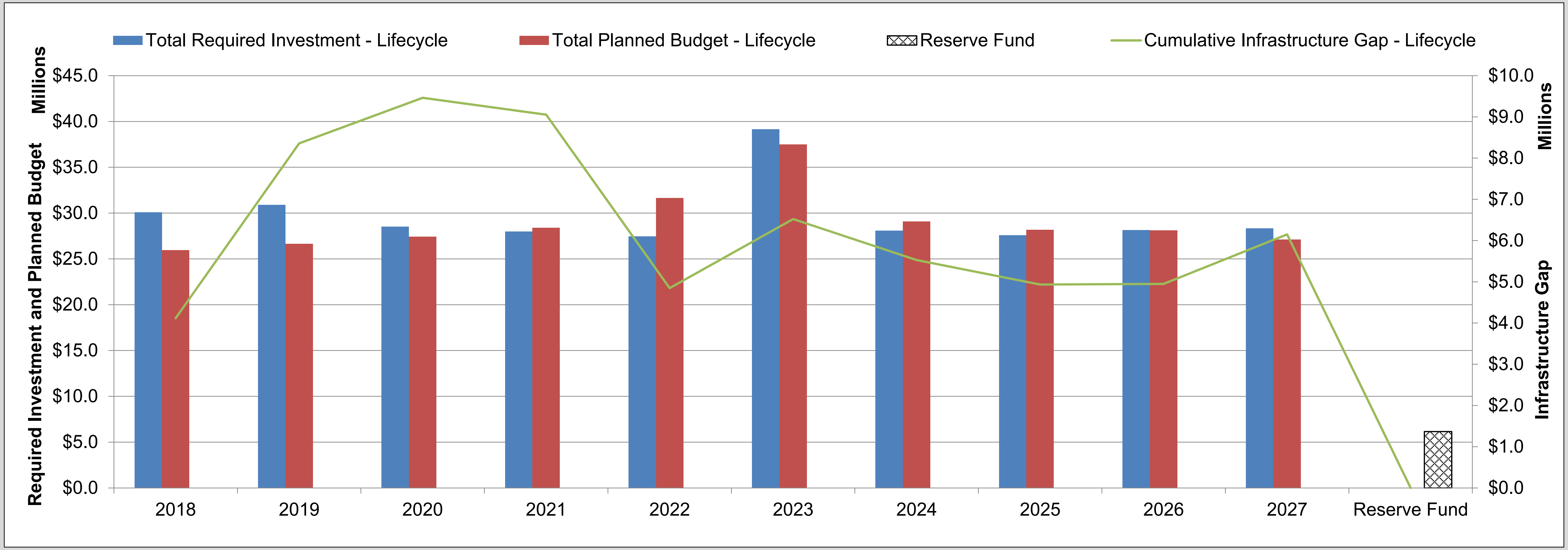


Figure 4.7 Forecasted Lifecycle Infrastructure Gap (Water Services)

For linear water assets the City is addressing its infrastructure needs by continuing proactive management techniques like targeted renewal, regular inspection, condition assessment and the use of trenchless technologies. Further use of these technologies will help control the gap over the long term.

Evaluating planned budget vs. required investment shows that the Water infrastructure gap will be reduced to $nil, assuming additional reserve fund availability of approximately $6.15 million. Total required investment represents the costs to renew and maintain the existing assets so services can continue to be delivered. The estimate does not account for any costs to improve service (e.g. water pressure, reliability, aesthetics), accommodate growth or expand service to new areas or customers.

The largest portions of the infrastructure gap in Water are represented by future requirements in pipes and service connections. The required investment for pipes with the exception of service connections in the ten year period is derived from Water Main Renewal Plan.

The required investment for service connections and water facilities assumes that assets identified as being in poor or very poor condition will need renewal over the next 20 years. The infrastructure gap increases over time due to ductile iron replacement needs and other pipe groups reaching the end of their expected useful lives. For example, many watermains installed in the 1930's through the 1970's are experiencing pipe breaks. The 1950's through 60's watermains are failing at a much higher rate than those installed before and since due to construction and material practices of the time. Cast iron pipes are failing at a higher frequency every year. Lead service connections need to be replaced. The City has already implemented proactive management techniques like targeted renewal, acoustic fibre optic monitoring, condition assessment, lining, cathodic protection, etc. to optimize management of the water assets. Further use of these technologies will help mitigate the gap over the long term.

Section 4: Water

This is consistent with the principles of the 20 Year Water Financial Plan that confirms a commitment to full cost recovery, financial stability and closing the water infrastructure gap (not necessarily in the ten year period), while achieving sustainability of the system in the years to come. The plan is a commitment to continue renewing infrastructure as it approaches the end of its useful life, prior to failure, thereby minimizing maintenance and repair costs, social disruption and water loss. The future projected rate increases will be used to address infrastructure that requires significant renewal (replacement and rehabilitation) work to close the infrastructure gap ensuring that future generations and businesses are not faced with a water system that is failing, unreliable and expensive to maintain. The 20 Year Water Financial Plan includes allowances for growth and inflation while closing the infrastructure gap over several decades. This State of Infrastructure Report uses a 10 year period to study the infrastructure gap. The results of this report reflect an initial increase in the Water infrastructure gap which the 20 year plan resolves over several decades.

Deferring renewal efforts due to budget limitations would contribute to the infrastructure gap. Success of the 20 Year Water Financial Plan will be determined through monitoring. However the plan will also need to be flexible to address the myriad of changes that will occur over time.

It is noted that risk assessment and consequence of failure is not explicitly addressed in this CAM Plan. For example, the consequence of failure of a large diameter distribution main in very poor condition is expected to have a greater impact than a local transmission main in very poor condition. The Water service areas is developing a risk prioritization method of large diameter mains (600 mm or greater diameter) and scope of work will be expanded over the next several years. Once a risk assessment methodology is embedded in the asset management analysis, it could have a material impact on needs identified for water linear infrastructure gap.

Bulkwater Station - Commissioners Rd W

4.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

While the water system as a whole is in fairly good shape there are current and future challenges that must be contended with. It is important to address these challenges thoroughly and promptly if we are to leave a positive legacy for future generations.

The premature failure of 1950s and 1960s cast iron watermains continues to be a major challenge for both London's system and many other water systems. Fortunately, these watermains lend themselves well to structural relining which has been our main method of renewal for these watermains. Targeted replacement is also used on streets where it can be coordinated with other capital needs such as asphalt replacement.

While the water system has historically had consistent investment in renewal, the sanitary and storm systems have not always had this investment in the past. This has resulted in many streets through the City having watermains that are in fairly good shape following replacement in the 1980s and 1990s with sanitary sewers that are over a century old and failing. Due to their depth, the replacement of these sewers often necessitates the replacement of the watermain, even though that watermain has a significant amount of remaining life.

Replacement of the larger, more expensive components of the water system also present a challenge moving forward. One of our reservoirs, Springbank #2 is nearing the end of its useful life and is scheduled to be replaced in the next five years. Proactive planning has been beneficial but the large capital costs of this replacement will still be a financial challenge for the Water Service Area.

Looking into the future, a significant amount of our large diameter trunk watermains will begin to become a concern. A disproportionate amount of the large diameter trunk system dates to the 1960s when London moved from drawing our water from municipal wells to connecting to the Huron water supply. While these pipes are currently performing well, we must be mindful that their replacement will likely be needed around the same time and will be very costly. The key to addressing this financial pressure is preparing and planning early. In 2019 the Water Service Area will begin an Environmental Assessment to examine the short and long term measures that should be taken with a large section of this pipe that is considered a good candidate for realignment.

Section 4: Water

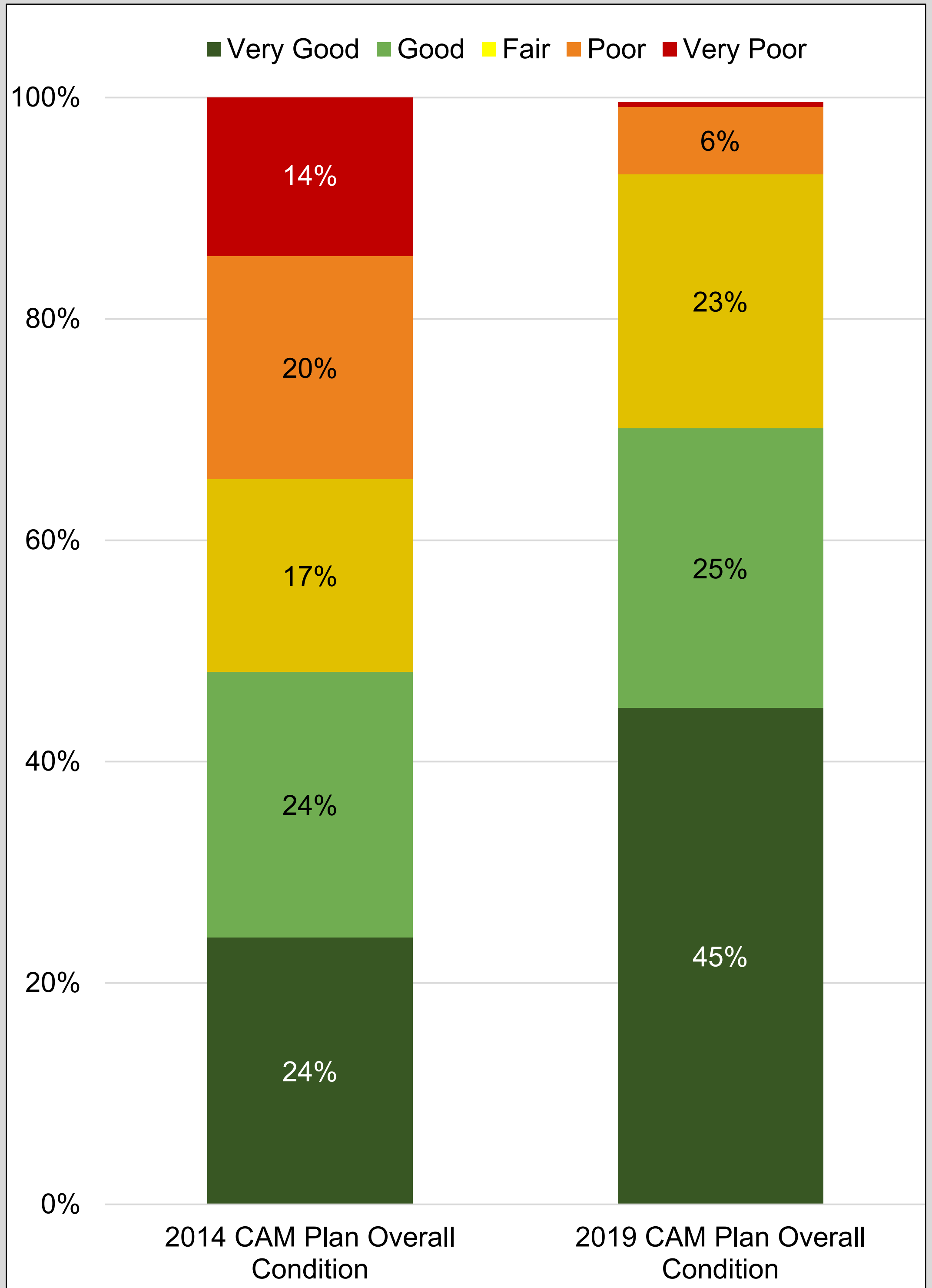


Figure 4.8 2014 CAM Plan to 2019 CAM Plan Condition Summary (Water Services)*

***Subject to Rounding**

COMPARING 2014 AND 2019 ASSET MANAGEMENT PLANS

From Figure 4.8, it is apparent that the reported condition of Water assets have significantly changed since the 2014 CAM Plan. While some of the change is a result of increased investment in the system since 2014, much of the change is due to an increase in the Water Service Area's understanding of the assets and incorporating it into the Corporate Asset Management Program. The 2014 CAM Plan condition data was solely based on age of the pipes and facilities. A more comprehensive approach has been taken with the 2019 CAM Plan condition data which used a variety of relevant information including inspection information for key assets, historic failure information and professional internal and external opinion.

Water pump – Uplands Pumping Station

4.6 CONCLUSIONS

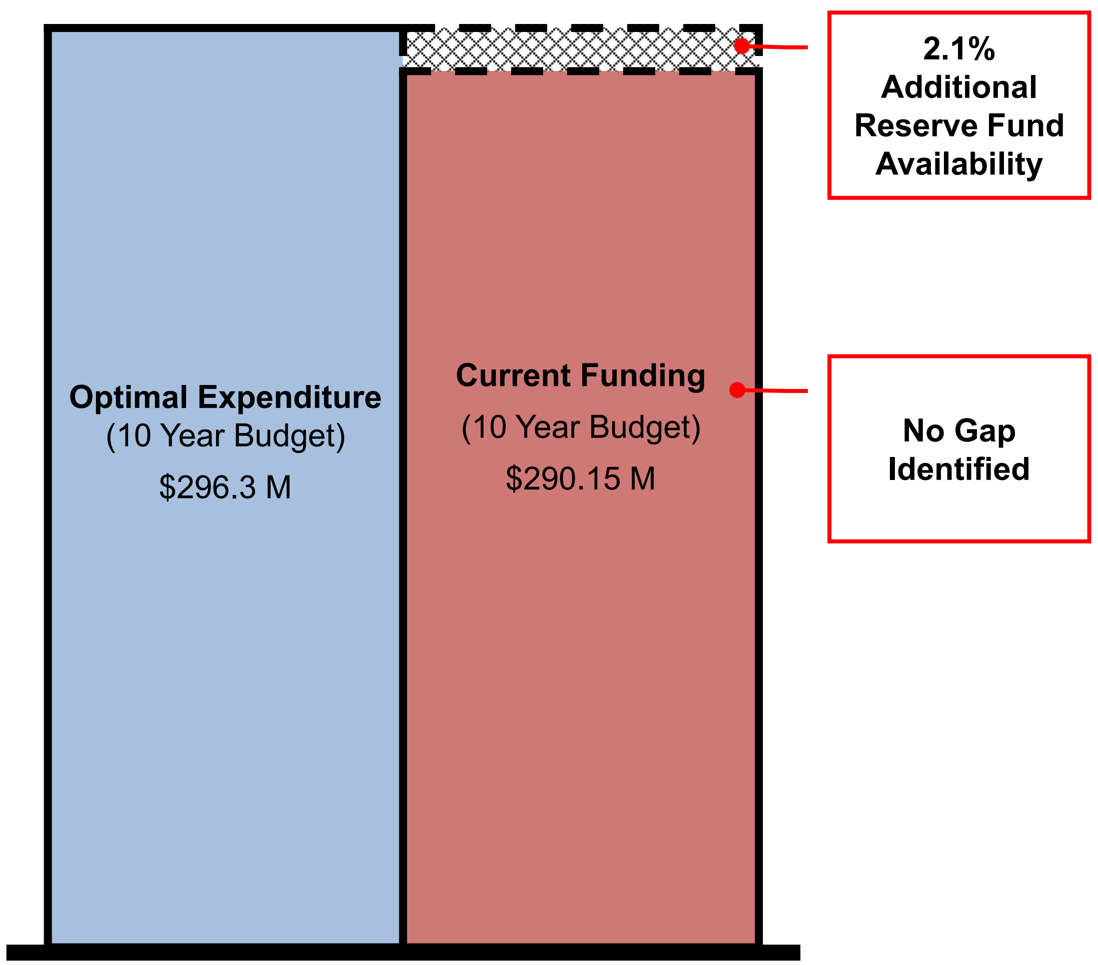


Figure 4.9 Cumulative 10 year Infrastructure Gap Visual (Water Services)

Valued at approximately $5.9 Billion, the City's water assets are overall in **Good** to **Very Good** condition, indicating that they meet current needs, but are aging. Failure to address the infrastructure gap could result in localized reductions to service. These may include increased break frequency, localized service outages, increased maintenance costs on assets past their optimal life, increased water quality concerns due to changes in flow patterns, etc. The infrastructure gap suggests that condition and funding need to be monitored and asset requirements addressed in order to continue to deliver high quality service to the London community. The 20 Year Water Financial Plan demonstrates an existing commitment to continue renewing infrastructure as it approaches the end of its useful life.

Overall, London's Water System is in relatively good shape which allows it to continue providing a plentiful, high quality, and reliable water supply to Londoners. This is a positive legacy left by previous generations of staff and decision makers and one we strive to continue. For over a century, under the Public Utilities Commission and then the City of London, there has been consistent investment in renewing water infrastructure and expanding our system in a sustainable way. Our challenge moving forward is how we protect this legacy to ensure future generations are able to benefit from an excellent water system.

Construction of South East Reservoir

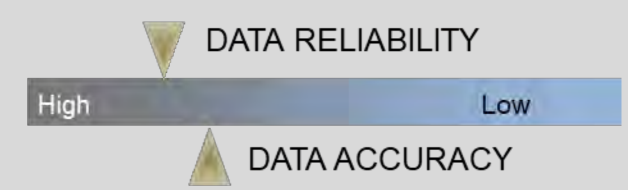
Section 4: Water

Table 4.9 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Water Services)

City of London - Water Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Linear (Mains and Appurtenances)	$5,668		$2.1	No Gap Identified***	0.45%	1.0% to 1.5%**
Water Meters	$33.6		No Gap Identified	No Gap Identified***	4.6%	5.0%
Water Facilities	$167.1		$2.6	No Gap Identified***	1.2%	1.7% to 2.5%**
Overall Water	**$5,869**		**$4.1***	**No Gap Identified***	**0.5%**	**1.0% to 1.5%**

* Total Water Infrastructure gap less than amount identified in Water Facilities as it is netting against Meters and Linear surplus amounts.
** Canadian Report Card Recommended Annual Reinvestment Rate.
*** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Section 5: Wastewater - Sanitary

Quick Facts
1,434 kilometers of Sanitary Mains
6 Wastewater Treatment Plants
34 Pumping Stations

Replacement Value	$5.048 Billion
Condition	Good

10 Year Gap	$36.28 Million
City-Wide Infrastructure Gap Contribution	6.4%

6.4% City-Wide Infrastructure Gap Contribution

Section 5: Wastewater – Sanitary

5.1 STATE OF LOCAL INFRASTRUCTURE

The City's wastewater (or sanitary) infrastructure is a combination of linear sewers and pumping stations that convey flows from homes and business to the treatment plants, where it is cleaned and discharged into the environment.

The City of London protects its citizens and the natural and built environments through the management and treatment of the City's sanitary sewage. The sanitary system is designed to collect and treat residential, commercial and industrial wastewater. Sanitary sewers carry wastewater from homes, commercial buildings, institutional, and industrial sources to one of six* wastewater treatment plants designed and operated to meet strict provincial standards. Treated water outlets to the Thames River.

***One treatment plant is closing and being converted to a pumping station.**

Effluent Pumping Station at Vauxhall Wastewater Treatment Plant – Price Street

5.1.1 Asset Inventory and Valuation

Sanitary assets are managed and maintained to meet provincially issued system and facility operating permits, as well as City of London technical targets for performance and reliability. Valued at over $5.0 Billion, this extensive network of assets can be grouped into two categories: collection and treatment; and, further divided into five categories ranging from local sewers to wastewater treatment plants.

It is also noted that this replacement value is considered as if this service would be replaced on a complete and standalone basis. In practice, the City's core services (Transportation, Wastewater Sanitary, Wastewater Storm, and Water) coordinate to ensure cost efficiencies to maintain the current level of service at the lowest cost. While the Core chapters are presented separately, they should be read and considered as whole when considering their infrastructure lifecycle needs.

Greenway Wastewater Treatment Plant – Greenside Ave.

Section 5: Wastewater – Sanitary

5.1.1 Asset Inventory & Valuation (Continued)

Table 5.1 Asset Inventory and Valuation (Wastewater – Sanitary Services)

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
Collection	Local Sewers (<450 mm diameter)	1,155	km	$3,137,006
	Trunk Sewers (450 mm to < 1,500 mm diameter)	223	km	$724,490
	Trunk sewers (> and equal to 1,500 mm diameter)	9	km	$51,761
	Forcemains	47		$109,833
Treatment	Wastewater Treatment Plants (Incl. Equipment)	**6***	Ea.	$942,375
	Pump Stations (Incl. Equipment)	34	Ea.	$82,176
TOTAL				**$5,047,641**

***One treatment plant is closing and being converted to a pumping station.**

Collection assets represent the largest component of the Sanitary system inventory, and include pipes, manholes, fittings and related equipment. These undergo regular maintenance and inspection. Video inspections (CCTV) identify problems and blockages. Where possible, existing assets are rehabilitated using trenchless technologies at a fraction of the cost of traditional practices. This also reduces social impact. Trenchless technology can extend service life by a minimum of 50 years. It also reinstates initial design functionality and capacity. As part of capital works project analysis, determinations of whether sanitary pipe replacement or relining occur.

Treatment assets include the City's six water **Wastewater Treatment Plants**, and their related equipment, including treatment train components (e.g. screens, clarifiers, disinfection units, etc.). Also included in the treatment category are wastewater **Pumping Stations**, which although they do not treat sewage, share many similar equipment type assets, and are operated and maintained by the plants. Pumping stations are fixed facilities dispersed throughout the collection system. Treatment assets and equipment undergo extensive operations and maintenance regimes to sustain their reliable operation. Investment needs are identified and coordinated with normal operations to minimize disruptions to service. Major replacements are planned and accommodated using system redundancy and changes to operations, in order to maintain service. It is critical to maintain sanitary service in order to protect public health and the environment. Technology and requirements change rapidly in the treatment industry.

A number of factors will influence the sanitary asset base in the coming years. London is challenged by the need to discharge its treated waters to the Thames River rather than a larger body of water. The limited capacity of the river means that discharge criteria are stringent making treatment requirements more rigorous than for many peer communities in Ontario. Criteria are expected to become even tighter in the future, triggering the need for new ways to treat our sewage. Consumers of water are making progress at minimizing water use in the City which lowers flows to the treatment plants. At the same time, the impacts of climate change may result in varying effects to peak and low flow conditions.

Section 5: Wastewater – Sanitary

5.1.2 Age Summary

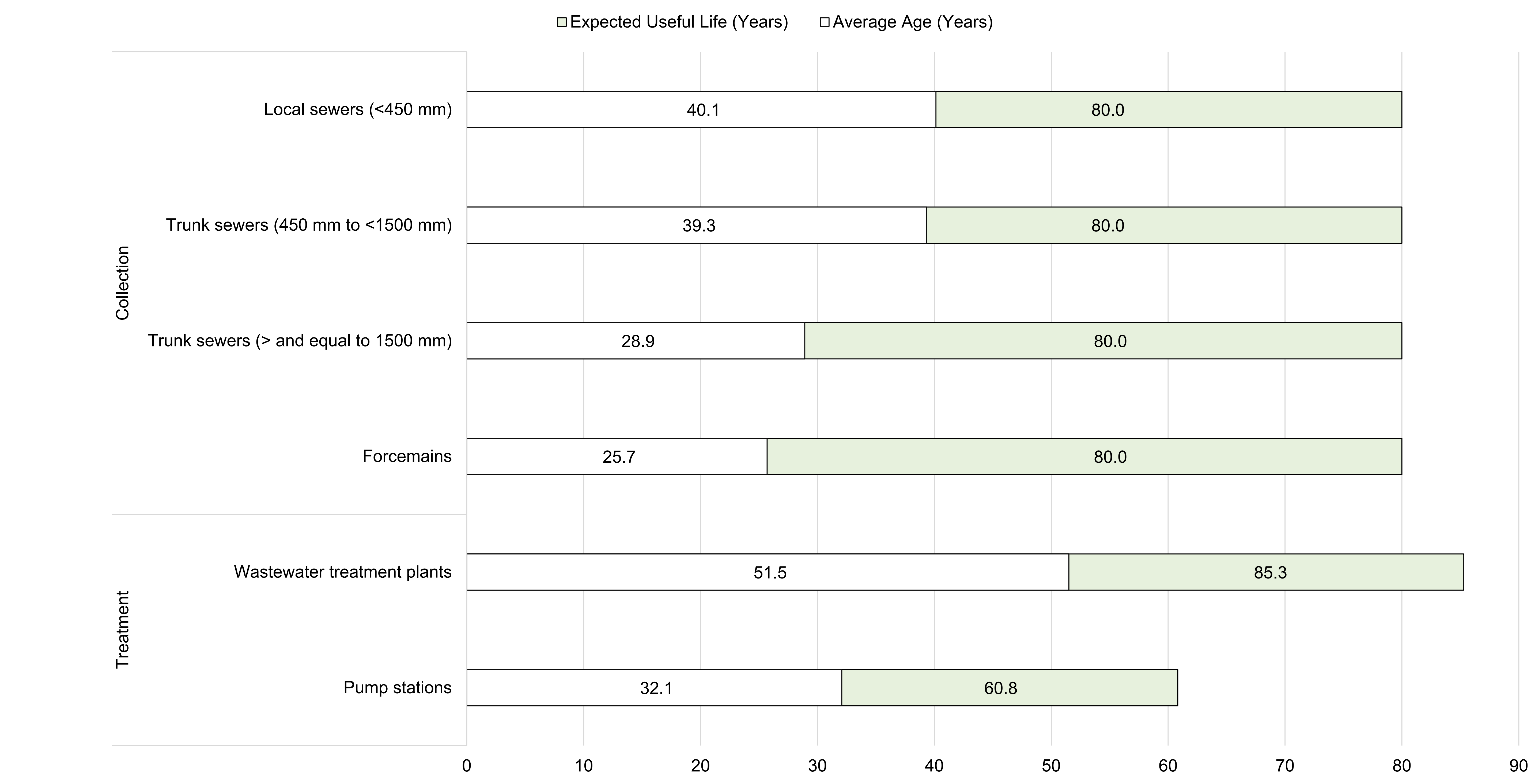


Figure 5.1 Average Asset Age as a Proportion of Average Useful Life (Wastewater – Sanitary Services)

Section 5: Wastewater – Sanitary

5.1.2 Age Summary (Continued)

Figure 5.1 shows the average asset age as a proportion of the average useful life by asset. Sewers with diameters less than 1,500 millimeters (mm) in diameter are generally mid-way through the expected useful life. Forcemains and trunk sewers with diameter greater than 1,500 mm in diameter are approximately one-third through the expected useful life. Treatment assets are beyond mid-way through the expected useful life. Pumping stations average age is toward the latter half of their expected life. Treatment plants are nearing the final third of their expected life.

Piping - Greenway Wastewater Treatment Plant

5.1.3 Asset Condition

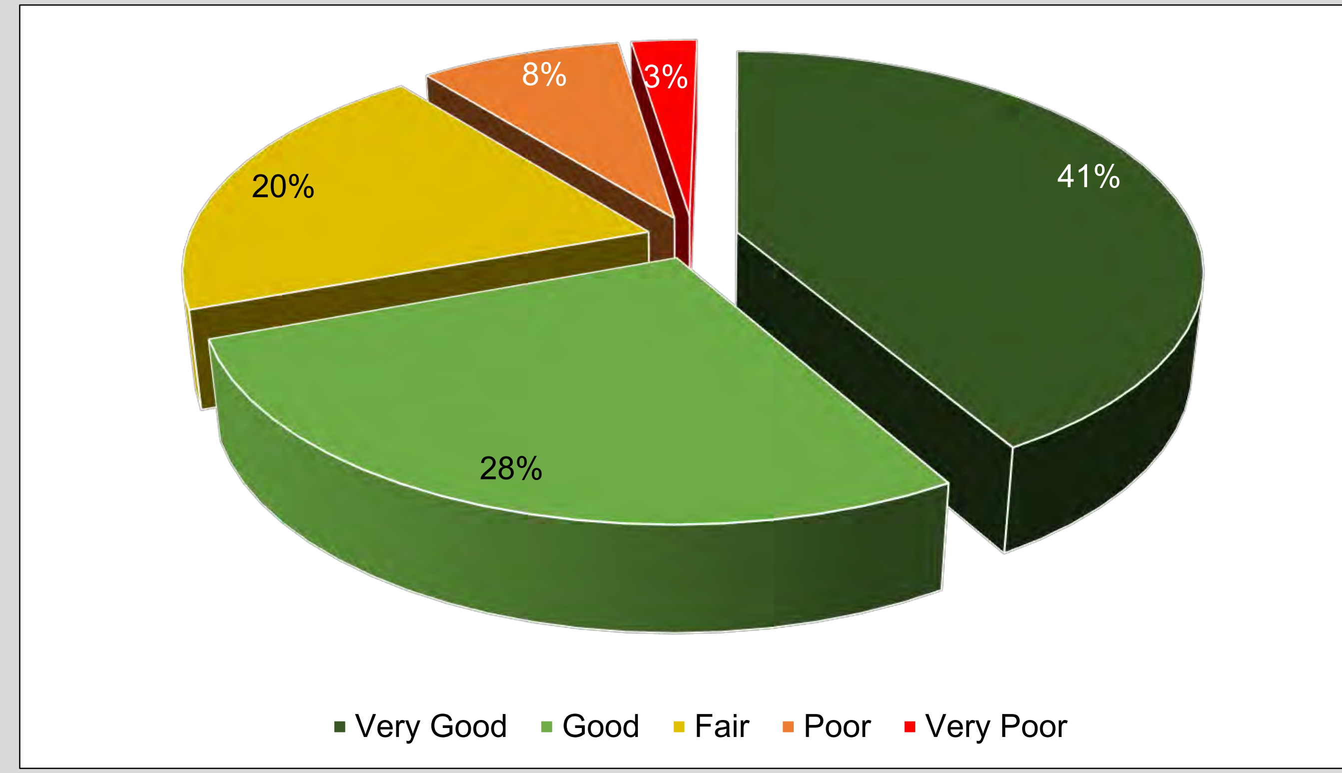


Figure 5.2 Asset Condition Summary (Wastewater – Sanitary Services)

The Sanitary service has nearly 90% of assets in **Fair**, **Good**, or **Very Good** condition. The remainder is approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The City's Sanitary assets are overall in **Fair** to **Good** condition, indicating that they are meeting current needs but are aging and may require attention.

Inspection and Condition Assessment using CCTV

Section 5: Wastewater – Sanitary

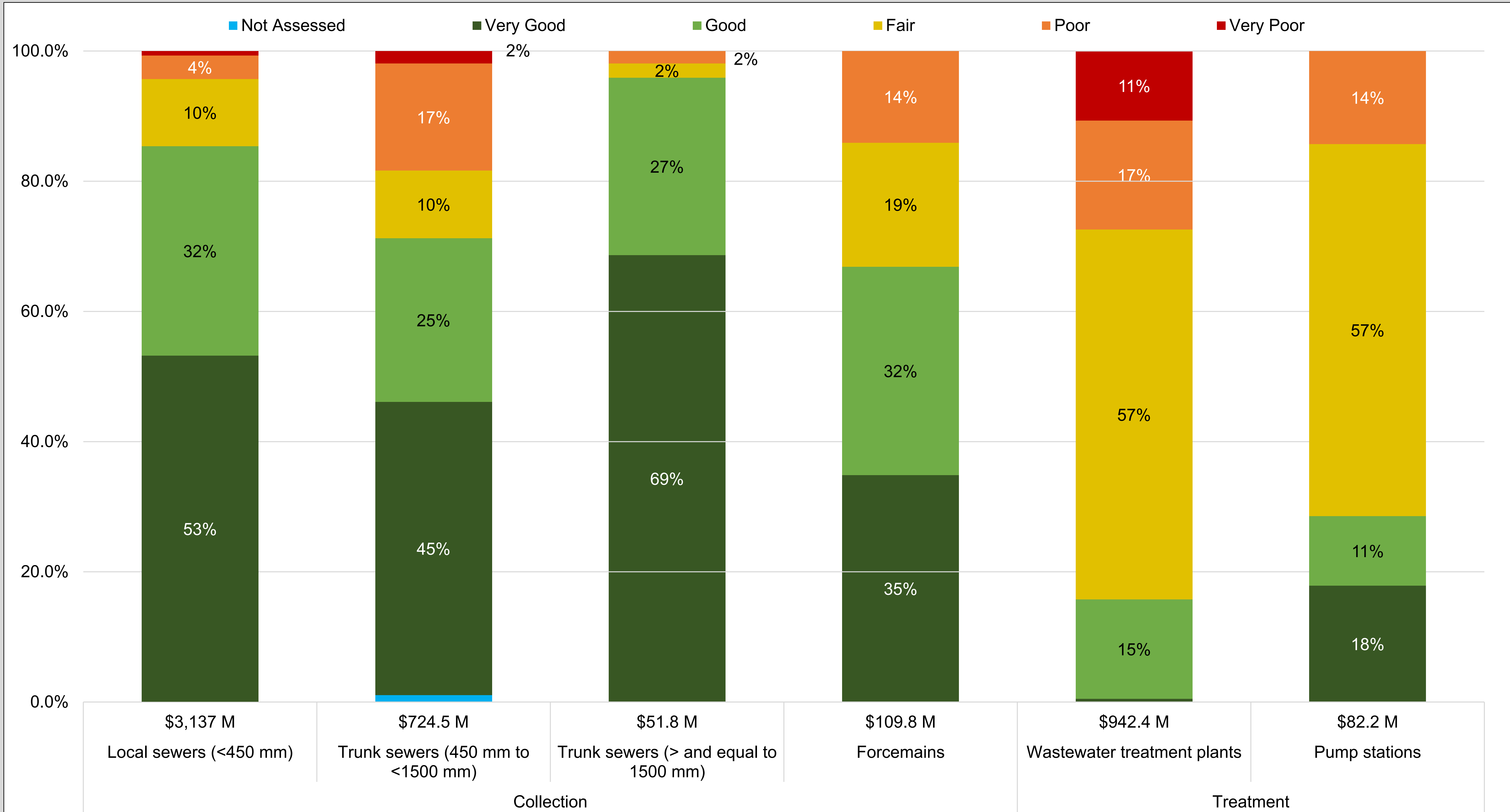


Figure 5.3 Asset Condition Detail (Wastewater– Sanitary Services)

5.1.3 Asset Condition (Continued)

Sewers represent the bulk of the value of the sanitary asset base and are rated in **Very Good** to **Good** condition based on information collected from the City's sewer inspection program. Sewers are inspected on a rotating basis and evaluated using a standardized rating system to evaluate the risk of failure and anticipated investment needs. Trunk sewers with diameter 1,500 mm and greater is in the best condition.

Wastewater Treatment Plants and Pump Stations are in **Fair** to **Poor** condition based on assessments with consultant and internal expert opinion (Pump Stations), while Treatment Plant condition is based on age, expected useful life, and internal expert opinion. Treatment Plant condition data is available but not comprehensive. It is recommended that additional data be obtained in order to improve the accuracy of future reports. With respect to capacity, the majority of the treatment plants are currently being operated at the limit of their capabilities. Expansions are planned and considered as part of growth studies.

Headworks screens Primary wastewater Treatment – Greenway Wastewater Treatment Plant

Inlet Screen – Pottersburg Wastewater Treatment Plant

5.2 LEVELS OF SERVICE

O. Reg. 588/17 requires legislated community levels of service (LOS) for core assets. Community levels of service use qualitative descriptions to describe the scope or quality of service delivered by an asset category. Examples of legislated community levels of service include a map showing areas of the municipality that are serviced by the water and wastewater system. In this example, a map provides an illustrative view of the extent of the services provided through the infrastructure assets.

O. Reg. 588/17 also requires legislated technical levels of service for core assets. Technical levels of service use metrics to measure the scope or quality of service being delivered by an asset category. Examples of technical levels of service include the percentage of urban properties serviced by the municipal water and wastewater system. Technical levels of service for core assets are provided below.

The following are performance measures in the LOS Table that are O.Reg 588/17 requirements for wastewater (or sanitary) assets. References are provided to show where O. Reg 588/17 requirement has been attained:

Table 5.2 O.Reg 588/17 Levels of Service Metrics for Wastewater – Sanitary Services

Customer Level of Service	Technical Level of Service
• Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system. **(Table 5.3)**	• Percentage of properties connected to the municipal wastewater system. **(94%, Table 5.3 and Figure 5.4)**
• Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes. **(Table 5.3)**	• # of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system. **(Table 5.3)**
• Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches. **(Table 5.3)**	• The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system. (**Table 5.3)**
• Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes. **(Table 5.3)**	• The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system. **(Table 5.3 and Table 5.4)**
• Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in previous paragraph. **(Table 5.3)**	
• Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system. **(Table 5.3)**	

OTHER LEVELS OF SERVICE PERFORMANCE METRICS

Other LOS performance measures are related to Corporate Values of Scope, Reliability, Cost Efficiency, and Environmental Stewardship. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate services that have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

CCTV sewer main screenshots that visualize the CAM condition rating of Very Good (Condition 1) to Very Poor (Condition 5) are provided in Figure 5.5. Foundational and advanced metrics are listed in Table 5.5.

Wastewater Treatment Pumps - Adelaide

Section 5: Wastewater – Sanitary

Table 5.3 O. Reg 588.17 Required Levels of Service Metrics (Wastewater – Sanitary Services)

Performance Measure: Customer / Council Focused | 1 | 2 | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Reliable	Providing wastewater services with minimal interruptions	1. Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes.	Of the approximate 1,388 km wastewater sewers, 17.1 km are combined with stormwater. The City no longer constructs combined sewers. To avoid basement flooding and backups into homes, existing combined sewers have a sewer system overflow to provide system relief. Sewer overflows exist to prevent sanitary sewer backup into basements by instead relieving overloaded sanitary sewers into an adjacent storm sewer, or receiving water body. Sewer overflows exist on both combined sewer locations and on otherwise separated sewer locations. Many have be retroactively installed after basement flooding experiences. The design varies greatly among the many overflow locations. The frequency varies from site to site but are largely triggered by wet weather (rainfall) events or snow melt. London has a Pollution Prevention and Control Plan (PPCP) which details all of the overflow locations in London, along with characterizing each overflow site and setting priorities/strategies for remediation. The City currently has about 135 overflow locations.	
		2. Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches.	Frequency and volume varies based on intensity and duration of the wet weather event. Bypasses have to be reported on volume and duration of the event. There are 14 modelled wet weather events on an average year, with overflow volumes estimated at 83,818 cubic meters annually.	
		3. Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes.	Infiltration and inflow into sanitary sewers in both groundwater and stormwater which are not intended to be in sanitary system. Infiltration can enter through a variety of sources (cracks in pipes, weeping tile connections, cross connection, catchbasins, etc.).	
		4. Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to avoid events described in paragraph 3.	To minimize sewage overflow into streets or backup into homes, the City of London has established design standards to convey flows under ultimate conditions, design sheets for capacity needs that include infiltration inflow.	

No Change | Positive Upward | Positive Downward

Table 5.3 (Continued) O. Reg 588.17 Required Levels of Service Metrics (Wastewater – Sanitary Services)

Performance Measure: Customer / Council Focused | 1 | 2 | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Reliable	Providing wastewater services with minimal interruptions	5. Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system	Effluent can be defined as water pollution, such as the outflow from a sewage treatment facility. The effluent from the five active treatment facilities in London have documented compliance limits, objectives, and actual performance. The effluent criteria include effluent flow rates, and parameters for suspended solids, Biochemical Oxygen Demand (BOD), phosphorous, ammonia, and E. coli. A Table giving technical parameters is in page 7 of the Wastewater Service Chapter.	Not Applicable
Scope	Providing adequate wastewater services to the community	Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system.	See Figure 5.4 map of Wastewater Service section	
		% of residents satisfied with the wastewater system*	74%	

*It is noted this metric is not Regulation-required but included in this list given is has the same Customer Value as Regulation-required metrics.

No Change | Positive Upward | Positive Downward

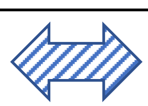
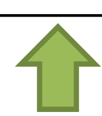
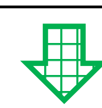
Southwinds Pumping Station Instrumentation

Section 5: Wastewater – Sanitary

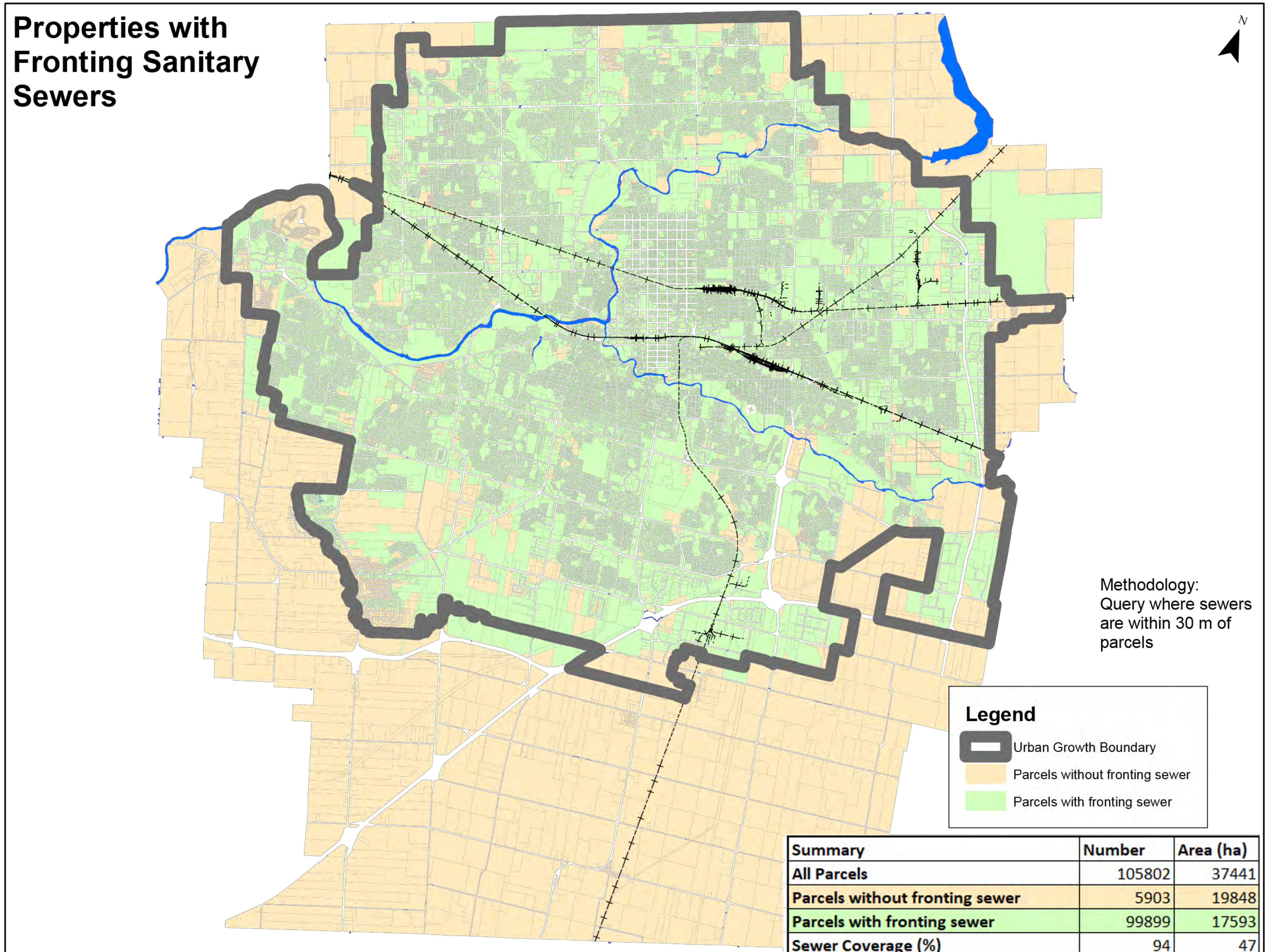
Table 5.3 (Continued) O. Reg 588.17 Required Levels of Service Metrics (Wastewater – Sanitary Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing wastewater services with minimal interruptions	# of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system.	14 modelled wet weather events based on 2010 data (consistent with analysis performed in Pollution Pretention Control Plan and consistent with Ministry of Environment and Climate Change Procedure F-5-5) compared to 99,887 properties connected to the municipal wastewater system.	14 wet weather events / average year
		The number of connection-days per year due to wastewater backups compared to the total number of properties connected to the municipal wastewater system.	32 reported instances of private and public basement flooding. 462 reported instances of sanitary/stormwater issues compared to 99,987 connected properties	Target not assessed as reported instances vary with annual severity of annual rainfall and wet weather events
		The number of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system	3 violations compared to 99,887 properties connected to the municipal wastewater system	0
Scope	Providing adequate Sanitary wastewater services to the community	% of properties connected to the municipal wastewater system	94%	

 **No Change**  **Positive Upward**  **Positive Downward**

Section 5: Wastewater – Sanitary



Summary	Number	Area (ha)
All Parcels	105802	37441
Parcels without fronting sewer	5903	19848
Parcels with fronting sewer	99899	17593
Sewer Coverage (%)	94	47

Figure 5.4 Map Outlining the User Groups or Areas of the City that are Connected to the Municipal Wastewater System

Section 5: Wastewater – Sanitary

Table 5.4 London Wastewater Plant Effluent Performance vs Objective and Compliance Limits

Treatment Plant	Flow (MLD) Actual/Rated	Solids (mg/L) Actual/Obj/Limit	BOD (mg/L)* Actual/Obj/Limit	Phosphorus (mg/L) Actual/Obj/Limit	Unionized Ammonia (mg/L)** Actual/Obj/Limit	E. coli (cfu/100mL) Actual/Limit
Adelaide	26.89/36.4	3/10/2015	3/10/2015	.46/.6/.75	.024/.08/.1	150/200
Greenway	120/170	6.4/8.5/10	2.4/8.5/10	.46/.5/.75	.024/.08/.1	150/200
Oxford	10.22/17.25	1/5/2010	1/5/2010	.32/.5/.65	.2/2/3*	1/200
Pottersburg	25.4/39	4/8.5/10	1.4/5/10	.45/.5/.75	.16/3/5*	24/200
Vauxhall	15/20.4	3/15/2020	1/15/2020	.26/.75/1	.11/3/4*	40/200

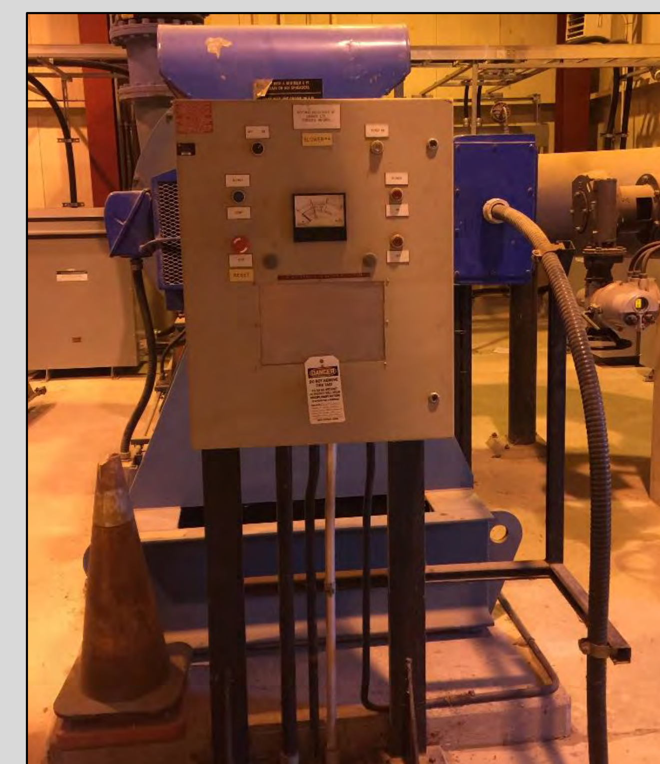
*Biochemical Oxygen Demand is the quantity of oxygen utilized in biochemical oxidation of organic and inorganic matter in five (5) days at twenty (20) degrees Celsius, expressed in milligrams per litre.

**Ammonia is the effluent criteria, not unionized ammonia.

As noted in the level of service chart, there were three (3) effluent violations in 2017, compared to 99,887 of properties connected to the municipal wastewater system.

Pumps - Greenway WWTP

Turbo Blower - Greenway WWTP



Turbo Blower control unit - Greenway WWTP

Section 5: Wastewater – Sanitary

Condition	Images that illustrate the different levels of sewer main condition
Very Good Condition 1	
Good Condition 2	
Fair Condition 3	

Condition	Images that illustrate the different levels of sewer main condition
Poor Condition 4	
Very Poor Condition 5	

Figure 5.5 Screenshots of CCTV Sewermain Inspections Compared to Asset Management Condition Rating

Section 5: Wastewater – Sanitary

Table 5.5 Levels of Service Metrics – Foundational and Advanced (Wastewater – Sanitary Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2 | 3

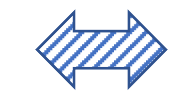
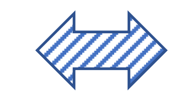
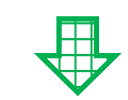
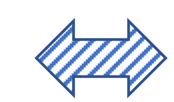
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing wastewater services in an efficient manner	Operating cost to provide service ($/household) for wastewater services	$144	
Reliable	Providing wastewater services with minimal interruptions	% of wastewater assets in fair or better condition	89%	
		# of customers that have experienced a service interruption in the last year	0	0
		# of odour complaints	7	0
Environmentally Conscious	Providing wastewater services that have minimal impacts on the environment	% of wastewater flows that meet environmental objectives when discharged	Environmental Compliance Approval (ECA) contains the effluent criteria for each wastewater treatment plant. Compliance Limits - 100% compliance limit of four treatment plants. Greenway had 83% compliance, relating to construction. Objective limits - 100% objective limit of three treatment plants. Greenway had 83% relating to construction, Pottersburg had 83% relating to influent phosphorus spikes.	100%
		Energy consumption/ML of wastewater treated	729 kW/ML	Not Applicable

No Change **Positive Upward** **Positive Downward**

Section 5: Wastewater – Sanitary

Table 5.5 (Continued) Levels of Service Metrics – Foundational and Advanced (Wastewater – Sanitary Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2 | 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing wastewater services in an efficient manner	Operating budget for wastewater services	$25,532,434	
		Collection Reinvestment Rate	0.3%	
		Treatment Reinvestment Rate	0.3%	
Reliable	Providing wastewater services with minimal interruptions	% of Collection sewers in poor or very poor condition	7%	
		% of Treatment assets in poor or very poor condition	26%	
		km of network CCTV inspected annually	81.8	72
		# of sewage pumping stations with standby power	17	
		Current rates capacity of treatment plant	75	90
		% of sewers with operational issues likely to cause service interruption having preventative inspection/maintenance at minimum once a year	100%	100%

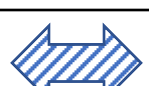
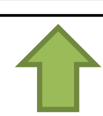
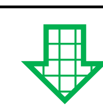
 **No Change**  **Positive Upward**  **Positive Downward**

Table 5.5 (Continued) Levels of Service Metrics – Foundational and Advanced (Wastewater – Sanitary Services)

Performance Measure | Customer / Council Focused | Technical Focused | 1 | 2 | 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing wastewater services with minimal interruptions	% of preventative maintenance activities completed on schedule	90%	95%
		# of blocked sewers / 100km length per year	0.51 blocked sewers/100 km length	Reduce the # of blocked sewers/100 km length per year to zero
		% of flushing/total length	160% of flushable local sewers is flushed annually	Flush 100% of flushable local sewers once over a two year period
		# of inspections per maintenance hole in a two year period	160% of manhole inventory associated with flushable local sewers is inspected annually	Inspect 100% of manhole inventory associated with flushable local sewers
		# of locations with odour control devices	8	
Environmentally Conscious	Providing wastewater services that have minimal impacts on the environment	# of primary bypass events without primary treatment	20	0
		# of secondary bypass events	16	10

No Change | Positive Upward | Positive Downward

Section 5: Wastewater – Sanitary

Table 5.5 (Continued) Levels of Service Metrics – Foundational and Advanced (Wastewater – Sanitary Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2 | 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Environmentally Conscious	Providing wastewater services that have minimal impacts on the environment	# of system overflows	7	0
		Total volume of untreated wastewater discharged into the natural environment via pumping station overflows	27 ML	0
		% compliance with all applicable regulatory requirements	99%	100%
		% BOD Removal	99%	99%
		% removal of suspended solids in wet weather flows (primary treatment)	60%	60%
		% removal of BOD in wet weather flows (primary treatment)	50%	40%
		# of days discharging safe treated effluent	365 days	365 days
		Energy consumption kW/ML from collection	748	Not Applicable
		Energy consumption kW/ML from treatment	542	Not Applicable

No Change **Positive Upward** **Positive Downward**

5.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

5.3.1 Lifecycle Activities

Table 5.6 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Wastewater Sanitary assets:

Table 5.6 Current Asset Management Practices or Planned Actions (Wastewater – Sanitary Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	***Collection (Sewer mains) and Treatment (Treatment Plants and Pump Stations)*** • Sewer Use Bylaw that regulates discharge quality to sewer. • Automation and online monitoring help maximize the capacity of existing assets. • Coordination efforts to optimize construction between city projects and external parties (UCC).	• Refer to Appendix B.
Maintenance Activities Including regularly scheduled inspection and maintenance or more significant repair and activities associated with unexpected events.	***Collection*** • Routine Flushing and Cleaning. • 24 hour maintenance response capability. • Scheduled inspections include CCTV visual. ***Treatment Plants and Pump Stations*** • Use JDE for work orders. • Failures in one facility can be inspected at other facilities and added to scheduled preventative maintenance routines.	• Collection - Incomplete annual preventative maintenance. • Collection – incorrect diagnosing/labelling of existing pipe condition. • Overscheduling preventative maintenance can lead to excessive maintenance and additional costs with no actual benefits.

Section 5: Wastewater – Sanitary

Table 5.6 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Sanitary Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	***Collection*** • Sanitary sewer rehabilitation is based on the current condition of the pipe: o Pipe lining e.g. Cured In Place Pipe (CIPP), structural lining using horizontal drill machine. o Spot repairs. o Manhole replacement. o Joint sealing. o Flushing & Cleaning. o Calcite Removal. ***Wastewater Treatment Plants and Pump Stations*** • Wastewater treatment facilities are rehabilitated based on facility inspection reports and expertise of service area: o Refurbish tanks, pumps, mixers, aerators, filters etc. o Incinerator refurbished routinely. • Renewal programs on the collection system may offer opportunities to reduce the number or size of wastewater pumping stations.	• Incorrect assumptions regarding improved expected useful life after rehabilitating a main. Specifically, the estimated service life of a full length cure-in-place pipe is still not well founded in the scientific literature as it is a comparatively new process (developed over the past two decades). • Renewal/rehab on major components must be completed prior to failure due to extended engineering and equipment delivery times, and potential loss of service due to unplanned failure.

Section 5: Wastewater – Sanitary

Table 5.6 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Sanitary Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	***Collection*** • Sanitary sewer replacement is based on the condition rating of the infrastructure. In most cases, once the pipe has been inspected and given a condition rating, city staff can determine the best method for replacement: ○ Complete open-cut replacement. ○ Horizontal directional drilling (HDD). ○ Pipe bursting. • Full replacement is the most common method for collapsed or heavily deteriorating pipe. • Look for clusters of poor condition rated sewers and apply high priority. • Coordinate with water, roads projects and through UCC. ***Treatment Plants and Pump Stations*** • Wastewater facilities are replaced based on facility inspection reports, service area expertise and are usually done on the components within the facility rather than the replacement of an entire wastewater treatment plant such as replace pump station, tankage, incinerator refurbishments, etc. • More stringent effluent criteria, new technology and the fact that major components of many wastewater facilities are approaching the end of their service life may drive the replacement of much of the existing wastewater infrastructure over the next 20-40 years.	• Cost over-runs and delays during large, complex design and construction projects. • Permitting, design and construction can take 10 or more years to complete and replacement funding will be required in large blocks • New technologies may not be compatible with existing/old assets.

Section 5: Wastewater – Sanitary

Table 5.6 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Sanitary Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	***Collection*** • Current practice is removal with no cost recovery. Historically some left in situ (original place). • Data on old sewers is stored in GIS. GIS tracks the asset status (i.e. active, abandoned, and/ or removed). • Assessment of material type and special considerations of health and safety concerns (such as asbestos pipe) is part of disposal process. ***Treatment Plants and Pump Stations*** • Wastewater facilities are replaced based on facility inspection reports, service area expertise and are usually done on the components within the facility rather than the replacement of an entire wastewater treatment plant such as replace pump station, tankage, incinerator refurbishments, etc. • Equipment disposed or inventoried as spare parts, usually no cost recovery. • Wastewater facilities identified for disposal often provide required capacity and may occupy an area needed for the replacement capacity. In this case the facility must have enough available capacity for the end of life component to be removed from service to allow the construction of the new asset while maintaining adequate treatment. Some plants do not have the space to build new capacity without first recovering the needed space from existing processes.	• Lack of planning and funding may limit the options to efficiently replace existing and add new capacity. • Cost increases resulting from unexpected health concerns resulting from disposal (such as uncovering asbestos pipe).
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability	***Collection*** • These can include improved technologies such as oversizing/expansions, trunk extensions of sanitary sewer. ***Treatment Plants and Pump Stations*** • These can include improved technologies such as upgraded sludge and ash dewatering facilities. • Plant optimization can maximize a plant's capacity at relatively low cost compared to a major plant expansion.	• Plant optimizations may maximize the capacity of existing assets but do not increase the life expectancy of those assets. The useful life of the added assets may be limited to the life of the existing assets.

Section 5: Wastewater – Sanitary

Table 5.6 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Sanitary Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	***Wastewater – All*** • Capital growth projects are identified by Development Charges and Wastewater – Sanitary (subject to Development Charges Act, 1997 requirements and City of London policy). • Undertake Environmental Assessments. • Assumption of subdivisions, commercial and industrial extensions, local improvements, etc. • Interim works (typically one to ten years) built to provide temporary service pending construction of permanent infrastructure assets. These are usually sanitary pump stations and force mains. ***Collection*** • Projects relate to wastewater trunk extensions and expansions. • Projects that relate to upsizing local wastewater collection pipe sections. ***Treatment Plants and Pump Stations*** • Projects typically relate to process upgrades. • Interim work generally needed for sanitary pump stations. • Plant refurbishments/rehabilitations have been coordinated with the construction of additional capacity to service growth.	• Risk of insufficient funding to maintain new asset. • Incorrect asset sizing will cost more money and may cause operational challenges (too large asset), or may result in the need to prematurely expand the asset (too small asset). • Collection - Future modest capacity increases to accommodate growth could initiate the replacement of existing capacity at significant additional cost if the existing capacity is near end of life. • It may not be practical to add additional capacity to an asset that will need to be completely replaced in the next 20-40 years.

Risks described above are compared to current lifecycle and service improvement funding, and any identified growth budgets in the 2018-2027 period.

Section 5: Wastewater – Sanitary

Table 5.7 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Wastewater Collection and Treatment	Operating Budget*	Collection	$5,620
		Treatment	$19,604
		Total	**$25,224**
	Lifecycle Capital Budget**	Collection	$12,805
		Treatment	$2,991
		Total	**$15,796**
	Service Improvement Budget	Collection	$5,501
		Treatment	$1,442
		Total	**$6,943**

Current funding presented for operating budgets presented is the average of budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Greenway Section 1 – Crumbling Concrete

Wastewater Ultra Violet Disinfection Systems Greenway WWTP

*(Non-Infrastructure , Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

Table 5.8 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Wastewater Collection and Treatment	Growth Capital Budget and Significant Operating Costs	Collection	$3,974
		Treatment	$3,315
		Significant Operating Costs – Collection and Treatment	$451
		Total	**$7,740**

Growth activities are analyzed using the draft 2019 DC Background Study. The asset management plan has been completed prior to the finalization of the draft DC Background Study. Thus, any growth needs as identified in the draft 2019 DC Background Study are assumed to be approved for purposes of the CAM Plan, but could be revised.

Approximately two-thirds of Wastewater approved growth budgets relate to Treatment plants (Vauxhall and Adelaide). Approved sanitary main projects either are required for intensification projects or in conjunction with treatment plant growth projects.

Expected funding resulting from the draft 2019 DC Background Study are split approximately 55% Wastewater Collection (mains) and 45% Treatment (Facilities). All treatment plants have identified expansion/growth requirements, and three pumping stations have growth needs.

Sanitary main needs are either identified for intensification projects or in conjunction with treatment plant growth projects.

While not factored into this asset management plan's growth commentary, it is noted the draft DC Background study identifies a $75 million growth project for Greenway Treatment Plant Incinerator in 2035.

Section 5: Wastewater – Sanitary

5.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is not sufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 5.6 presents the condition profile for the next 20 years based in the current budget.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the level of service metrics. Figure 5.7 shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. Figure 5.7 presents the condition profile for the next 20 years based in the optimal budget.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

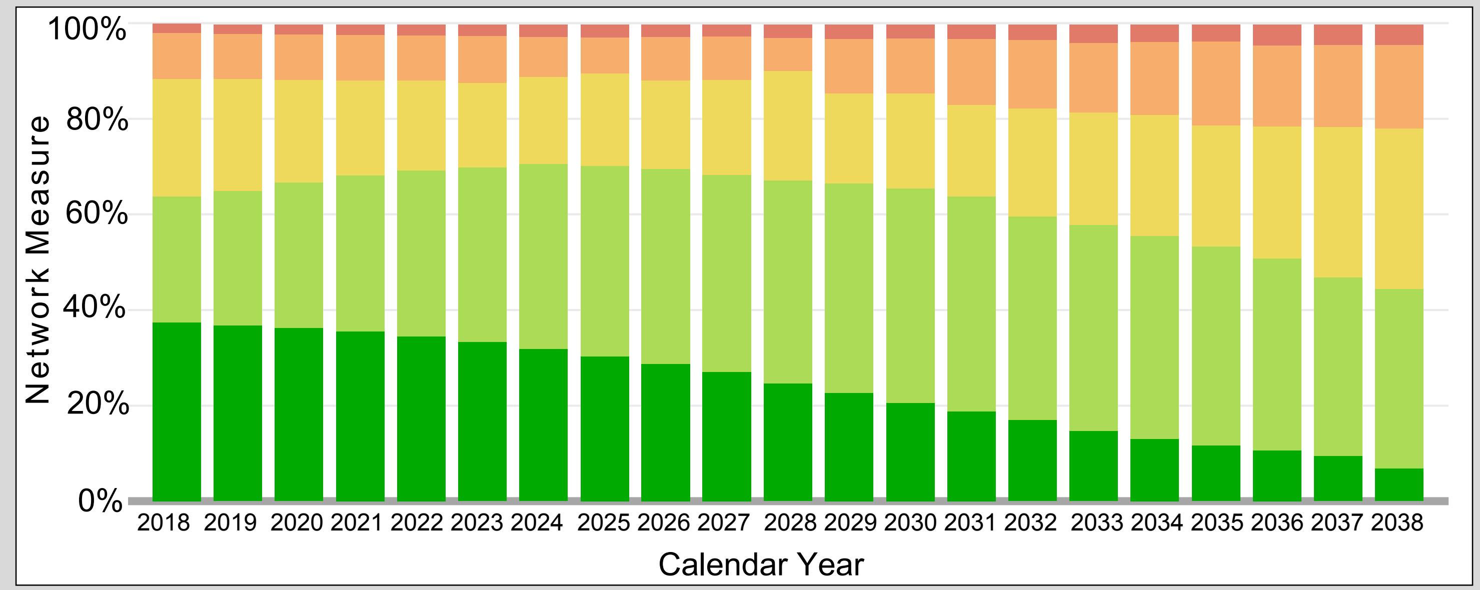


Figure 5.6 Projected 20-year Current Budget Condition Profile (Wastewater – Sanitary Services)

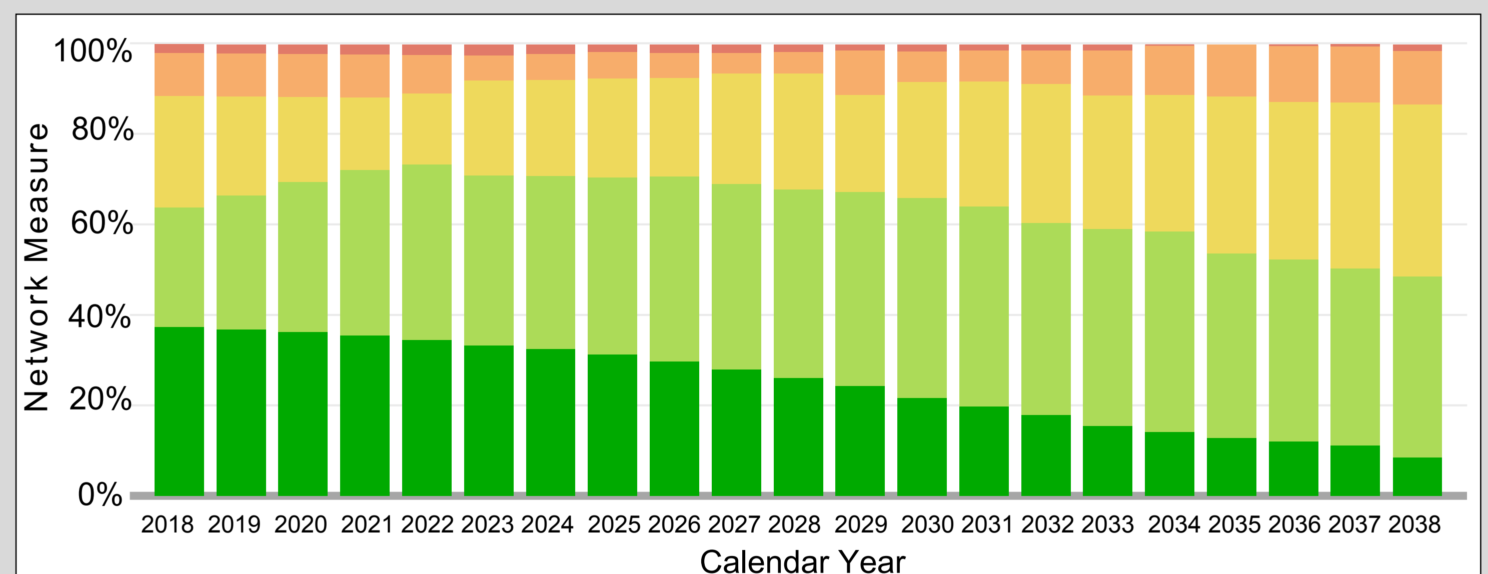


Figure 5.7 Projected 20-year Optimal Budget Condition Profile (Wastewater – Sanitary Services)

Section 5: Wastewater – Sanitary

5.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 5.9. The analysis documented is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Certain capital budgets are intended and approved for both sanitary and stormwater sewer mains. The historical split as to how these capital budgets were used between sanitary and stormwater mains for these single budget items were discussed with the each service and assumed would be applicable for future years. When combined the listed sanitary and stormwater lifecycle budgets match the 2018-2027 budgets approved as of December 31, 2017.

Table 5.9 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Wastewater Collection and Treatment	Lifecycle Capital Budget (renewal/rehab/replacement, & disposal)	Collection	$12,805	$8,140	**Not Applicable**	Not Applicable
		Treatment	$2,991	$14,028	**$2,744**	$8,293
		Total	**$15,796**	**$22,168**	**$2,744**	**$3,628***

* Total infrastructure gap is less than gap identified in Treatment as it is netting against Collection surplus amount.

Secondary Treatment - Greenway Wastewater Treatment Plant

Section 5: Wastewater – Sanitary

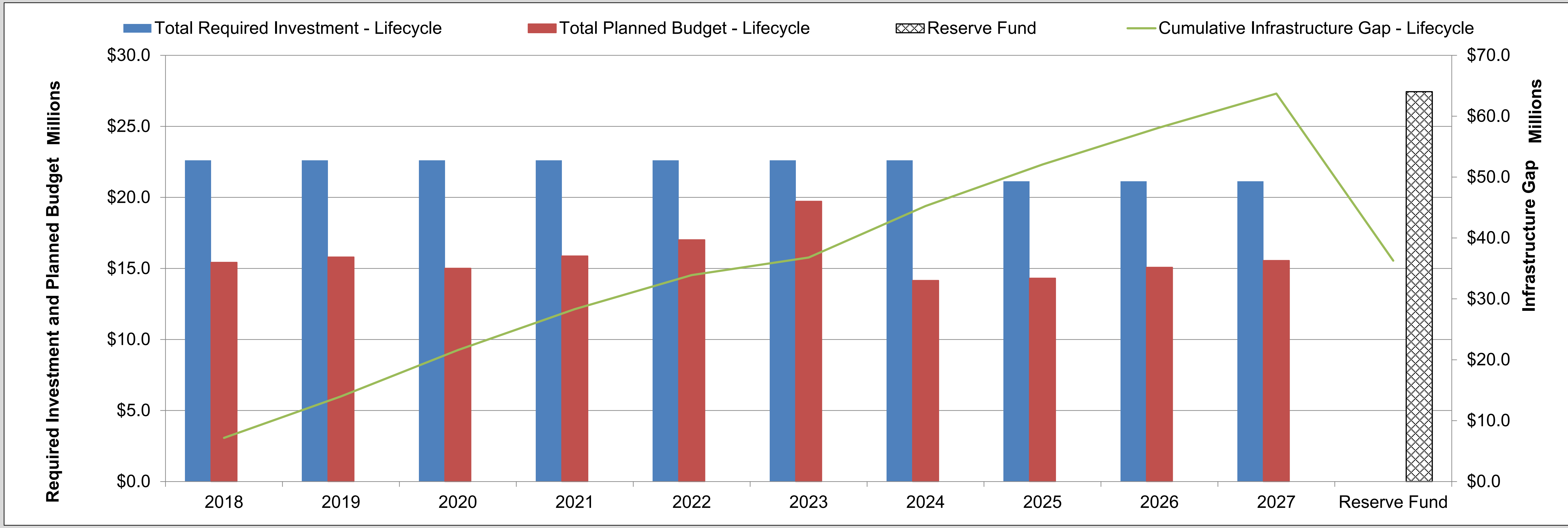


Figure 5.8 Forecasted Lifecycle Infrastructure Gap (Wastewater – Sanitary Services)

Evaluating planned budget vs. required investments shows that the Wastewater infrastructure gap will grow to $36.28 million over the next decade. Total required investment represents the costs to renew and maintain the existing assets so services can continue to be delivered. The estimate does not account for any costs to improve service (e.g. new treatment technology), accommodate growth or expand service to new areas or customers. The trend is influenced by treatment assets nearing the end of their expected useful lives over the next 20 years. The majority of these assets are greater than 50 years of age.

For collection and trunk sewer systems the City is addressing its infrastructure needs by continuing proactive management techniques like targeted renewal, regular inspection, condition assessment and the use of trenchless technologies. Further use of these technologies will help control the gap over the long term.

The 2017 wastewater capital budget addresses needs which have been identified through the sewer inspection program and engineering studies such as the Sanitary and Storm Sewerage Master Plan updates and the 20 Year Sewer System Plan. This 20 Year Sewer System Plan works within the constraints of the debt servicing ratio, gradually increasing the pay-as-you-go funding for lifecycle replacement, and slowly growing the reserve funds.

Success of the 20 Year Sewer System Plan will be determined through monitoring. The City has developed and continues to use a Pollution Prevention and Control Plan to provide a “road map” for the phased implementation of infrastructure projects that will mitigate the impacts of combined sewer overflows and bypasses on the Thames River. This will align with the City’s commitment to environmental stewardship and the protection of water resources.

It is noted that risk assessment and consequence of failure is not explicitly addressed in this CAM Plan. For example, the consequence of failure of a forcemain in very poor condition is expected to have a greater impact than a local sanitary pipe in very poor condition. Once a risk assessment methodology is embedded in asset management analysis, it could have a material impact on needs identified for sanitary main (Collection) infrastructure gap.

5.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

Current challenges primarily relate to continuously assessing representative replacement values. The 2014 CAM Plan relied on inflation-adjusted historic cost of Collection and Treatment assets. It approximated $2.0 billion. The 2019 CAM Plan replacement value approximates $5.0 billion. The increase is attributed to relying on recent tendered project costs which quantify both sewer main construction and restoration costs (costs of restoring roadway after a main is installed). Restoration cost efficiencies are realized through coordinating projects with Core assets (Transportation, Wastewater, and Water). If these projects cannot be coordinated or restoration costs continue to increase, infrastructure funding shortfalls will increase. The infrastructure gap of approximately $36.28 million assumes that that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities.

The Sanitary service condition comparison is provided. The change in condition profile is attributed to basing condition not solely on asset age, but incorporating sewermain inspection assessments and both internal and external opinion on pumping station and treatment plants. The cumulative 10 year infrastructure gap from the 2014 CAM Plan was approximately $21.8 million. The increase results from insufficient funding for treatment infrastructure needs.

Replaced Screen at Adelaide Wastewater Treatment Plant

New Ferric Tank at Pottersburg Wastewater Treatment Plant

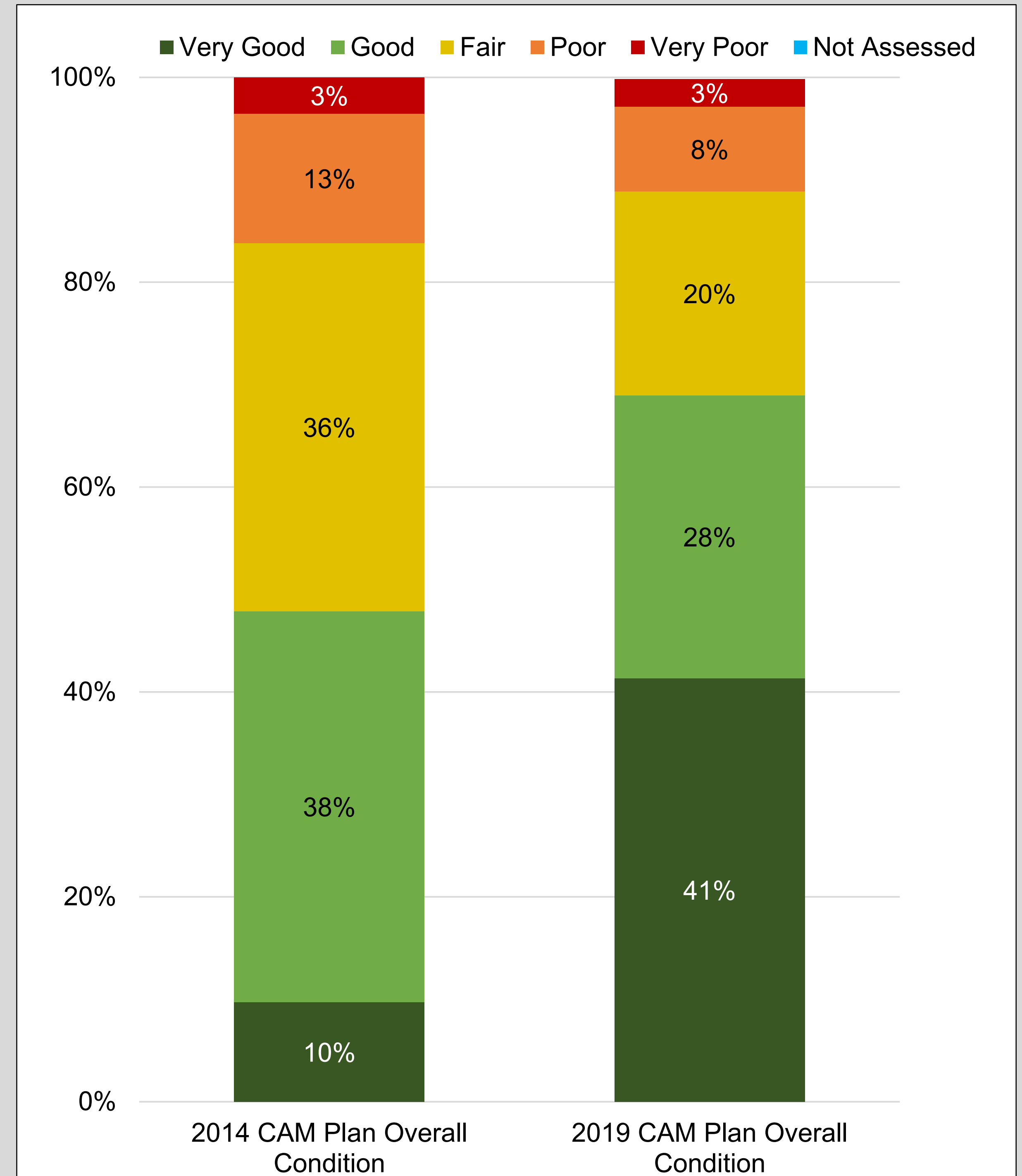


Figure 5.9 2014 CAM Plan to 2019 CAM Plan Water Condition Summary (Wastewater – Sanitary Services)

Section 5: Wastewater – Sanitary

5.6 CONCLUSIONS

Valued at over $5 Billion, the City's Wastewater assets are overall in **Fair** to **Good** condition, indicating that they are meeting the City's immediate needs. However, detailed condition data is generally limited for Treatment plants, sanitary connection services, and sewermain video inspections do not cover the entire Sanitary network. Failure to address the infrastructure gap could result in localized and or global reductions to service. These may include blockages, sewer backups, basement flooding, localized service outages, increased maintenance costs on assets past their optimal life, poor quality effluent, damage to the natural environment, fines, etc. The 20 Year Wastewater Financial Plan demonstrates an existing commitment to continue renewing infrastructure as it approaches the end of its useful life.

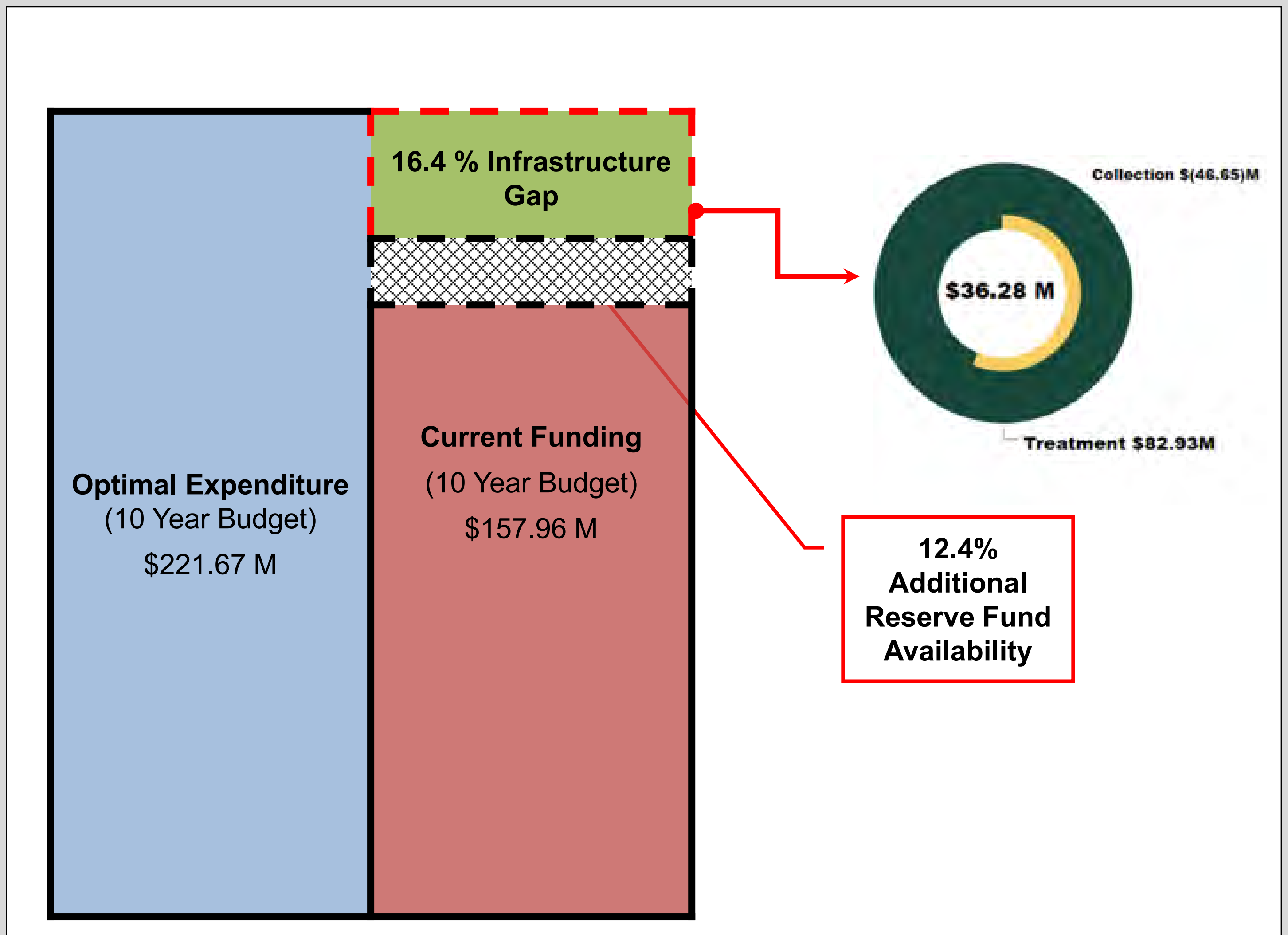


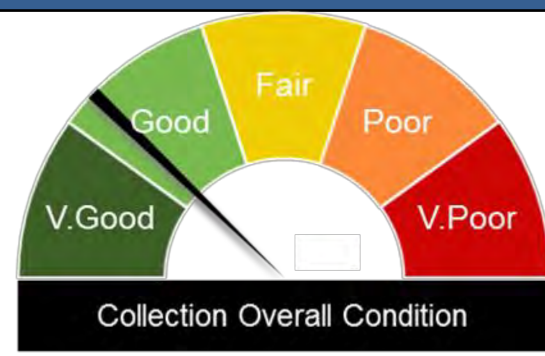
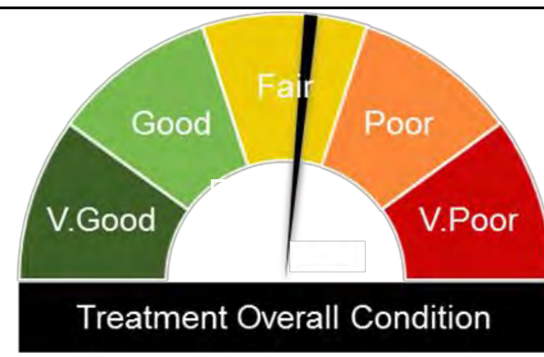
Figure 5.10 Cumulative 10 year Infrastructure Gap Visual (Wastewater – Sanitary Services)

Greenway Wastewater Treatment Plant – Greenside Ave.

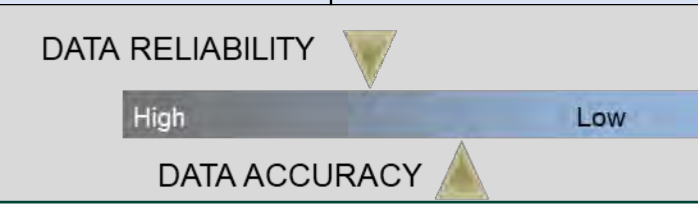
Section 5: Wastewater – Sanitary

Table 5.10 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Wastewater Sanitary Services)

City of London Wastewater Sanitary Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Collection	$4,023		No Gap Identified	No Gap Identified***	0.3%	1.0% to 1.3%**
Treatment	$1,025		$13.1	$82.93***	0.3%	1.7% to 2.5%**
Overall Wastewater	**$5,048**		**$7.2***	**$36.28*, *** **	**0.3%**	**1.1% to 1.4%** **

* Total infrastructure gap is less than gap identified in Treatment as it is netting against Collection surplus amount.
** Canadian Report Card Recommended Annual Reinvestment Rate.
*** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Section 6: Wastewater - Stormwater

Quick Facts
1,377 kilometers of Storm Mains
89 km of Open Conveyance
64 Stormwater Management Facilities

Replacement Value	$4.408 Billion
Condition	Good
10 Year Gap	$3.75 Million
City-Wide Infrastructure Gap Contribution	0.7%

0.7% City-Wide Infrastructure Gap Contribution

Section 6: Wastewater – Stormwater

6.1 STATE OF LOCAL INFRASTRUCTURE

The City of London protects its citizens and the natural and built environments through the management and treatment of stormwater and drainage. The City's stormwater system aids in preventing flooding by draining rain water away from buildings and roads and controlling the rate of discharge to rivers and streams. The majority of the run-off water from areas developed in recent decades is treated to help remove sediment and pollutants before it outlets to the natural environment. The City also works to protect groundwater aquifers through managing infiltration and being compliant with source water protection laws when considering development approvals.

Stormwater Management Facility – Sunningdale Road W.

6.1.1 Asset Inventory & Valuation

An extensive network of infrastructure and equipment is operated and maintained by the City in order to manage stormwater. Valued at approximately $4.4 Billion, the stormwater infrastructure consists of two asset types - Conveyance and Management.

The Stormwater Conveyance network is divided between storm sewers and appurtenances, such as catch basins and maintenance holes; and, linear systems such as watercourses, municipal drains, channels, and flood control dykes. The bulk of the stormwater inventory value lies in the storm sewer network.

The Stormwater Management category is divided between open conveyance, facilities (primarily stormwater ponds in London), SWM green infrastructure and smaller treatment equipment such as oil/grit separators.

Stormwater green infrastructure was added to the inventory in 2016. The intent of Stormwater green infrastructure is to create small scale, de-centralized water quantity and quality control infrastructure with a reduced environmental impact.

It is also noted that this replacement value is considered as if this service would be replaced on a complete and standalone basis. In practice, the City's Core services (Transportation, Wastewater Sanitary, Wastewater Stormwater, and Water) coordinate to ensure cost efficiencies to maintain the current level of service at the lowest cost. While the Core chapters are presented separately, they should be read and considered as whole when considering their infrastructure lifecycle needs.

Stormwater Curb Inlet Catch Basins

Section 6: Wastewater – Stormwater

6.1.1 Asset Inventory & Valuation (Continued)

Table 6.1 Asset Inventory and Valuation (Wastewater – Stormwater Services)

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
Stormwater Conveyance System	**Storm Sewers** (< 450 mm diameter)	494	km	$1,165,744
	Storm Sewers (450 mm >= to < 1,500 mm diameter)	766	km	$2,203,817
	Storm Sewers (=> 1,500 mm diameter)	117	km	$571,096
Stormwater Management	**Open Conveyance** (Municipal Drains, Drains, Channels, Dyke)	89	km	$247,042
	Storm Water Management Facilities (Wet Facility, Dry Facility, Dissipation Pools, Online Flood & Erosion Control Facilities)	64	Ea.	$206,259
	SWM Green Infrastructure (Bioretention cells with or without underdrain, Drywells)	63	Ea.	$11,166
	Minor Treatment (Oil/Grit Separators)	37	Ea.	$3,350
TOTAL				**$4,408,474**

Rain Garden – Waterloo Street

Stormwater Conveyance assets undergo regular maintenance and inspection, which identify proactive and reactive investment requirements. Inspections include a limited use of CCTV inspection where different small portions of the underground network are viewed annually. Inspections also occur in response to complaints. Where possible, existing sewers are rehabilitated using trenchless technologies, which extend their lives at a fraction of the cost of replacement.

Stormwater Management assets include open conveyance linear systems, storm water management facilities, stormwater management green infrastructure, and minor treatment. The open conveyance linear systems include municipal drains, drains, channels and dykes. The Storm water Management Facilities (SWMF) provide water quantity, quality and/or erosion control for the majority of recently developed areas. Stormwater management facilities are relatively new (first one built in approximately 1981) and are expected to have long lives. Stormwater management green infrastructure includes infiltration basins, bioretention swales, engineered wetlands, and rain gardens. In addition, some smaller treatment facilities, such as oil/grit separators, are strategically placed where needed in the City.

Stormwater Inlet– During Construction

Section 6: Wastewater – Stormwater

6.1.2 Age Summary

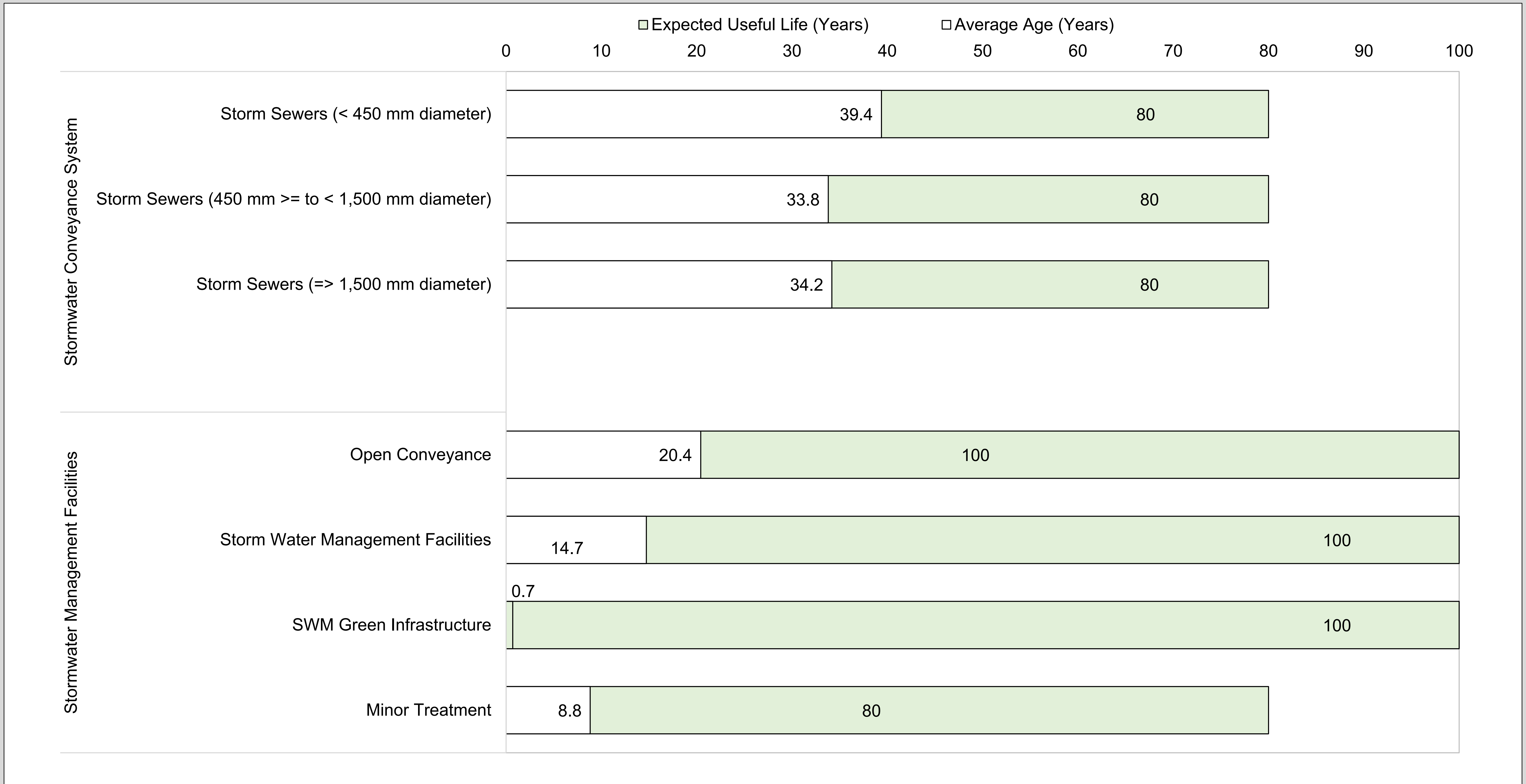


Figure 6.1 Average Asset Age as a Proportion of Average Useful Life (Wastewater – Stormwater Services)

Section 6: Wastewater – Stormwater

6.1.2 Age Summary (Continued)

The stormwater Conveyance infrastructure is nearing mid-way through its life. Storm sewers with diameter less than 450 mm in diameter are approximately halfway through their expected useful life. Storm sewers 450 mm in diameter and above are approximately 34 years old. The stormwater management facilities assets are considered to be in the early stages of life. Management facilities are at the first sixth of their expected useful life. Green infrastructure has only been introduced in the past fiscal year and thus not even one year old. Minor treatment assets are approximately one tenth through their expected useful life. While the known average age of open conveyance assets are approximately 20 years old, the exact ages of many open conveyance assets (specifically dykes, waterways, and municipal drains) have not been systematically documented or the information is not readily available.

Dingman Erosion Control Facility

6.1.3 Asset Condition

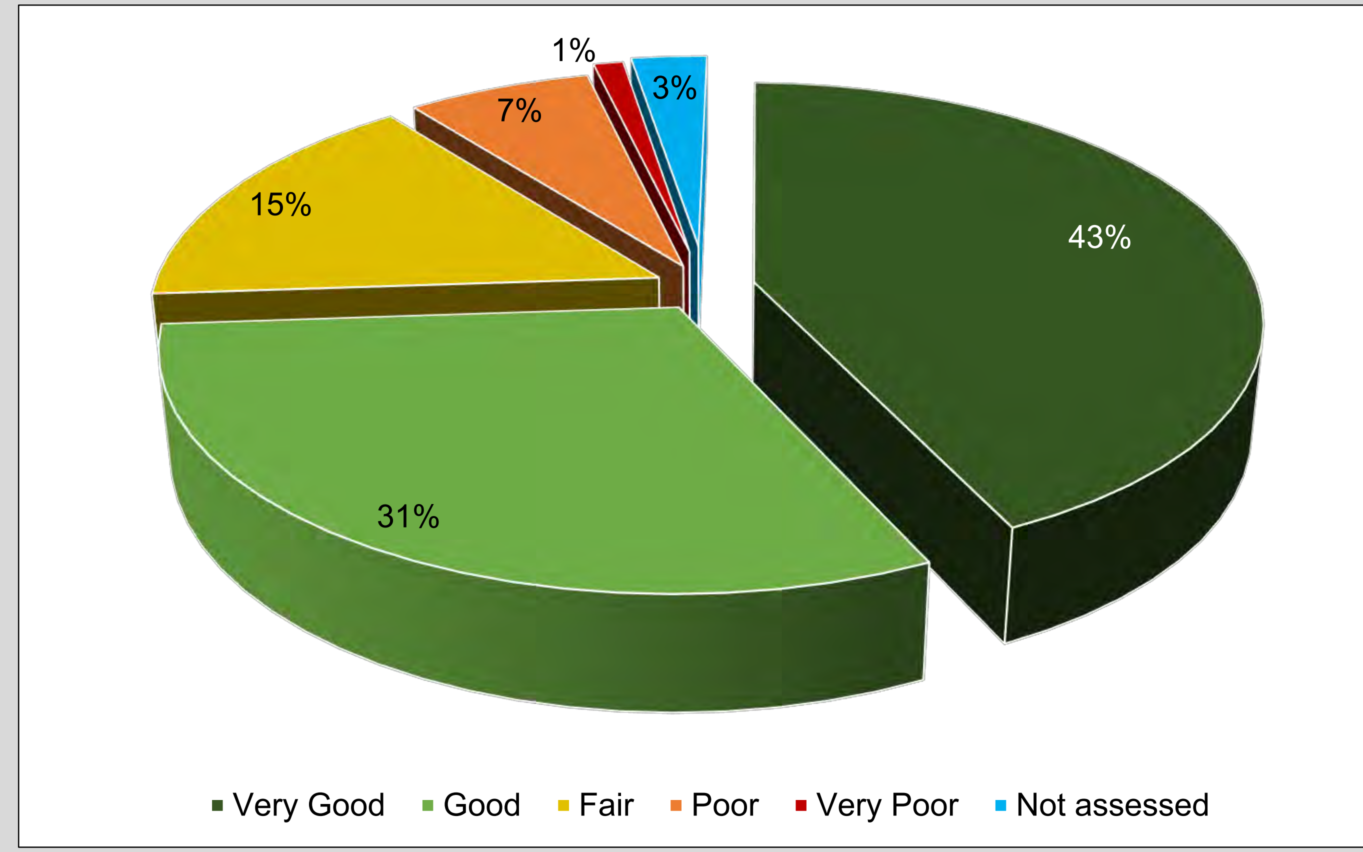
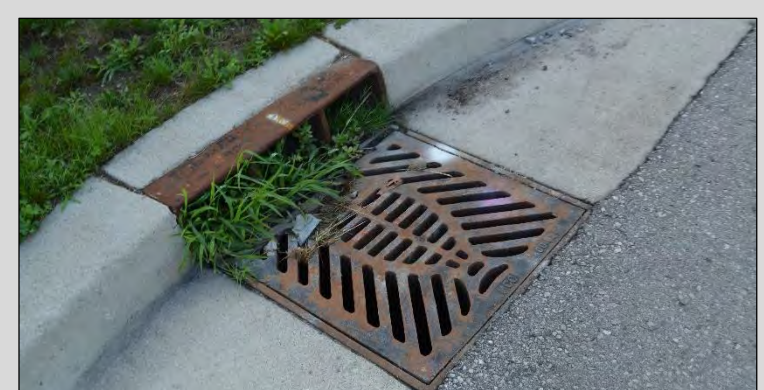


Figure 6.2 Asset Condition Summary (Wastewater – Stormwater Services)

The Stormwater service has nearly 90% of assets in **Fair**, **Good**, or **Very Good** condition. The remainder is approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The City's Stormwater assets are overall in **Fair** to **Good** condition, indicating that they are meeting current needs but are aging and may require attention.



Plants growing in a stormwater Curb Inlet Catch Basins

Stormwater Facility Health and Safety Precautions Sign

Section 6: Wastewater – Stormwater

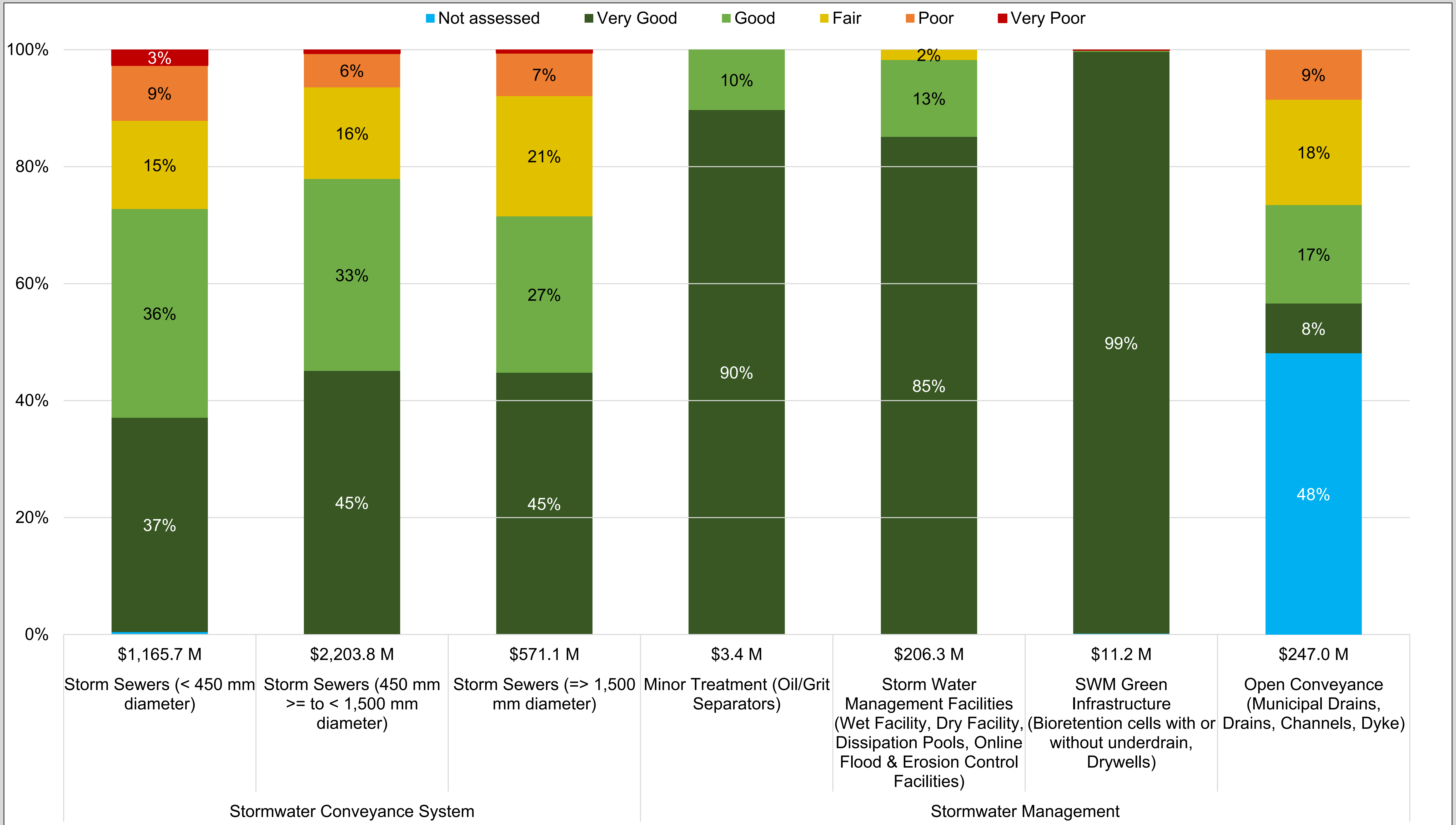


Figure 6.3 Asset Condition Detail (Wastewater – Stormwater Services)

Section 6: Wastewater – Stormwater

Stormwater Conveyance system assets are the highest value stormwater asset type and are shown to be in Very Good to Good condition based on information collected from the City's limited sewer inspection program. Sewers are CCTV inspected on a rotating basis and evaluated using a standardized rating system to evaluate the risk of failure and anticipated investment needs. The fraction of total storm sewers inspected annually is small which weakens the overall integrity of the condition data for this inventory class.

Detailed condition data is incomplete for **Open Conveyance** assets, primarily as it relates to municipal drain condition. Condition presented in Figure 6.3 is primarily based on age, estimated useful life information, and internal expert opinion regarding recent drain rehabilitations. Consultant reports to assess dykes condition were also used. Failures (blockage) could result in flooding requiring immediate response. Proactive remediation is undertaken based on routine staff observations and annual planned programs. To date, this strategy has been generally adequate to protect against flooding. For the purpose of this assessment, in the absence of data, assets have been distributed based on age recorded in the Geomatics (GIS) stormwater management listings that are regularly maintained by the City, noting that age is not a good methodology to gauge condition of open conveyance systems. However, it is the best available method. Limited storm channel maintenance occurs as part of the annual planned program and work rotates through the assets depending on available time and resource. Investment requirements are determined based on staff observations and public inquiries and complaints. However, many of these channels are overgrown with vegetation and will need to be rehabilitated in the near term to ensure flooding does not occur.

Stormwater Management Facility assets in London have a documented history of rehabilitation, which assists in determining the condition of the SWMF generally as Very Good to Good. There are some major maintenance/rehabilitation needs identified over the next ten years. Recently the City has taken over construction of the SWMF and post-construction monitoring. The bulk of the capital SWMF construction costs originate from excavating the initial basin. As such, the initial capital expenditure is a one-time only cost. The ongoing expense will occur as it relates to maintenance and sediment removal. The SWMF do need to be cleaned more frequently when heavy construction is undertaken within the drainage area of the SWMF. SWMFs are managed on a proactive basis with work performed, recorded and analyzed for each location. Unplanned work is also undertaken based on staff observations of issues and public inquiries and complaints.

Green Stormwater assets (Low Impact Development) are a minor part of the asset base and are considered in Very Good to Good condition, based on age and expected useful life. These assets are assessed as requiring little maintenance, or in the instance of LID, given they are very new assets, there is not yet a historic pattern to estimate maintenance needs.

Minor Treatment (oil/grit separators) are considered in Very Good condition, based on age recorded in GIS and expected useful life.

Green Valley Drain

6.2 LEVELS OF SERVICE

O.REG 588/17 REQUIREMENTS

O. Reg. 588/17 requires legislated community levels of service for core assets. Community levels of service use qualitative descriptions to describe the scope or quality of service delivered by an asset category. Examples of legislated community levels of service include a map showing areas of the municipality that are serviced by the water and wastewater system, or images that illustrate the different levels of pavement condition grade of roads. In this example, maps provide an illustrative view of the extent of the services provided through the infrastructure assets.

O. Reg. 588/17 also requires legislated technical levels of service for core assets. Technical levels of service use metrics to measure the scope or quality of service being delivered by an asset category. Examples of technical levels of service include the percentage of properties resilient to 100-year and 5-year storm events. Technical levels of service for core assets are provided in below.

The following are performance measures in the Level of Service Table that are O.Reg 588/17 requirements for stormwater assets. References are provided to show where O. Reg 588/17 requirement has been attained:

Table 6.2 O.Reg 588/17 Levels of Service Metrics for Wastewater - Stormwater Assets

Customer Level of Service	Technical Level of Service
Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system. **(Table 6.3 and Figure 6.4)**	1. Percentage of properties in municipality resilient to a 100-year storm. **(92.3% , Table 6.3)** 2. Percentage of the municipal stormwater management system resilient to a 5-year storm. **(91.6%, Table 6.3)**

Stormwater Management Facility

OTHER LEVELS OF SERVICE PERFORMANCE METRICS

Other LOS performance measures are related to Corporate Values of Scope, Reliability, Cost Efficiency, and Environmental Stewardship. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate services have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

CCTV sewer main screenshots that visualize the CAM condition rating of Very Good (Condition 1) to Very Poor (Condition 5) are provided in Figure 6.5.

Foundational and advanced metrics are listed in Table 6.4.

Stormwater Management Facility

Section 6: Wastewater – Stormwater

Table 6.3 O. Reg 588/17 Required Levels of Service Metrics (Wastewater – Stormwater Services)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Scope	Providing stormwater services that protect the community	Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of the protection provided by the municipal stormwater management system.	See maps provided in Figure 6.4 of Stormwater Service Chapter	
		% of residents satisfied with stormwater management services	65%	

*It is noted this metric is not Regulation-required but included in this list given is has the same Customer Value as Regulation-required metrics.

Stoney Creek Erosion Control Facility

No Change | **Positive Upward** | **Positive Downward**

Table 6.3 (Continued) O. Reg 588/17 Required Levels of Service Metrics (Wastewater – Stormwater Services)

Performance Measure: Customer / Council Focused | Technical Focused

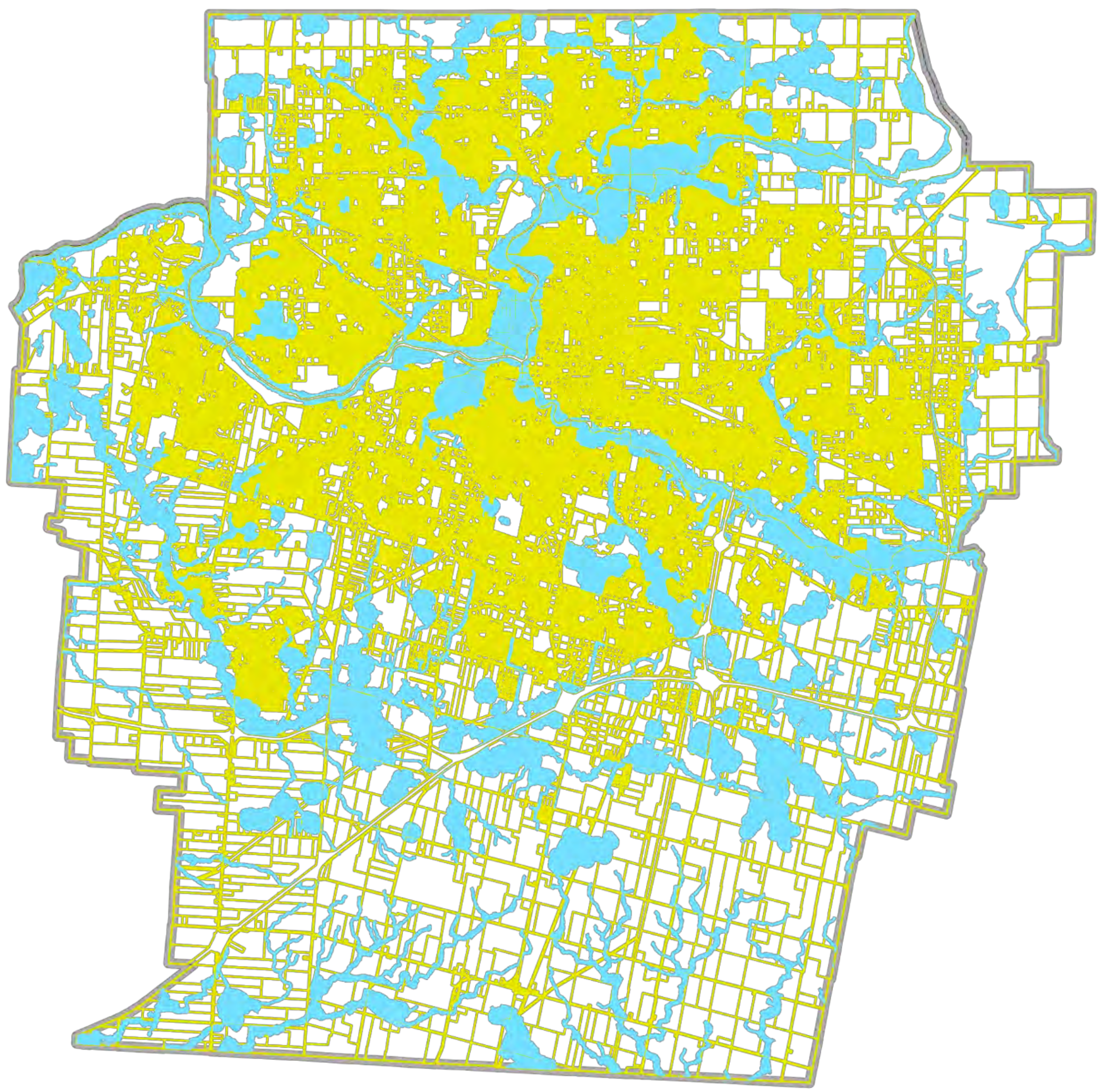
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Scope	Providing stormwater services that protect the community	% of properties in municipality resilient to a 100-year storm	92.3%	
		% of the municipal stormwater management system resilient to a 5-year storm	91.6%	

Talbot Village Stormwater Management Facility

No Change | Positive Upward | Positive Downward

Section 6: Wastewater – Stormwater

% of Properties in municipality resilient to a 100-year storm

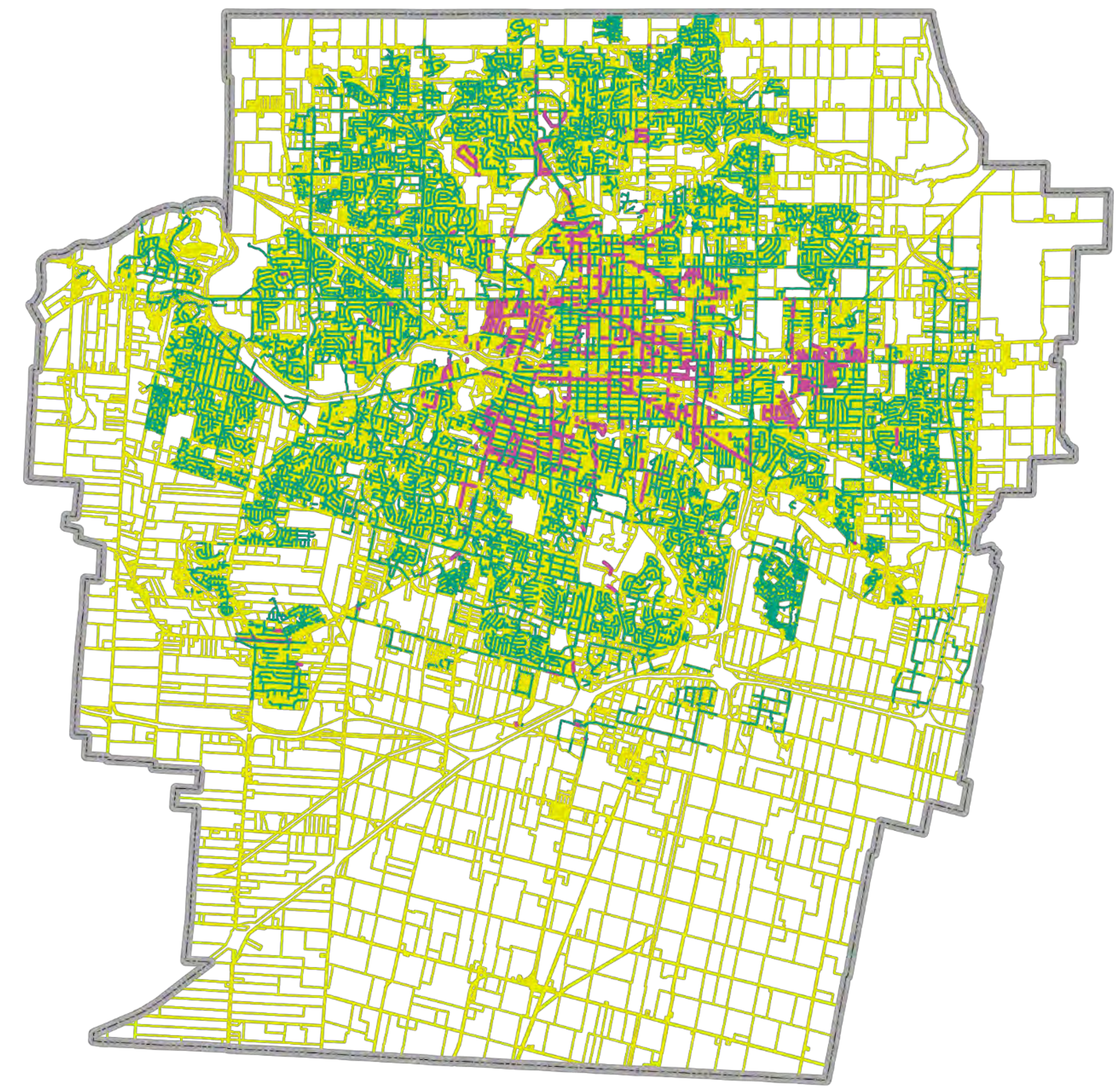


Legend

- Regulated Flood Area
- Parcels in City Boundary
- City Boundary

Total # of parcels within the City Boundary	107,225	Parcels
# of undevelopable parcels (0.3 reserves, Walkways, etc.)	-2,264	Parcels
Total # of parcels (properties) considered	104,961	properties
# of properties within Regulated Flood Area	8,399	properties
# of parcels (0.3 reserves, Walkways, etc.) within Regulated Flood Area	-288	parcels
% of Properties in City Boundary resilient to a 100-year storm	92.27	%

% of the municipal stormwater management system resilient to a 5-year storm



Legend

- Resilient
- Non resilient
- Parcels in City Boundary
- City Boundary

Total storm sewer length within City Boundary	1,372	km
Total storm sewer relief	13	km
Total storm sewer combined	15	km
Subtotal	1,400	km
Total storm sewer of pipe 65 year or older	102	km
Total storm sewer combined	15	km
% of the municipal stormwater management system resilient to a 5-year storm	91.64	%

Figure 6.4 Map outlining the resiliency of City properties to 100-year and 5-year storms

Section 6: Wastewater – Stormwater

Condition	Images that illustrate the different levels of sewer main condition
Very Good Condition 1	
Good Condition 2	
Fair Condition 3	

Condition	Images that illustrate the different levels of sewer main condition
Poor Condition 4	
Very Poor Condition 5	

Figure 6.5 Screenshots of CCTV Sewermain Inspections Compared to Asset Management Condition Rating

Section 6: Wastewater – Stormwater

Table 6.4 Levels of Service Metrics – Foundational and Advanced (Wastewater – Stormwater Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing stormwater services in an efficient manner	Annual operating cost to provide service ($/household - $176,859 in 2017)	$34.88	
Reliable	Providing stormwater services with minimal impact to the community	% of Stormwater assets in fair or better condition	89%	
		# of locations in the City prone to flooding during wet weather events	7.7%	*
Environmental Stewardship	Providing stormwater services that protect the environment	% of community with stormwater quality and quantity control (% of properties within the catchment area of a wet or dry SWMF)	17.0%	

*Note: The expected increase is due to flood mapping updates that more accurately account for recent precipitation patterns and updated topography

No Change **Positive Upward** **Positive Downward**

Wetland Overhead View

Section 6: Wastewater – Stormwater

Table 6.4 (Continued) Levels of Service Metrics – Foundational and Advanced (Wastewater – Stormwater Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing stormwater services in an efficient manner	Operating budget for stormwater services	$6,168,731	↔
		Stormwater Conveyance Reinvestment Rate	0.2%	↑
		Stormwater Management Reinvestment Rate	1.2%	↑
Reliable	Providing stormwater services with minimal impact to the community	% of Stormwater Conveyance assets in poor or very poor condition	8.4%	↓
		% of Stormwater Management assets in poor or very poor condition	4.5%	↓
		% of minor system with insufficient capacity to convey flows of a 5-year wet weather event	8.4%	↔
		km of network CCTV inspected annually	72.9	48
		% of catchbasins total inspected and cleaned annually	Approximately 33%	33% of the total number of catchbasins (~30,600)
		% of inspections & routine mtce. carried out on stormwater management facilities (wet SWMF) annually	100% (inspected and maintained once annually)	100%

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 6: Wastewater – Stormwater

Table 6.4 (Continued) Levels of Service Metrics – Foundational and Advanced (Wastewater – Stormwater Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing stormwater services with minimal impact to the community	Flood prevention – complete a current list of inspections on isolated, high risk flooding locations	100% (inspected on as required basis)	100%
		% of inspections & routine maintenance carried out on inlets/outlets annually	100% (inspected and maintained once annually)	100%
		% of inspections & routine maintenance carried out on oil/grit separators annually	100% (inspected twice annually, cleaned a minimum of once annually)	100%
		% of inspections & routine maintenance carried out on flap gates annually	100% (inspected and maintained once annually)	100%
		% of inspections & routine maintenance carried out on weir boards annually	100% (inspected and maintained once annually)	100%
Environmental Stewardship	Providing stormwater services that protect the environment	% of storm sewer flushed when silt and debris accumulation > 1/4 internal pipe diameter	100% of pipe discovered with accumulations exceeding a depth equal to or greater than one-quarter (1/4) of its internal diameter is flushed	Flushing of silt and debris when accumulations exceed a depth equal to or greater than one-quarter (1/4) of the internal pipe diameter
		% of stormwater management facilities that meet the Province's 5% Total Suspended Solids (TSS) reduction requirement	95% achievement of 5% Total Suspended Solids (TSS) reduction	Achieve 5% Total Suspended Solids (TSS) reduction requirement on all stormwater management facilities (wet)
		#/type of LID technologies implemented (Raingardens and bioswales)	17	

No Change | **Positive Upward** | **Positive Downward**

Section 6: Wastewater – Stormwater

6.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

6.3.1 Lifecycle Activities

Table 6.5 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Stormwater assets:

Table 6.5 Current Asset Management Practices or Planned Actions (Wastewater – Stormwater Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	***Stormwater – All*** • Sewer Use Bylaw that regulates discharge quality to sewer. • Increased street sweeping to reduce sediment loads to SWMF. • Increased enforcement of sediment and erosion controls for new construction to reduce sediment loads to SWMF. • Coordination efforts to optimize construction between city projects and external parties (UCC).	• Refer to Appendix B.

Dingman Creek Erosion Control Facility

Table 6.5 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Stormwater Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	***Stormwater Conveyance*** • Reactive Flushing and Cleaning on as required basis. • 24 hour maintenance response capability. • Scheduled inspections include CCTV visual. ***Stormwater Management*** • Specific maintenance programs include annual clean out program for catch basins, stormwater facilities inlet/outlets cleaning, etc.). • Open Conveyance – create a program to (1) rehabilitate the 30-year old channels within the City and (2) establish a program to remove vegetation in its juvenile state along the channel and at headwalls or culvert crossings, particularly following a rehabilitation project. • Maintenance programs for Oil/Grit Separators are reactive or will be cleaned in conjunction with the catch basin cleanout program. Observations will determine frequency of cleaning required. • Green stormwater facilities, such as Low Impact Development assets, are approximately 1 year old. Preventative maintenance includes protection of the features from sediment loading during active construction and regular mulching or weed removal in bioswales.	• Completing planned maintenance activities while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure. • Overscheduling preventative maintenance can lead to excessive maintenance and additional costs with no actual benefits.

Section 6: Wastewater – Stormwater

Table 6.5 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Stormwater Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	***Stormwater Conveyance*** • Stormwater sewer rehabilitation is based on the current condition of the pipe or will be reconstructed in conjunction with a sanitary sewer or watermain project: ○ Pipe lining e.g. Cured In Place Pipe (CIPP), structural lining using horizontal drill machine. ○ Spot repairs. ○ Manhole replacement. ○ Joint sealing. ○ Flushing & Cleaning. ***Stormwater Management*** • Stormwater Management assets are generally newer but 'wet' SWMF require regular inspection to assess if sediment removal is required The City has conducted consultant reviews of the sediment loading to the facilities and has developed a 10-year cleanout plan. An update to this study is currently underway to develop and approximate sediment loading estimates. • Open Conveyance –The City has a desire to rehabilitate sections of the open channels that are approximately 40 years old over the next 10 years. • Rehabilitation of Dykes and other flood/erosion control are triggered by field observations, consultant reports, and in coordination with conservation authority (UTRCA). • Oil/Grit Separators are generally newer with minimal rehabilitation expected over the next 10 years. • Green stormwater facilities, such as Low Impact Development assets, are new assets with minimal rehabilitation work expected over the next 10 years.	• Incorrect assumptions regarding improved expected useful life after rehabilitating a main. Specifically, the estimated service life of a full length cure-in-place pipe is still not well founded in the scientific literature as it is a comparatively new process (developed over the past two decades). • The facilities will not meet the water quality targets specified by the provincial Environmental Compliance Approval if they are not maintained through the removal of sediment. The City may be subject to enforcement and penalties from the Ministry of Environment, Conservation and Parks.

Section 6: Wastewater – Stormwater

Table 6.5 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Stormwater Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	***Stormwater Conveyance*** • Stormwater sewer replacement is based on the condition rating of the infrastructure. In most cases, once the pipe has been inspected and given a condition rating, city staff can determine the best method for replacement: ○ Complete open-cut replacement. ○ Horizontal directional drilling (HDD). ○ Pipe bursting. • Full replacement is the most common method for collapsed or heavily deteriorating pipe. • Look for clusters of poor condition rated sewers and apply high priority. • Coordinate with water, roads projects and through UCC. ***Stormwater Management*** • Stormwater management projects are generally developer driven. SWMF are not replaced, rather they are rehabilitated. • Open Conveyance – there is not a history of replacement. • Oil/Grit Separators have no history of full replacement. If a replacement were to occur, the assets within the separator 'shell' would be replaced. • Green stormwater facilities, such as Low Impact Development assets, have no history of replacement.	• Cost over-runs during large, complex design and construction projects.

Table 6.5 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Stormwater Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	***Stormwater Conveyance*** • Current practice is removal with no cost recovery. Historically some left in situ (original place). • Data on old sewers is stored in GIS. GIS tracks the asset status (i.e. active, abandoned, and/ or removed). ***Stormwater Management*** • Aside from occasional decommissioning of temporary SWMF, stormwater management assets are not typically disposed. However, should disposal of a permanent facility occur, the City could sell the land if no longer needed or retain it as parkland. • Linear Dykes - if a dyke were to be disposed of, activities could include purchasing residential properties that would be impacted if the dyke was no longer in effect. It also includes decommissioning costs which would restore the formerly protected area back to floodplain.	• Cost increases resulting from unexpected health concerns resulting from disposal (such as uncovering asbestos pipe)
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	***Stormwater Conveyance*** • These can include improved technologies or use existing technology for oversizing/expansions or trunk extensions of stormwater sewer. ***Stormwater Management*** • These can include improved technologies that minimize environmental impact, such as Green Stormwater Management Facilities (i.e. low impact development assets).	• Refer to Appendix B.

Section 6: Wastewater – Stormwater

Table 6.5 (Continued) Current Asset Management Practices or Planned Actions (Wastewater Stormwater Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	***Stormwater – All*** Capital growth projects are identified by Development Charges and Water service are a (subject to Development Charges Act, 1997 requirements and City of London policy). • Undertake Environmental Assessments. • Assumption of subdivisions, commercial and industrial extensions, local improvements, etc. • Interim works (typically one to ten years) built to provide temporary service pending construction of permanent infrastructure assets. ***Stormwater Conveyance*** • Projects relate to stormwater trunk extensions and expansions. ***Stormwater Management*** • Interim works (typically one to ten years) built to provide temporary service, usually temporary stormwater SWMF. • New SWMF are planned in the next 10 years to provide servicing for growth. The City follows a Growth Management Implementation Plan to schedule the timing of Development Charges projects within the 5-year window. • Expansions to previously existing facilities may occur to enhance the stormwater functions and allow for more growth area to be serviced.	• Incorrect growth assessments may result in overabundance of assets. • Risk of insufficient funding to maintain new asset. • Incorrect asset size will cost more money and may cause operational challenges (too large asset), or may result in the need to prematurely expand the asset (too small asset). • This is exacerbated by the unknown related to climate change and the need to make stormwater infrastructure larger to accommodate more frequent, intense rainfall events.

Risks described above are compared to current lifecycle and service improvement funding, and any identified growth budgets in the 2018-2027 period.

Section 6: Wastewater – Stormwater

Table 6.6 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Stormwater Conveyance and Management	Operating Budget*	Conveyance	$4,988
		Management	$1,135
		Total	**$6,123**
	Lifecycle Capital Budget**	Conveyance	$9,025
		Management	$5,689
		Total	**$14,714**
	Service Improvement Budget	Conveyance	$5,221
		Management	$470
		Total	**$5,691**

Current funding presented for operating budgets presented is the average of budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget. It is noted the Stormwater Management lifecycle capital budget includes budget amounts for Upper Thames River Conservation Authority-related activities (dykes) that have been identified to having a lifecycle component.

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

Table 6.7 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average annual Activity Expected over 10 year period)
Stormwater Conveyance and Management	Growth Capital Budget and Significant Operating Costs	Capital – Conveyance	$6,853
		Capital – Management	$12,009
		Significant Operating Costs – Conveyance and Management	$1,988
		Total	**$20,850**

Growth activities are analyzed using the draft 2019 DC Background Study. Note that the asset management plan has been completed prior to the finalization of the draft DC Background Study. Thus, any growth needs as identified in the draft 2019 DC Background Study are assumed to be approved for purposes of the CAM Plan, but could be revised.

Approximately 80% of Stormwater approved growth budgets relate to Management projects of various locations ranging across the City boundaries. Approved stormwater main projects either are required for intensification projects.

Expected funding and projects resulting from the draft 2019 DC Background Study are approximately 2/3 Stormwater Management and 1/3 Stormwater Conveyance. Stormwater conveyance needs are attributed to oversizing and Built Area Works identified.

Approximately thirty Stormwater Management growth projects have been identified and various locations ranging across the City boundaries.

Section 6: Wastewater – Stormwater

6.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is not sufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 6.6 presents the condition profile for the next 20 years based in the current budget.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the level of service metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. Figure 6.7 presents the condition profile for the next 20 years based in the optimal budget.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

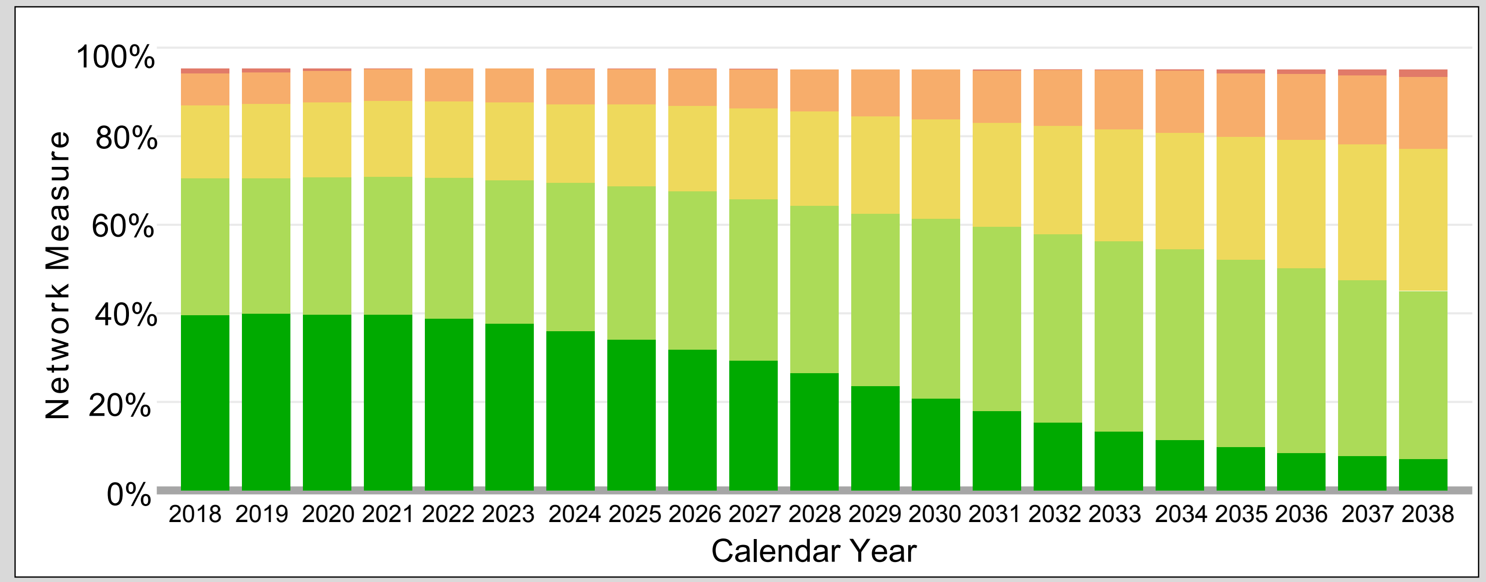


Figure 6.6 Projected 20-year Current Budget Condition Profile (Wastewater – Stormwater Services)

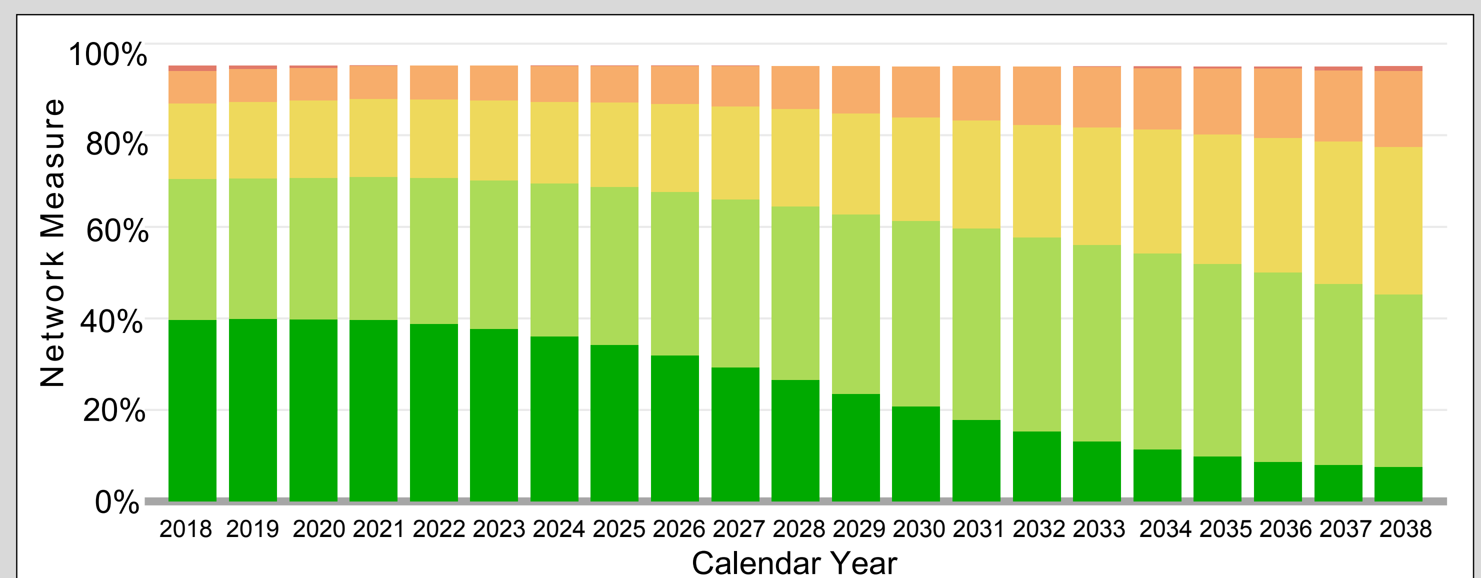


Figure 6.7 Projected 20-year Optimal Budget Condition Profile (Wastewater – Stormwater Services)

6.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 6.8. The analysis documented is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Certain capital budgets are intended and approved for both sanitary and stormwater sewer mains. The historical split as to how these capital budgets were used between sanitary and stormwater mains for these single budget items were discussed with the each service and assumed would be applicable for future years. When combined the listed sanitary and stormwater lifecycle budgets match the 2018-2027 budgets approved as of December 31, 2017.

It is noted the Stormwater Management lifecycle capital budget includes budget amounts for Upper Thames River Conservation Authority-related activities (dykes) that have been identified to having a lifecycle component.

Table 6.8 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Wastewater – Stormwater Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Stormwater Conveyance and Management	Lifecycle Capital Budget	Conveyance	$9,025	$9,484	$400	$59
		Management	$5,689	$8,161	$2,156	$316
		Total	**$14,714**	**$17,645**	**$2,556**	**$375**

Stormwater Sewer pipes – Conveyance System

Section 6: Wastewater – Stormwater

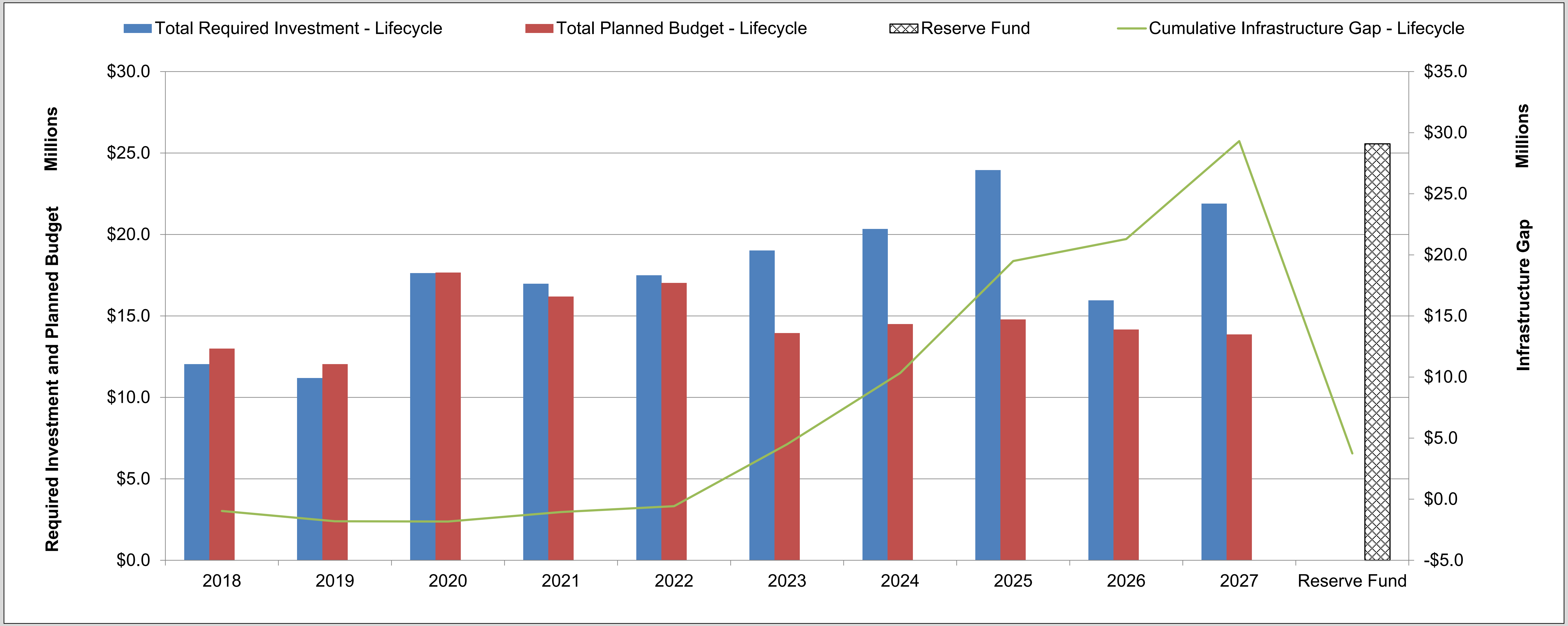


Figure 6.8 Forecasted Lifecycle Infrastructure Gap (Wastewater – Stormwater Services)

Evaluating planned budget vs. required investments shows that Stormwater's 10 year infrastructure gap is $3.75 million. Increased needs regarding rehabilitating stormwater management facilities, dykes renewals, and implementing renewal programs for Low Impact Development (LID) assets are key drivers of the infrastructure gap. Total required investment represents the costs to renew and maintain the existing assets so services can continue to be delivered. The remaining infrastructure gap trend is driven by renewal requirements for stormwater conveyance. The Stormwater service shares the same 20 Year Sewer System Plan as the Wastewater – Sanitary service. This 20 Year Sewer System Plan works within the constraints of the debt servicing ratio, gradually increasing the pay-as-you-go funding for lifecycle replacement, and slowly growing the reserve funds.

Required investment values presented are based on estimates of age and expected useful life noting that inventory and condition information for stormwater assets is improved but considered incomplete.

Furthermore, it is noted that risk assessment and consequence of failure is not explicitly addressed in this CAM Plan. This equal distribution of risk does not consider that the consequence of failure of a channel that conveys a once in 250 year stormwater event is considered greater than that of a stormwater main that conveys stormwater relating to a once in two year storm event. Once a risk assessment methodology is embedded in asset management analysis, it could have a material impact on needs identified for the Stormwater infrastructure gap.

Section 6: Wastewater – Stormwater

6.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

Current challenges relate to coordination and optimization of Core service lifecycle needs.

Current challenges primarily relate to continuously assessing representative replacement values. The 2014 Asset Management Plan relied on inflation-adjusted historic cost of Conveyance and Management assets. It approximated $2.0 billion. The 2019 CAM Plan replacement value approximates $4.4 billion. The increase is attributed to relying on recent tendered project costs which quantify both sewer main construction and restoration costs (costs of restoring roadway after a main is installed). Restoration cost efficiencies are realized through coordinating projects with Core assets (Transportation, Wastewater, and Water). If these projects cannot be coordinated or restoration costs continue to increase, infrastructure funding shortfalls will increase. The infrastructure gap of approximately $3.75 million assumes that that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities.

As well, the 2014 Asset Management Plan relied on watermain cost without factoring in restoration costs (costs of restoring the roadway after a main is installed). There was also reliance on internal estimates on Water Facilities replacement value. The 2014 CAM Plan Water Service replacement value was approximately $2.7 billion. The 2019 CAM Plan replacement value approximates $5.9 billion. The increase is attributed to relying on recent tendered project costs which quantify both watermain construction and restoration costs. Consultant reports which quantified Water Facilities replacement values were also obtained. Restoration cost efficiencies can be realized through coordinating needed Core Assets projects (Transportation, Wastewater, and Water). If these projects cannot be coordinated or restoration costs continue to increase, infrastructure funding shortfalls will increase.

The infrastructure gap of $3.75 million assumes that that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities.

The Stormwater service condition comparison is provided. The change in condition profile is attributed to basing condition not solely on asset age, but incorporating sewermain inspection assessments. The cumulative 10 year infrastructure gap from the 2014 CAM Plan was approximately $1.0 million. The increase is primarily resulting from insufficient funding for Stormwater Management infrastructure needs.

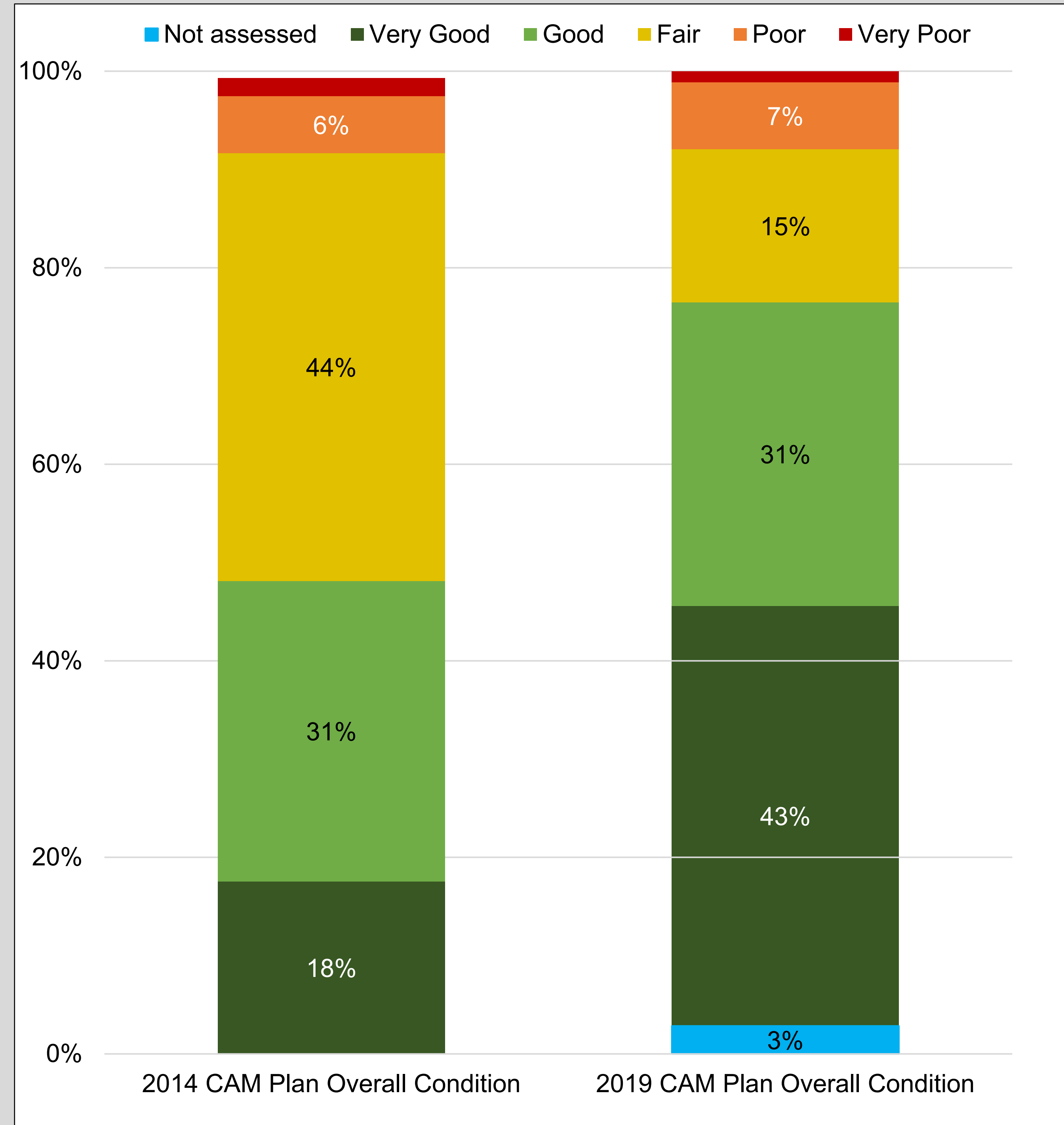


Figure 6.9 2014 CAM Plan to 2019 CAM Plan Condition Summary (Wastewater – Stormwater Services)

6.6 CONCLUSIONS

Valued at roughly $4.4 Billion, the City's Stormwater assets are overall in Fair to Good condition, indicating that they are meeting the City's immediate needs. However detailed condition data is generally limited for Stormwater services. Although the projected infrastructure gap is moderate, a loss of Stormwater services can result in localized and/or City-wide reductions to service. These may include significant impacts such as surface flooding, erosion, blockages, storm sewer backups, poor quality effluent, damage to the natural environment, etc. Further investment and planning will also be needed to accommodate advances in new technology and climate change. The 20 Year Sewer System Plan demonstrates an existing commitment to continue renewing infrastructure as it approaches the end of its useful life.

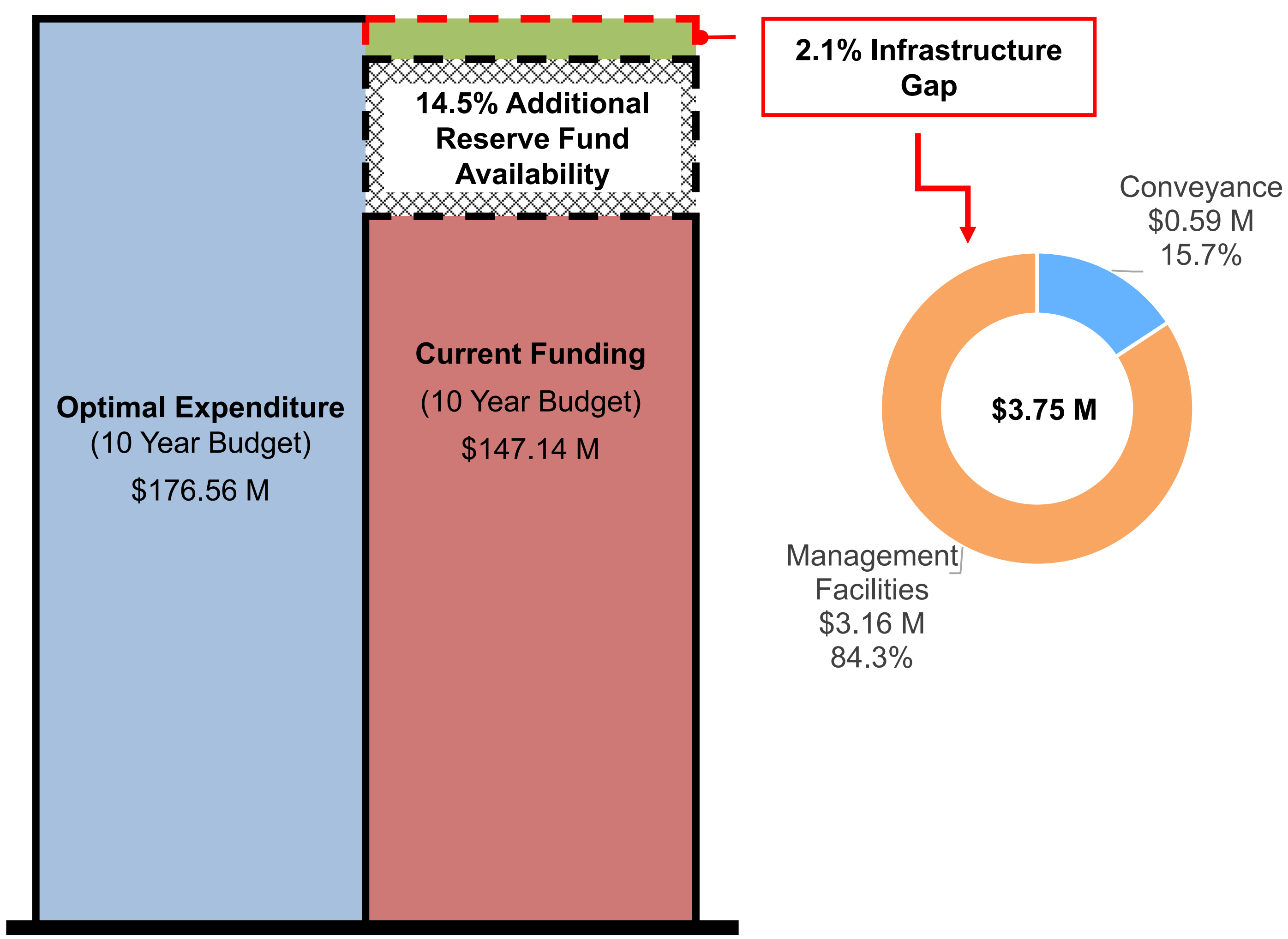
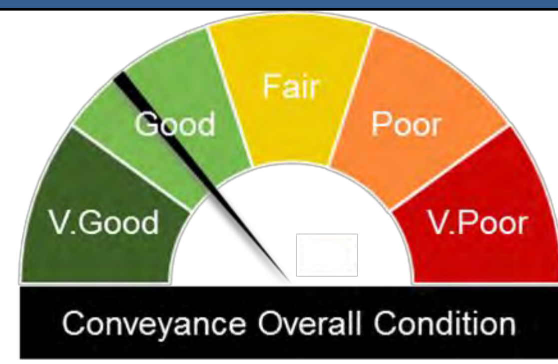
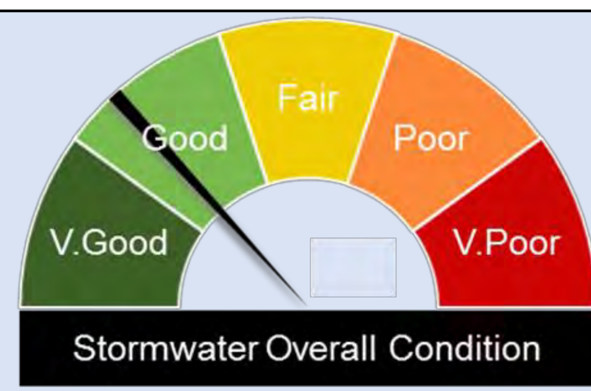


Figure 6.10 Cumulative 10 year Infrastructure Gap Visual (Wastewater – Stormwater Services)

Channel Before Restoration work

Channel After Restoration work

Table 6.9 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Wastewater Stormwater Services)

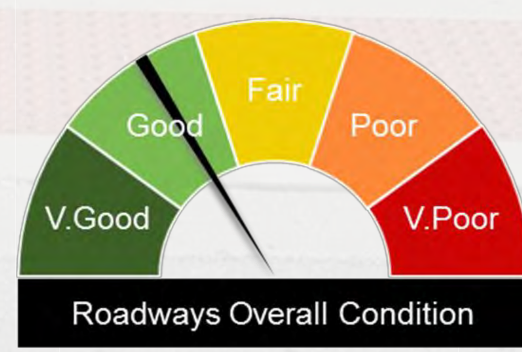
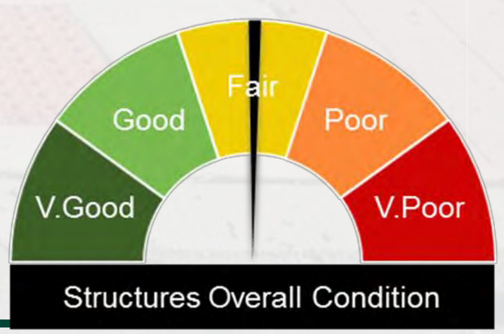
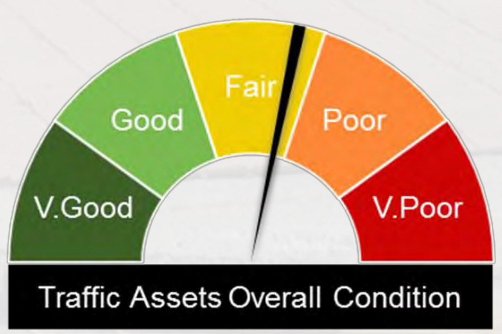
City of London Wastewater Stormwater Services Infrastructure						
Asset Type	**Replacement Value (millions)**	**Current Condition**	**Current Infrastructure Gap (millions)**	**10 Year Infrastructure Gap (millions)**	**Current Annual Reinvestment Rate**	**Recommended Annual Reinvestment Rate**
Conveyance	$3,941		None identified	$0.59**	0.2%	1.0% to 1.3%*
Management	$467		None identified	$3.16**	1.2%	1.7% to 2.0%*
Total	**$4,408**		**None identified**	**$3.75****	**0.3%**	**1.0% to 1.4%***

* Canadian Report Card Recommended Annual Reinvestment Rate.
**This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.

DATA RELIABILITY
High Low
DATA ACCURACY

Section 7: Transportation

Quick Facts
3,656 lane kilometers of Roads
1,568 kilometres of Sidewalks
102 Bridges
59 Noise Walls

	Roadways	Structures	Traffic
Replacement Value	$1.871 Billion	$435 Million	$253 Million
Condition	Good	Fair	Fair
			
10 Year Gap	$159.7 Million	$38.5 Million	$24.9 Million
City-Wide Infrastructure Gap Contribution	**39.2%** City-Wide Infrastructure Gap Contribution		

Section 7: Transportation

7.1 STATE OF LOCAL INFRASTRUCTURE

ROADS, STRUCTURES, AND TRAFFIC

Transportation infrastructure is such a crucial part of daily life that it is often taken for granted. When somebody leaves their home, they use a transportation service. Good roads and structures promote business, create employment, provide social opportunities, create markets, and save lives. When transportation infrastructure is deficient, congestion escalates, the frequency of accidents increases, wear and tear on vehicles worsens, emergency response deteriorates, the environment is negatively impacted, business suffers and opportunities are lost.

The importance of efficient transportation is essential to building a strong economy and improving the quality of life for our citizens. The City contributes to the local economy and quality of life by supporting the safe and efficient movement of people and goods using transportation infrastructure, while managing the growing cost of transportation.

Traffic assets are used to support reliable, efficient, and safe transportation through pedestrian/vehicular traffic control, appropriate lighting, signage, and pavement markings.

The City of London operates and maintains roadways, bridges and Traffic infrastructure, thus enabling safe and effective travel. The City's Transportation Planning and Design Division, Roadway Lighting and Traffic Control Division and Roadside Operations are responsible for planning and operating this critical infrastructure. In addition, the City owns and maintains different types of cycling facilities whether they are shared, designated or separated facilities.

Bicycle Lane at Colborne St

7.1.1 Asset Inventory & Valuation

ROADS AND STRUCTURES

The value of the City's extensive roadways and structures network is over $2.2 Billion. The Roads and Structures section includes assets ranging from roads, sidewalks, cycling facilities, vehicular and pedestrian bridges, to other City assets on right-of-way lands. Assets associated with Parking are addressed separately in this report. Two provincial freeways, Highways 401 and 402 pass through London but fall under the ownership and control of the Province. Similarly, rail and air transportation modes are not owned or managed by the City of London.

Assets falling under the Roads category include Local streets, Primary and Secondary Collectors, Arterials, and City-owned Expressways and Freeways. These assets include road base, drainage, asphalt, curb and gutter, islands, street furniture, etc.

Assets falling under the Structures category are classified based on purpose. Bridges and Major or Minor Culverts are vehicle crossing structures; Footbridges are major pedestrian crossings at highways, railways, or waterways; Pedestrian Tunnels are underground structures that support pedestrian movement under roadways; Noise Walls are vertical structures used to attenuate traffic noise from major routes; and Major Retaining Walls are engineered structures used to stabilize large embankments. Bridges, Footbridges, Major Culverts and Pedestrian Tunnels are inspected in accordance with Provincial Legislation (Reg. 104/97 Public Transportation and Highway Improvement Act) and are maintained as needs dictate within budget allowances. Major Retaining Walls and Noise Walls are assessed and renewed on a planned basis (every 2 and 5 years respectively) according to the findings of Engineering Studies. Table 7.1 summarizes the asset inventory and valuation for the Roads and Structure assets.

Bridge on Highbury Ave N

7.1.1 Asset Inventory & Valuation (Continued)

Table 7.1 Inventory and Valuation (Roadways and Structures Services)

Asset Type		Asset	Inventory	Unit	Replacement Value ($000's)
Roadways	Roads	Local Streets*	1,677	Lane-km	$641,571
		Secondary Collectors*	480	Lane-km	$217,503
		Primary Collectors*	135	Lane-km	$66,772
		Arterials*	1,302	Lane-km	$547,019
		Freeway*	23	Lane-km	$10,329
		Expressway*	39	Lane-km	$19,895
	Sidewalks		1,568	km	$274,050
	Cycling Facilities – In-Boulevard MUP **		40	km	$4,100
Structures	Bridges		102	Ea.	$309,854
	Footbridges		4	Ea.	$11,418
	Minor Culverts (less than 3m span)		38	Ea.	$11,360
	Major Culverts (greater than and equal to 3m span)		53	Ea.	$37,874
	Pedestrian Tunnels		7	Ea.	$7,812
	Major Retaining Walls		18	Ea.	$11,027
	Noise Walls		59	Ea.	$45,339
TOTAL					**$2,215,923**

* Integrating these road classifications with the London Plan road classification system for asset management purposes is underway, but not yet complete.

** The inventory covers only the In Boulevard Multi-use Pathway cycling facility type (40km) as all other types (121 Km) are covered in other asset types in the Transportation section.

Table 7.2 Inventory and Valuation (Traffic Services)

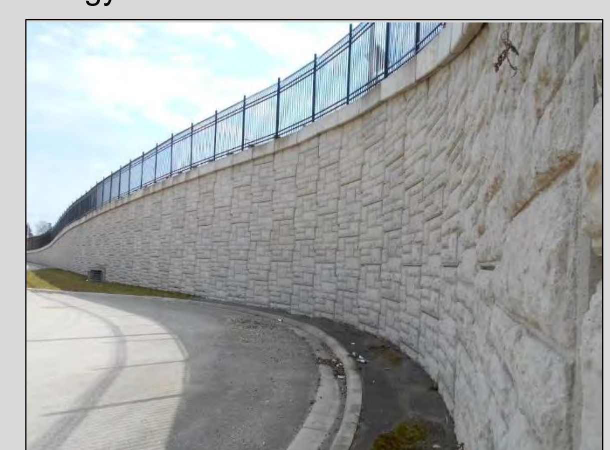
Asset Type	Asset	Inventory	Unit	Replacement Value ($000's)
Traffic	Street Lights	36,183	Ea.	$141,600
	Traffic Signs	8,774	Ea.	$1,973
	Signals	400	Ea.	$109,450
TOTAL				**$253,023**

TRAFFIC ASSETS

To meet transportation needs, the City owns and operates an extensive inventory of static, electrical and electronic Traffic infrastructure valued at over $250 million. Assets range from street lighting units, vehicular and pedestrian signals, to regulatory and informative signage, and road line markings. Table 7.2 summarizes the asset inventory and valuation for the Traffic assets.

Traffic infrastructure is broken down into three categories: Street Lighting, Signals, and Traffic Signage. Maintenance and upkeep of Lighting and Signals assets are contracted out to a third party. However, design and operating activities are undertaken by City staff. The contracts and Provincial standards govern asset performance and the timing of work. The City also maintains road signage and line markings. Major and minor regulatory signage is governed by the Highway Traffic Act, and local bylaws, respectively. Guidance or Information signs are posted according to City policy and as defined in the Ontario Traffic Manual.

Lighting is a significant consumer of energy. The City managed to convert 60% of the Streetlights to LED or low energy fixtures and the target is to transform 100% of the Streetlights to be energy efficient in the future. The City is also likely to pursue traffic efficiencies through newer and smarter technology.



Retaining Wall

7.1.2 Age Summary

ROADS AND STRUCTURES

Figure 7.1 shows the Roadways average asset age as a proportion of the average useful life by asset. The average useful life for a road is 60 years, and represents the construction of all necessary granulars and surface treatment (asphalt or concrete) that comprise a road structure. The average ages for roads was calculated using the Pavement Management System estimated base construction date, while the sidewalks and cycling facilities have been estimated using expert opinion and the asset condition distribution. The design life for most asphalt pavements is 15-20 years, and they must be rehabilitated or replaced 2 or 3 times in order for the roadway to last 60 years or its average useful life. Utilizing pavement preservation treatments (rout and seal, recycled asphalt) and pavement rehabilitation methods (mill & pave, mat replacement) at the appropriate intervals can achieve and extend the average useful life of a roadway. As shown in Figure 7.1, the average age of Primary Collectors, highlighted in red, has passed the Estimated Useful Life; which means that there may be many roads in this category that will be due for treatment and require some investment in the next few years.

Figure 7.1 Average Asset Life as a Proportion of Average Useful Life (Roadways Services)

7.1.2 Age Summary (Continued)

Figure 7.2 shows the Structures average asset age as a proportion of the average useful life by asset. The average age for all structures was calculated using the estimated construction date available in the City's Bridge Management System (BMS). As shown in Figure 7.2, the average age of all types of Structures are in an acceptable range compared to their respective asset type. Similar to roadways, Structures typically require ongoing maintenance and major rehabilitations in order to achieve their average useful life expectancy. Major rehabilitations are expected to occur at about the structures' age of 25 years, 50 years, and 75 years. Major rehabilitations bring the existing structure up to the current design code requirements, and with good planning, can extend the useful life of a structure beyond the averages noted below. A large number of the City's structures are nearing the 50 year threshold for major rehabilitation, though it should be noted that due to low historical funding levels, some of these structures were not rehabilitated at the 25 year mark and will likely require more significant and costly repair work.

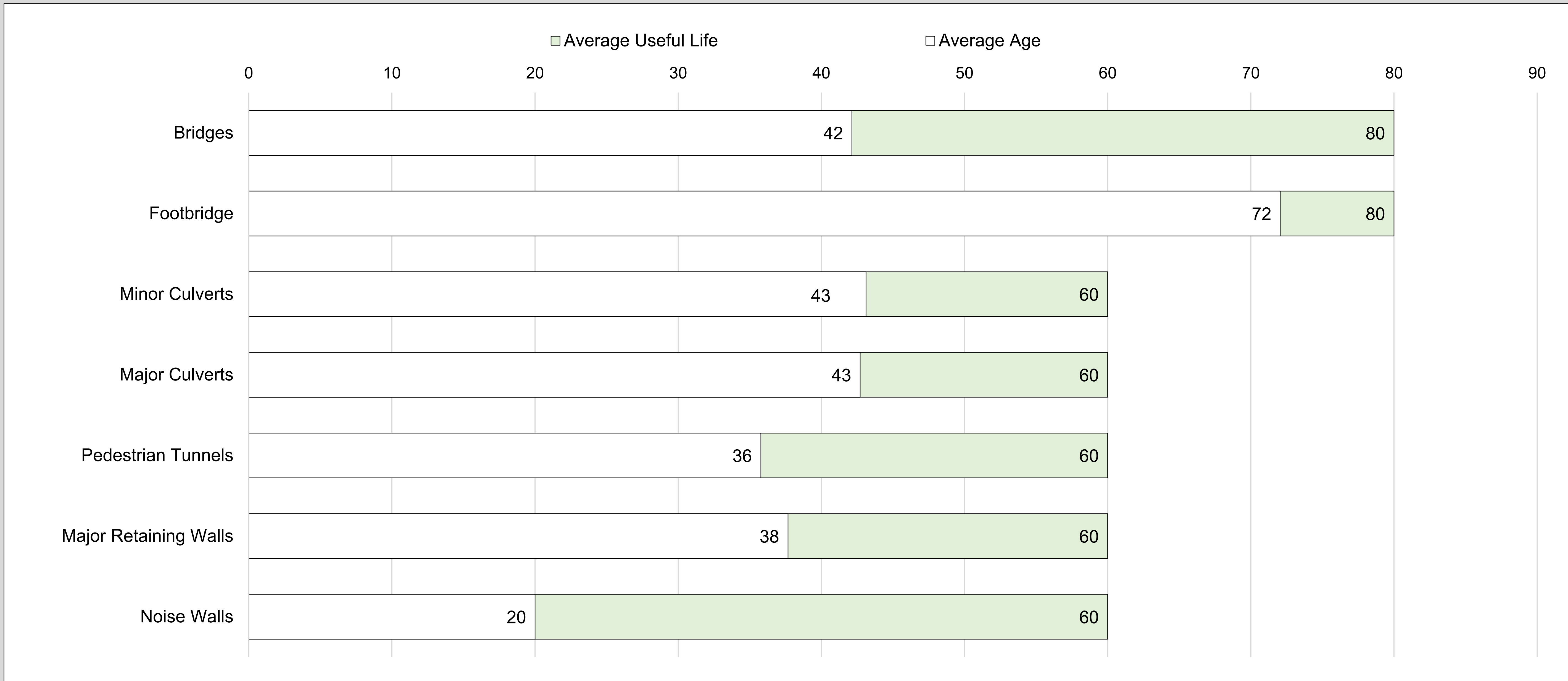


Figure 7.2 Average Asset Life as a Proportion of Average Useful Life (Structures Services)

7.1.2 Age Summary (Continued)

TRAFFIC ASSETS

Figure 7.3 shows the average Asset Age as a proportion of the average Useful Life by asset. The average ages for Signals have been calculated using the acquisition date of each Signal. The average ages of Signage and Streetlights Have been estimated using the asset condition distribution illustrated in Figure 7.3. As shown, the average age of Signals exceeded the Estimated Useful Life (EUL) and a plan is underway to replace 20 Signals per year in order to close the gap by 2038.

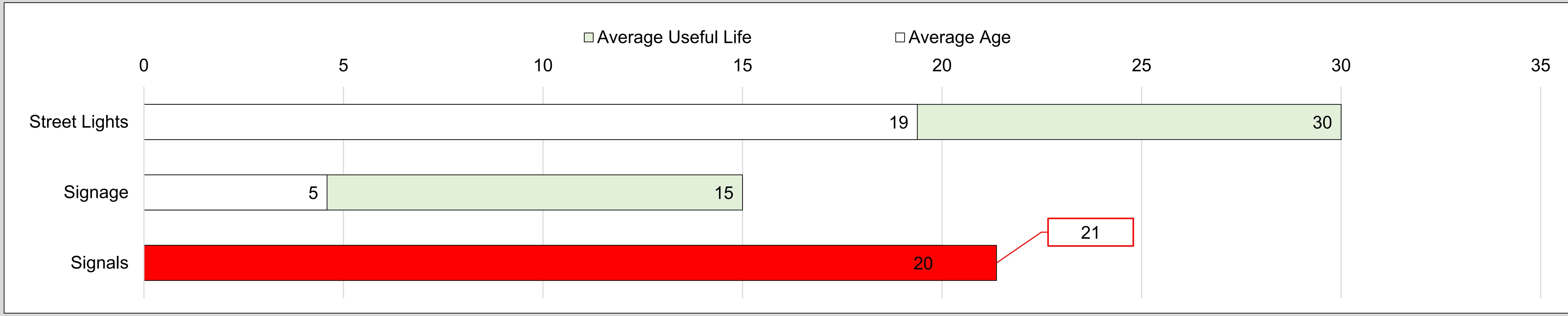


Figure 7.3 Average Asset Life as a Proportion of Average Useful Life (Traffic Services)

Bridge at Ridout St N

Noisewall

Section 7: Transportation

7.2.3 Asset Condition

80% of the city's Transportation services assets (Roadways, Structures, and Traffic) are in **Fair** to **Very Good** condition, with the remainder approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. Figure 7.4 illustrates the Condition distribution of the City's Transportation assets.

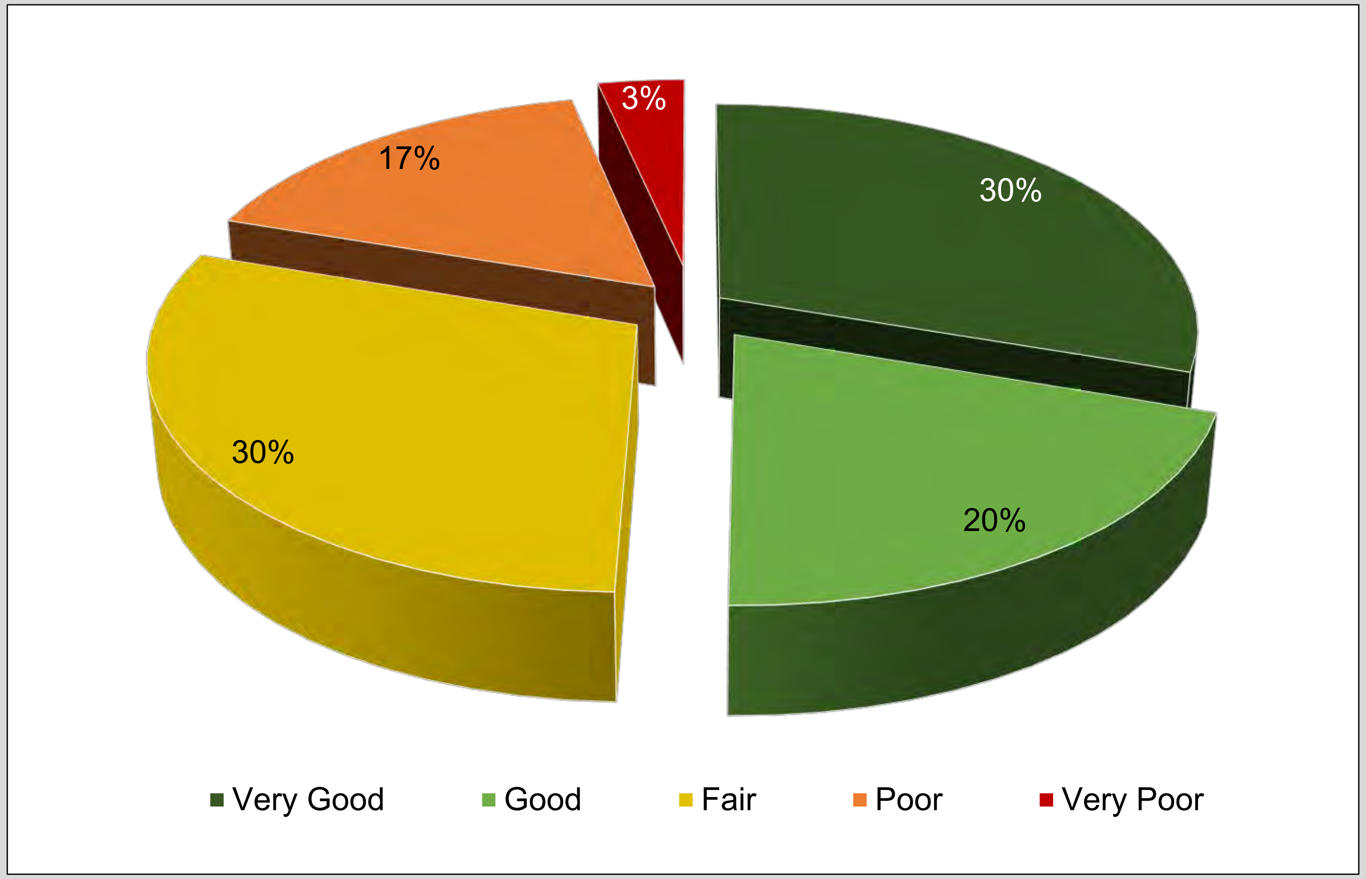


Figure 7.4 Asset Condition Summary (Transportation Services)

ROADS AND STRUCTURES

The condition of London's Roads, Sidewalks and Cycling Facilities are evaluated on a regular basis using varying condition assessment techniques. One quarter of the City's Paved Roads are assessed on a rotating annual cycle based on evaluating the curb lanes of a 4-lane road, or a single lane on a 2-lane road, using a combination of visual rating with surface distress and longitudinal profile (wheel path roughness) data collection. Visual Rating is used for curb type and condition. Results are analyzed and used to establish the pavement quality for each road segment in the City measured against road criteria known as the Pavement Quality Index (PQI).

Road sections that are at an optimal time for specific rehabilitation treatments are placed on a list for rehabilitation. The highest priority roads are repaired dependent on budget availability with efforts made to coordinate road needs with other infrastructure lifecycle renewal projects in order to maximize the economies for all users. The roads that are not repaired join the list for future budgets. Staff and public observations also result in spot repairs and rout and sealing as needed (i.e. potholes and cracks). In London, gravel roads generally represent a small rural portion of the road network and are visually inspected and repaired reactively. Sidewalks are annually walked and rated visually to identify trip hazards and major deficiencies, which were used to identify the overall condition of each segment. Sidewalk repairs are made based on the assessment results or feedback from the public and staff. Temporary sidewalk repairs are made quickly until full repairs can be made. Visual observations and public feedback are the primary triggers for repair for any remaining road assets, such as furniture. Cycling lanes, in most cases, are evaluated during the roads regular assessment and included in the Pavement Quality Index wherever they exist, with the exception of Cycling Facilities which are In-Boulevard Multi-Use-Pathways. These Pathways are assessed separately.

The City Road network is classified into six categories based on traffic volume and characteristics. Local and secondary collector roads are managed to a network average PQI target of 55 and 60 respectively, which corresponds to fair and good conditions, and allows for some localized pavement distress. Primary Collectors and Arterials are managed to a network average PQI target of 65, which corresponds to good condition. City owned Expressways and Freeways are managed to a network average PQI target of 70, which corresponds to good condition and only allows for minor deficiencies. Generally speaking, road assets are maintained on a lifecycle basis through the selection of the optimal treatment based on their current condition and projected deterioration. Treatments range from patching and sealing, to resurfacing or total reconstruction, and are selected to minimize the lifecycle cost of operating each asset within its target state. The majority of the network, **Local Roads, Primary and Secondary Collectors and Arterial Roads**, are rated in **Fair** condition with approximately 25% of each road class being in **Poor** condition and requiring near-term rehabilitation. **Expressways** (Veteran's Memorial Parkway which has recently been repaved from Hwy 401 to Oxford Street E) are in **Very Good** condition, and generally have no immediate needs. **Freeways** (Highbury Ave S from south of Hamilton Rd to Hwy 401) are only marginally in **Good** condition, with 44% in Fair Condition, requiring near term rehabilitation.

Section 7: Transportation

City **Sidewalks** are managed proactively so as to address trip hazards and safety concerns. Sidewalks are walked annually, and those having major issues are scheduled for immediate repair. Sidewalks are also evaluated and renewed as part of neighbourhood renewal and redevelopment activities, where replacement of assets is coordinated with other construction works. Sidewalks are primarily in **Very Good** condition indicating that they are free of trip hazards and major damage.

City owned **Bridges, Footbridges, Pedestrian Tunnels** and **Major Culverts** are managed in accordance with Provincial Bridge Legislation and Guidelines. Assets are managed using the City’s Bridge Management Rating System based on biennial field inspections by qualified experts to identify structural issues and concerns. Deficiencies are noted and combined with other service requirements in planning corrective action. Three quarters of City bridges and major culverts and the majority of the City's Footbridges and Pedestrian Tunnels assets are in **Fair** condition, indicating that most structures will require rehabilitation in the medium term. Assets in Poor condition are in need of some type of attention over the short to mid-term.

Noise Walls and **Major Retaining Walls** are managed to meet safety and City aesthetic standards. Assets are monitored by City crews and evaluated regularly (every 5 years and 2 years, respectively) using engineering studies. Needs are prioritized based on urgency and addressed as needed through capital renewal. Noise Walls are currently in **Good** to **Very Good** condition, indicating that they are free of significant defects. Major Retaining Walls are in **Fair** condition indicating that that they are operational and free of urgent deficiencies with approximately 22% of them in **Poor** condition and need of some type of attention over the short to mid-term.

Figure 7.5 illustrates the condition of each Asset Type in the Roadways and Structures asset portfolio.

Bridge Wingwall

Dundas Flex Street

Section 7: Transportation

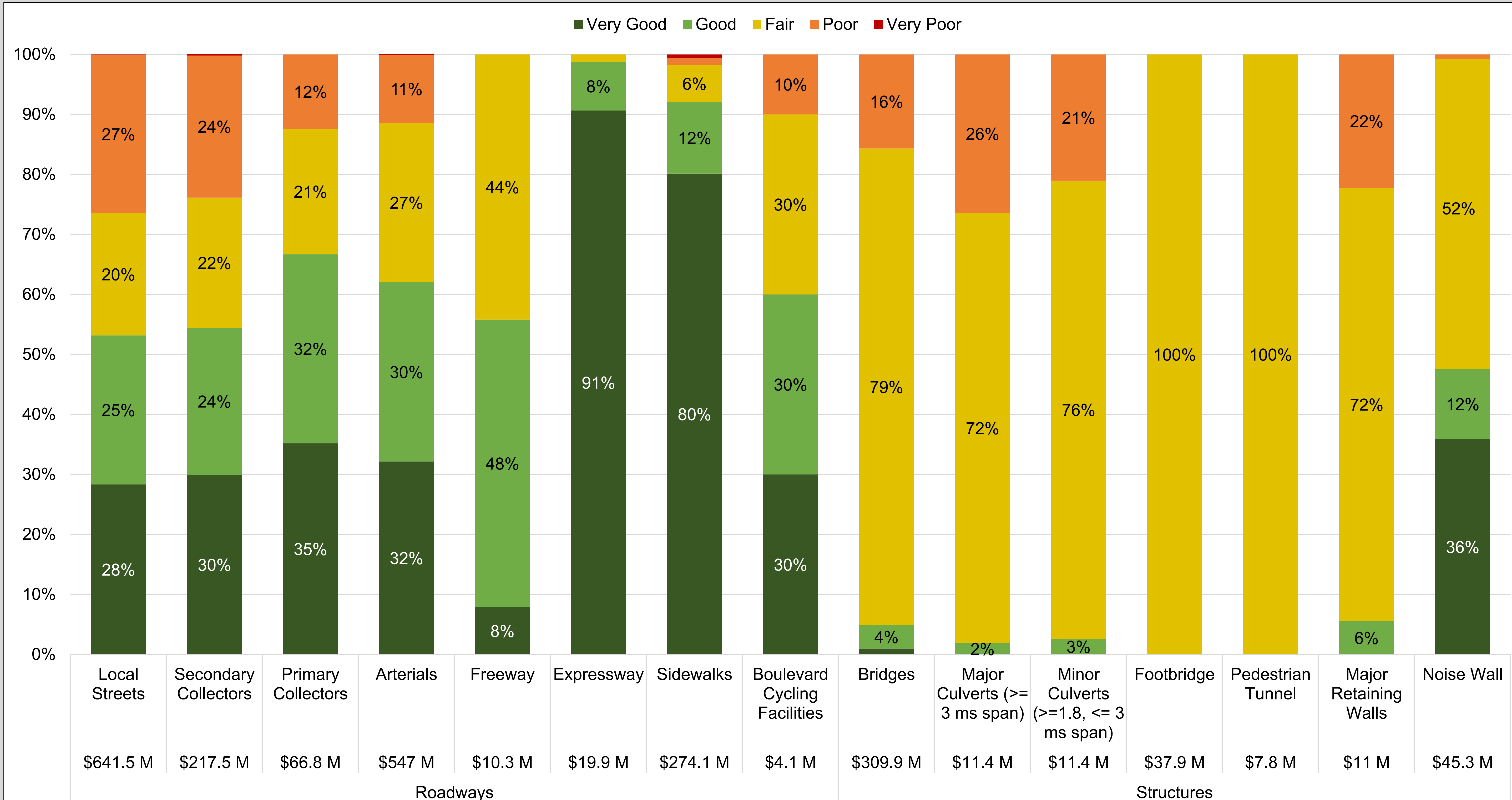


Figure 7.5 Roads and Structures Services Asset Condition by Asset Type (Roads and Structures Services)

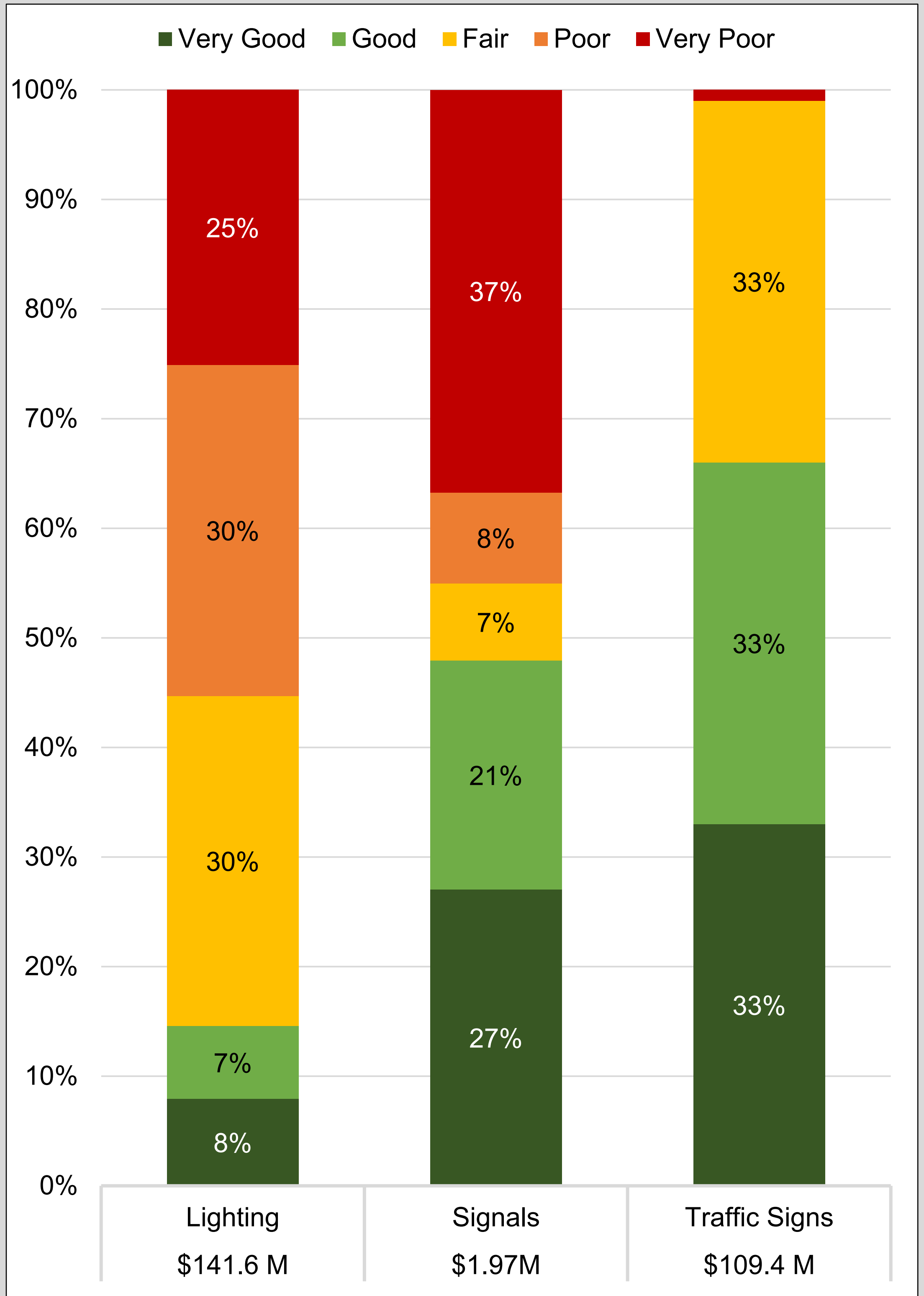


Figure 7.6 Asset Condition by Asset Type (Traffic Services)

7.2 LEVELS OF SERVICE

O.REG 588/17 REQUIREMENTS

O. Reg. 588/17 requires legislated community levels of service for core assets. Community levels of service use qualitative descriptions to describe the scope or quality of service delivered by an asset category. Examples of legislated community levels of service include a map showing the different levels of road class pavement conditions or images that illustrate the different condition of bridges and how this would affect use of the bridges.

O. Reg. 588/17 also requires legislated technical levels of service for core assets. Technical levels of service use metrics to measure the scope or quality of service being delivered by an asset category. Examples of technical levels of service include average surface condition for paved roads based on the Pavement Condition Index Value or the average bridges conditions based on Bridge Condition Index value.

Table 7.3 lists the performance measures that are included in the O.Reg 588/17 requirements for Roads and Structures assets. References are provided to show where O. Reg 588/17 requirements have been attained:

Piccadilly St and Wellington St Intersection

Section 7: Transportation

Table 7.3 O.Reg 588/17 Levels of Service Metrics for Roads and Structures Assets

Customer Level of Service	Technical Level of Service
• Description or images that illustrate the different levels of road class pavement condition. **(Figure 7.5)**	• Average surface condition (e.g. excellent, good, fair or poor) for unpaved roads. **(Table 7.4)**
• Description or images of the condition of bridges and how this would affect use of the bridges. **(Figure 7.6)**	• For bridges in the municipality, average bridge condition index value. **(Table 7.4)**
• Description or images of the condition of culverts and how this would affect use of the culverts. **(Figure 7.7)**	• For structural culverts in the municipality, average bridge condition index value. **(Table 7.4)**
• Description, which may include maps, of the road network in the municipality and its level of connectivity **(Figures 7.8 and 7.9)**	• Average surface condition (e.g. excellent, good, fair or poor) for paved roads **(Table 7.4)**
• Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists). **(Table 7.4)**	• # of lane-kilometres of arterial roads as a proportion of square kilometres of land area of the municipality. **(Table 7.4)** • # of lane-kilometres of collector roads and local roads as a proportion of square kilometres of land area of the municipality. **(Table 7.4)** • # of lane-kilometres of local roads as a proportion of square kilometres of land area of the municipality. **(Table 7.4)** • % of bridges in the municipality with loading or dimensional restrictions. **(Table 7.4)**

OTHER LEVELS OF SERVICE PERFORMANCE METRICS

Other level of service performance measures are related to Corporate Values of Cost Efficiency, Scope, Operational, Accessibility, and Environmental Stewardship. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or to be approximately equal in future years.

Foundational and advanced metrics are listed in Table 7.5.

Sidewalk tactile paving

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Table 7.4 O. Reg 588/17 Required Levels of Service Metrics (Transportation Services)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Scope	Providing a transportation network with a reasonable level of connectivity.	Include description, which may include maps, of the road network in the municipality and its level of connectivity.	Maps are included in Figures 7.8 and 7.9	Not Applicable
		Description of the traffic that is supported by municipal bridges (e.g., heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists).	The City of London bridges have been designed in accordance with the standard and requirements of the Bridge Design Code at the time of construction. The bridges have been designed to carry heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists.	Not Applicable
Operational	Providing an operational road network that is safe for drivers, pedestrians and cyclists.	Include description or images that illustrate the different levels of road class pavement condition.	Images included in Figure 7.7	Not Applicable
		Include description or images of the condition of bridges and how this would affect use of the bridges.	Images included in Figure 7.8	Not Applicable
		Include description or images of the condition of culverts and how this would affect use of the culverts.	Images included in Figure 7.9	Not Applicable

No Change | Positive Upward | Positive Downward

Table 7.4 (Continued) O. Reg 588/17 Required Levels of Service Metrics (Transportation Services)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Scope	Providing a transportation network with a reasonable level of connectivity.	# of lane-kilometres of arterial roads (Class 1 and 2) as a proportion of square kilometres of land area of the municipality.	2.497	↑
		# of lane-kilometres of collector roads (Class 3 and 4) as a proportion of square kilometres of land area of the municipality.	2.301	↑
		# of lane-kilometres of local roads (Class 5 and 6) as a proportion of square kilometres of land area of the municipality.	3.919	↑
		% of bridges in the municipality with loading or dimensional restrictions	1.53%	↓
Operational	Providing an operational road network that is safe for drivers, pedestrians and cyclists.	Average surface condition (e.g. excellent, good, fair or poor) for unpaved roads.	Fair	↔
		Average surface condition (e.g. excellent, good, fair or poor) for paved roads.	64.18 ROAD Matrix (Fair)	↑
		For bridges in the municipality, average bridge condition index value.	6.55 BMS (Fair)	↑
		For structural culverts in the municipality, average bridge condition index value.	6.79 BMS (Fair)	↑

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

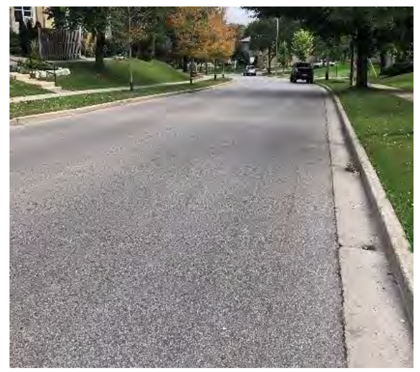
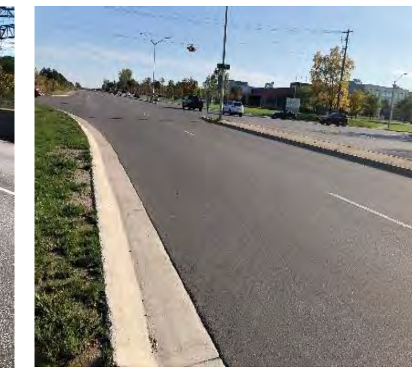
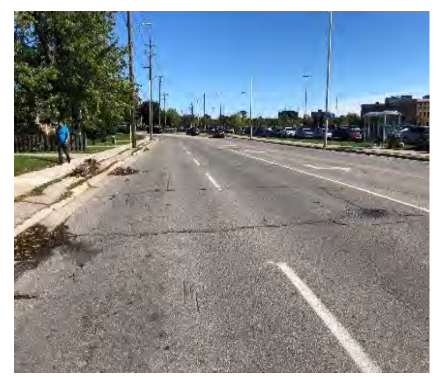
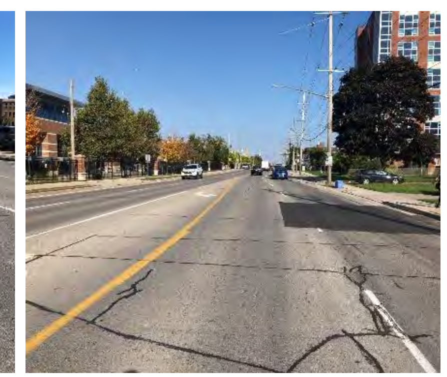
Condition	Images that illustrate the different Pavement Quality Index Levels					
	Local Roads	**Secondary Collector**	**Primary Collector**	**Arterial**	**Freeway**	**Expressway**
Very Good Condition 1 (PQI 80 – 100)	PQI = 80 	PQI = 80.1 	PQI = 80.4 	PQI = 81 	PQI = 88.2 	PQI = 98 
Good Condition 2 (PQI 60 – 79)	PQI = 60 	PQI = 60.2 	PQI = 61.1 	PQI = 60.1 	N/A	PQI = 70 
Fair Condition 3 (PQI 40 – 59)	PQI = 41.4 	PQI = 40.2 	PQI = 41.1 	PQI = 40.0 	PQI = 48.9 	N/A

Figure 7.7 Images of Pavement Quality Index Inspections Compared to Asset Management Condition Rating

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Condition	Images that illustrate the different Pavement Quality Index Levels					
	Local Roads	**Secondary Collector**	**Primary Collector**	**Arterial**	**Freeway**	**Expressway**
Poor Condition 4 (PQI 20 – 39)	PQI = 20.4 	PQI = 22.3 	PQI = 22.8 	PQI = 22.4 	N/A	N/A
Very Poor Condition 5 (PQI 0 – 19)	PQI = 20.4 	PQI = 18.6 	N/A	PQI = 19.8 	N/A	N/A

Figure 7.7 (Continued) Images of Pavement Quality Index Inspections Compared to Asset Management Condition Rating

Condition	Images of the condition of bridges and how this would affect use of the bridges
Very Good Condition 1 (BMS RATING 10)	Overall Condition Rating - 9.0 
Good Condition 2 (BMS RATING 8.0–9.9)	Overall Condition Rating - 6.2 
Fair Condition 3 (BMS RATING 6.0-7.9)	Corrosion and flaking steel 

Condition	Images of the condition of bridges and how this would affect use of the bridges
Poor Condition 4 (BMS RATING 3.0-5.9)	Full perforation of wrought iron arch member 
Very Poor Condition 5 (BMS RATING 1.0-2.9)	Shear ties on reinforcing steel in columns severed due to corrosion. 

Figure 7.8 Images of Bridge Inspections Compared to Asset Management Condition Rating

Condition	Images of the condition of culverts and how this would affect use of the culverts
Very Good Condition 1 (BMS RATING 10)	Almost New Condition 
Good Condition 2 (BMS RATING 8.0–9.9)	No repairs required for the foreseeable future 
Fair Condition 3 (BMS RATING 6.0-7.9)	Acceptable Condition and components generally functioning as intended 
Poor Condition 4 (BMS RATING 3.0-5.9)	Presence of distresses or significant deterioration with components not functioning as intended 
Very Poor Condition 5 (BMS RATING 1.0-2.9)	Danger and collapse. Replacement or repairs required as soon as possible 

Figure 7.9 Images of Culvert Inspections Compared to Asset Management Condition Rating

Section 7: Transportation

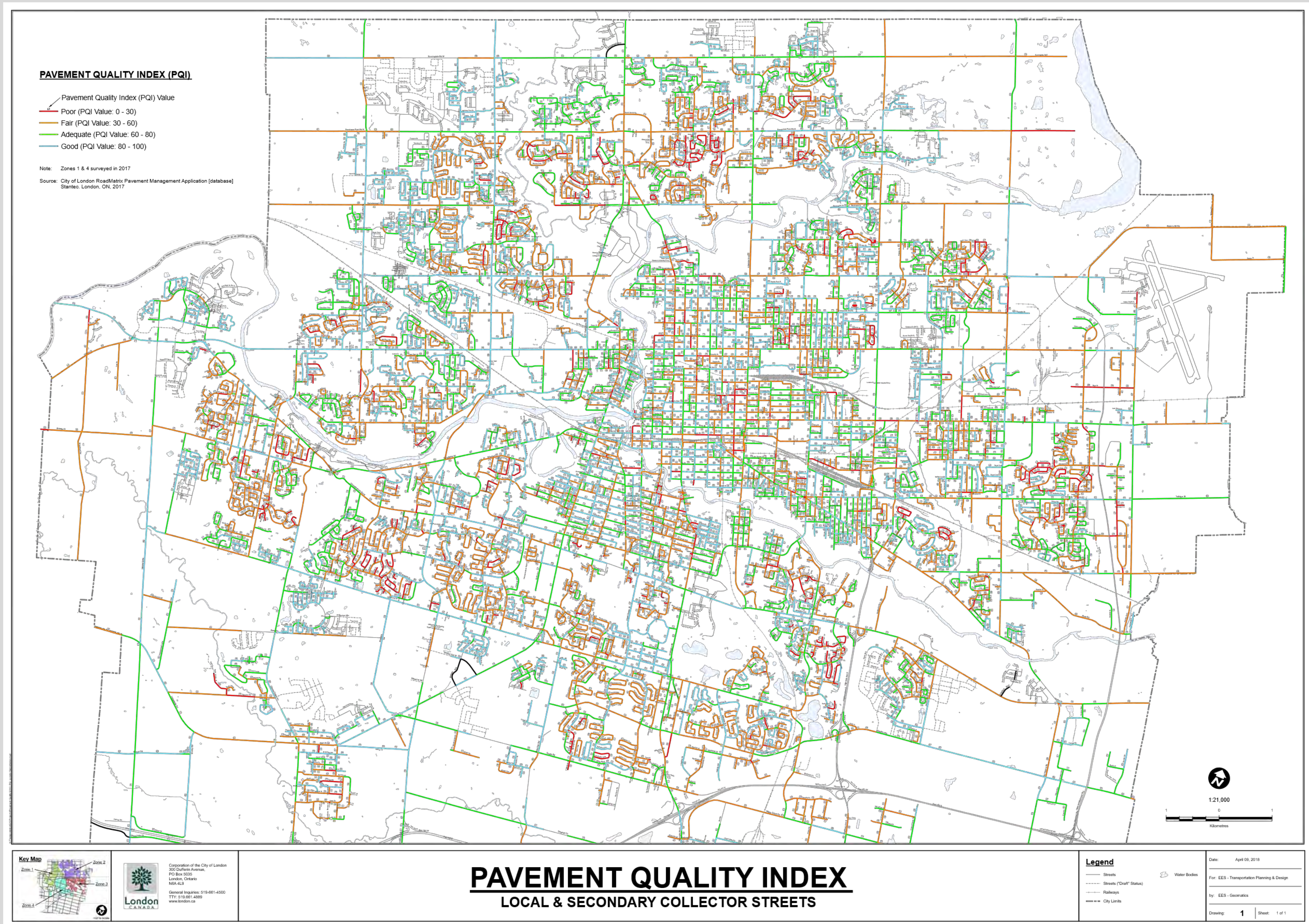

Figure 7.10 Map of the road network in the municipality and its level of connectivity (Local and Secondary Collector streets)

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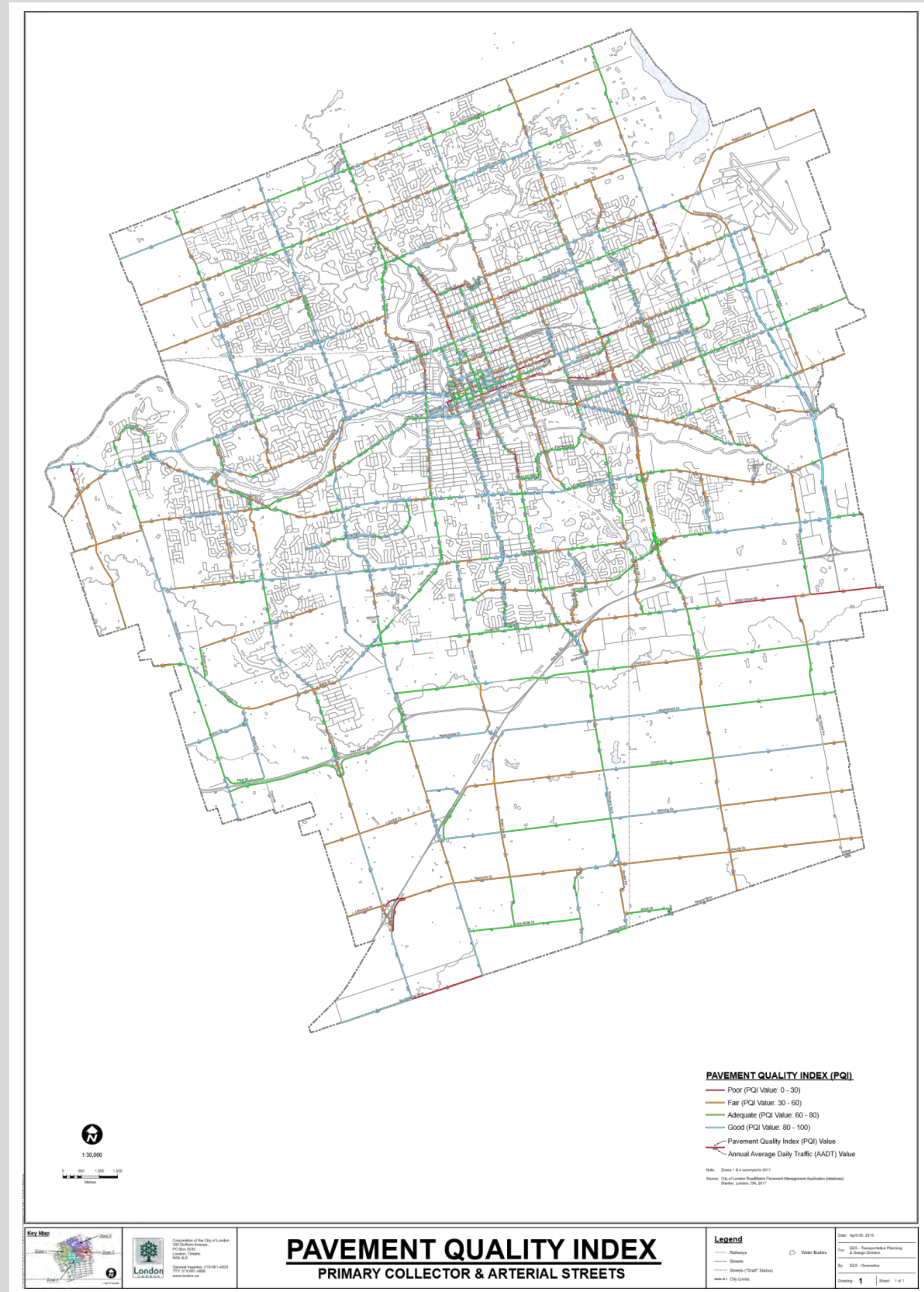

Figure 7.11 Map of the road network in the municipality and its level of connectivity (Primary Collector and Arterial streets)

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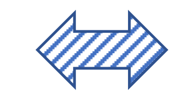
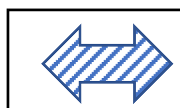
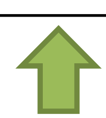
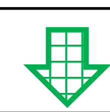
Table 7.5 Levels of Service Metrics – Foundational and Advanced (Transportation)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2 | 3

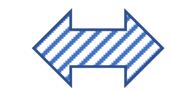
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing an efficient transportation network for all modes	Operating cost to provide transportation services (Roadway, Structure, Street Lighting and Traffic Signals) ($/household)	$256	
Scope	Providing a transportation network with a reasonable level of connectivity	% of residents satisfied with road service	52%	
Operational	Providing an operational road network that is safe for drivers, pedestrians and cyclists	% of transportation assets (roadways, traffic assets, structures as a weighted average based on replacement cost) in fair or better condition	80%	
		% of paved lane km where the condition is rated as good to very good	59.83%	65%
	To provide pedestrian/vehicular traffic control, appropriate lighting, signage and pavement markings for the safe and effective mobility needs of the public in a cost effective manner.	% of signage with visibility that meets (check)	100%	Clear obstructed signage as soon as practicable
		% of street light repairs that meet or exceed municipal road maintenance timeline standards	100%	100%
		% of traffic signal repairs that meet or exceed municipal road maintenance timeline standards	100%	100%
Accessibility	Provide an adequate/accessible road network and adequate pedestrian access	% warranted sidewalk needs vs total sidewalk network	47.60%	0%
		% of linear bike facility (i.e. bike lanes) completed vs total in cycling master plan	41.18%	100%
Environmental Stewardship	Providing a transportation network that is environmentally conscious	% of streetlights that are energy efficient	100%	100%
		Volume of salt tonnes applied to road per lane km (just km that are salted, not all km in city)	27.56	N/A

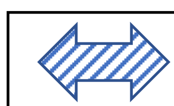
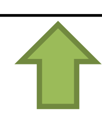
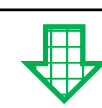
 **No Change**  **Positive Upward**  **Positive Downward**

Section 7: Transportation

Table 7.5 (Continued) Levels of Service Metrics – Foundational and Advanced (Transportation)

Performance Measure | Customer / Council Focused | Technical Focused | 1 | 2 | 3

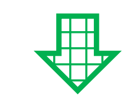
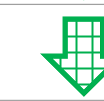
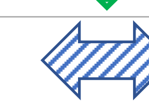
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing an efficient transportation network for all modes	Operating budget for transportation services (Roadway, Structure, Street Lighting and Traffic Signals)	$45,352,248	
		Roadway and Structure Reinvestment Rate	1.7%	
		Traffic Reinvestment Rate	2.95%	
Scope	Providing a transportation network with a reasonable level of connectivity	% arterials in urban growth area over capacity during peak hours	20.0%	0.0%
Operational	Providing an operational road network that is safe for drivers, pedestrians and cyclists	% of PAW site inspections	90%	100%
		% of identified trip hazards repaired/replaced vs. painted	75.0%	100%
		# of bridges and culverts with reduced load limits	1	0
		% of reduction in injury and fatality collisions over 5 years	13%	6.0%
		% of compliance with Minimum Maintenance Standards	100%	100%

 **No Change**  **Positive Upward**  **Positive Downward**

Section 7: Transportation

Table 7.5 (Continued) Levels of Service Metrics – Foundational and Advanced (Transportation)

Performance Measure | Customer / Council Focused | Technical Focused | 1 | 2 | 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Operational	Providing an operational road network that is safe for drivers, pedestrians and cyclists	% compliance with Bridge Inspection Standard	100%	100%
		% compliance of winter maintenance (sand, salt and plowing) with policies, road patrol and maintenance standards)	100%	100%
		% compliance of spring/summer maintenance (sweeping and debris removal) with policies, road patrol and maintenance standards	100%	100%
		% of roads in poor or very poor condition	19%	
		% of sidewalk segments in poor or very poor condition	2%	
		% of structures in poor or very poor condition	15%	
		% of streetlight assets in poor and critical conditions	55%	
		% of signal assets in poor and critical conditions	45%	
		% of signage assets in poor and critical conditions	1%	
		% of Arterial road segments that did not meet the desired condition	42.99%	<30%
		% of Primary Collector road segments that did not meet the desired condition	40.90%	<30%
		% of Expressway road segments that did not meet the desired condition	6.80%	<25%

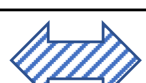
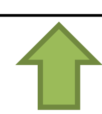
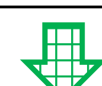
 **No Change**  **Positive Upward**  **Positive Downward**

Table 7.5 (Continued) Levels of Service Metrics – Foundational and Advanced (Transportation)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2 | 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Operational	Providing an operational road network that is safe for drivers, pedestrians and cyclists	% of Secondary Collector road segments that did not meet the desired condition	45.33%	<35%
		% of Local road segments that did not meet the desired condition	41.92%	<35%
	To provide pedestrian/vehicular traffic control, appropriate lighting, signage and pavement markings for the safe and effective mobility needs of the public in a cost effective manner.	Sign Reflectivity Testing - % Pass	>98% Pass Reflectivity Test, ones that don't are replaced as soon as practicable	99%
		% of streetlight repairs that do not meet municipal road maintenance timeline standards	0%	0%
		% of traffic signal repairs that do not meet municipal road maintenance timeline standards	0%	0%
Accessibility	Provide an adequate/accessible road network and adequate pedestrian access	% warranted sidewalk needs vs total sidewalk network	47.60%	0%
		% of linear bike facility (i.e. bike lanes) completed vs total in cycling master plan	41.18%	100%
Environmental Stewardship	Providing a transportation network that is environmentally conscious	% of streetlights with LED or low energy fixtures	60%	100%
		Volume of salt applied to road/lane km (just km that are salted, not all km in city)	27.56	N/A

No Change **Positive Upward** **Positive Downward**

7.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

7.3.1 Lifecycle Activities

Table 7.6 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Transportation assets:

Table 7.6 Current Asset Management Practices or Planned Actions (Transportation Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	**Roadways (Roads, Sidewalks, Cycling Facilities)** • Public involvement practices such as adopt a road, spring cleanup • Public transit incentives **Structures (Bridges, Culverts, Footbridges, Noise Walls, Retaining Walls)** • Encouragement of conservation of water and energy through policy, procedures, public outreach, etc. **Traffic assets (Street Lighting, Signals, Signs)** • Refer to Appendix B.	**Roadways (Roads, Sidewalks, Cycling Facilities)** • During rehabilitation work, extra costs to minimize road user disruption as roads become more congested. • Streetscaping enhancements can increase costs of project implementation and redirect dollars from maintaining existing assets. • Trend in cycling facilities design will increase operating budgets **Structures (Bridges, Culverts, Footbridges, Noise walls, Retaining Walls)** • Ten (10) year planning horizon for long lifecycle assets (like bridges) may be short sighted • Requirement to meet current design code requirements on major bridge rehabilitations can be expensive **Traffic assets (Street Lighting, Signals, Signs)** • Traffic signal renewals often triggers additional roadway improvements for safety, AODA and Active Transportation requirements.

Table 7.6 (Continued) Current Asset Management Practices or Planned Actions (Transportation Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	**Roadways (Roads, Sidewalks, Cycling Facilities)** • Routine maintenance such as street sweeping, pothole patching, utility cut repairs, sidewalk levelling, etc. (3,629 km road, 1,554 km sidewalk) • Snow and ice removal maintenance • Meet Provincial Minimum Maintenance Standards. • Scheduled preventative maintenance programs such as the rout and seal program to stop leakage damage. • Scheduled inspection programs – 25% per year pavement quality • 24 hour maintenance response capability • Line markings on major routes are reapplied semi-annually. The condition of the line markings vary throughout the year based on traffic, type of marking and time since reapplication. • ‘Report a Pot Hole’ Program. • Availability of Transportation Operations Public Service (TOPS). **Structures (Bridges, Culverts, Footbridges, Noise Walls, Retaining Walls)** • Scheduled inspection programs once every 2 years for structures • Reactive maintenance for significant portion of asset inventory **Traffic assets (Street Lighting, Signals, Signs)** • Maintenance of Lighting and Signals infrastructure is contracted out. The nature and frequency of re-lamping and pole maintenance are based on best practices and requirements in the contracts. The City is directly responsible for signal timing and operation. • Signage - Major regulatory signs (e.g. Stop Signs) are tested for reflectivity on a rotating basis and maintained based on the evaluation results. Minor regulatory (e.g. No Parking) and Guide/Information signs are managed reactively based on citizen inquiries and staff observations.	• Refer to Appendix B.

Table 7.6 (Continued) Current Asset Management Practices or Planned Actions (Transportation Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	**Specific Actions** **Roadways (Roads, Sidewalks, Cycling Facilities)** • Roadways are maintained on a lifecycle basis through the selection of the optimal treatment based on their current condition and projected deterioration. Road renewal and rehabilitation treatments range from patching and crack sealing, to resurfacing, to total reconstruction, and are selected to minimize the lifecycle cost of operating each asset within its target state. Road sections that are at an optimal time for specific rehabilitation treatments are placed on a list for prioritization. Rehabilitation is dependent on budget availability. • 130 average annual km of rehabilitated roadways. **Structures (Bridges, Culverts, Footbridges, Noise Walls, Retaining Walls)** • Structures rehabilitation is based on structure age and assumed life spans and the result of condition surveys. **Traffic assets (Street Lighting, Signals, Signs)** • Traffic assets rehabilitation is based on age and assumed life spans.	• Refer to Appendix B.

Cracking Retaining Wall

Section 7: Transportation

Table 7.6 (Continued) Current Asset Management Practices or Planned Actions (Transportation)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	**Specific Actions** ***Roadways (Roads, Sidewalks, Cycling Facilities)*** • Congestion is an issue in London and leads to early deterioration. Replacement activities are selected to minimize the lifecycle cost of operating each asset within its target state. Road sections that are at an optimal time for replacement are placed on a list for prioritization and constructed pending budget availability. ***Structures (Bridges, Culverts, Footbridges, Noise walls, Retaining Walls)*** • Structures replacement is based on structure age and assumed life spans and the result of condition surveys. ***Traffic assets (Street Lighting, Signals, Signs)*** • Traffic asset replacement is based on age and assumed life spans.	• Refer to Appendix B.

Broken Copping - Noisewall

Table 7.6 (Continued) Current Asset Management Practices or Planned Actions (Transportation)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	**Specific Actions** **Roadways (Roads, Sidewalks, Cycling Facilities)** • Roadway disposals are infrequent and generally related to rerouting. Should a section of a road be permanently closed, the section can be deconstructed and the land sold or repurposed. **Structures (Bridges, Culverts, Footbridges, Noise Walls, Retaining Walls)** • Structures disposals are infrequent. Should a structure be permanently closed, the section can be deconstructed. **Traffic assets (Street Lighting, Signals, Signs)** • Traffic asset disposal at end of useful life.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability	**Specific Actions** **Roadways (Roads, Sidewalks, Cycling Facilities)** • These can include technologies such as pavement material alternatives. • New and improved materials and pavement design processes. **Structures (Bridges, Culverts, Footbridges, Noise Walls, Retaining Walls)** • Refer to Appendix B. **Traffic assets (Street Lighting, Signals, Signs)** • Refer to Appendix B.	• Refer to Appendix B.

Section 7: Transportation

Table 7.6 (Continued) Current Asset Management Practices or Planned Actions (Transportation)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	<u>**Specific Actions**</u> ***All Transportation Assets*** • Undertake Environmental Assessments. • Capital growth projects and analysis in conjunction with Development Charge service area (where applicable with regulatory and municipal policy), or as a part of Assessment Growth Policy (where applicable with municipal policy). • Assumption of subdivisions, commercial and industrial extensions, local improvements, etc. ***Roadways (Roads, Sidewalks, Cycling Facilities)*** • Capital growth projects-road extensions and expansions, and additional lanes. ***Structures (Bridges, Culverts, Footbridges, Noise Walls, Retaining Walls)*** • Refer to Appendix B. ***Traffic assets (Street Lighting, Signals, Signs)*** • Refer to Appendix B.	• Refer to Appendix B

Mason Joints Loss - Noisewall

Spalling - Noisewall

7.3.1 Lifecycle Activities (continued)

The cost of these identified Lifecycle activities is summarized in Table 7.7. Current funding for operating budgets presented is the average of budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through various studies and a review of the capital budget.

Table 7.7 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Transportation Assets	Operating Budget*	Roadways	$30,436
		Structures	
		Traffic	$13,921
		Total	**$44,357**
	Lifecycle Capital Budget**	Roadways	$29,610.6
		Structures	$5,411.1
		Traffic	$7,471.6
		Total	**$42,493.3**
	Service Improvement Budget	Roadways	$600
		Structures	-
		Traffic	$45
		Total	**$645**

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

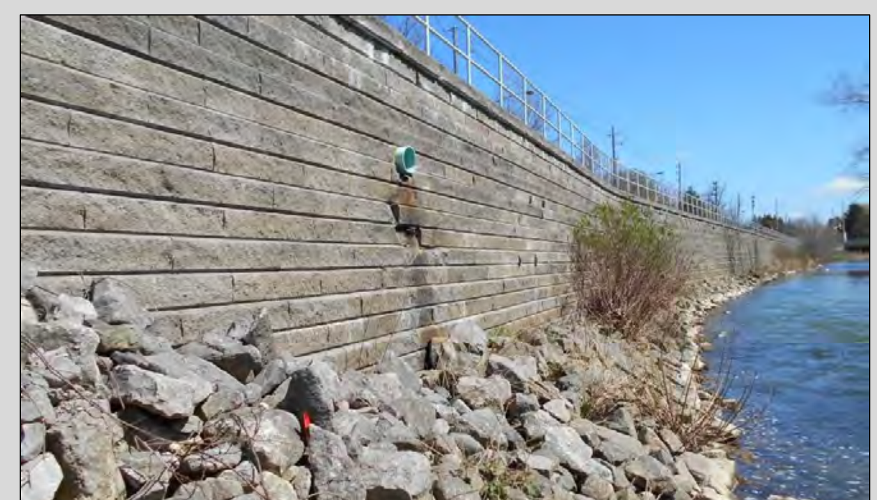
Table 7.8 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 Year Period)
Transportation Assets	Growth Capital Budget and Significant Operating Costs (excludes Transit and Parking)	Growth Capital	$93,363
		Significant Operating Costs	$22,972
		Total	**$116,335**

The Transportation Capital and Operating growth expected funding is summarized in Table 7.8. Growth activities are analyzed using the draft 2019 DC Background Study. Note that the asset management plan has been completed prior to the finalization of the draft DC Background Study. Thus, any growth needs as identified in the draft 2019 DC Background Study are assumed to be approved for purposes of the CAM Plan, but could be revised.

It is noted that approximately $480 million of growth projects identified in the draft 2019 DC Study would occur after 2027, which is beyond our period of analysis.

Of the growth needs identified in 2018-2027 time horizon, approximately 44% relate to Bus Rapid Transit. Approximately 41% relate to arterial road upgrades and 8% relate to two lane arterial upgrades. The remaining relates to future studies and plans and additional programs (such as work at intersections).



Retaining Wall

7.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is insufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a Poor or Very Poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 7.12 presents the expected Transportation assets condition profile for the next 20 years based in the current budget.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the LOS metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City staff involved with the management of the assets. Figure 7.13 presents the expected Transportation assets condition profile for the next 20 years based in the optimum budget.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

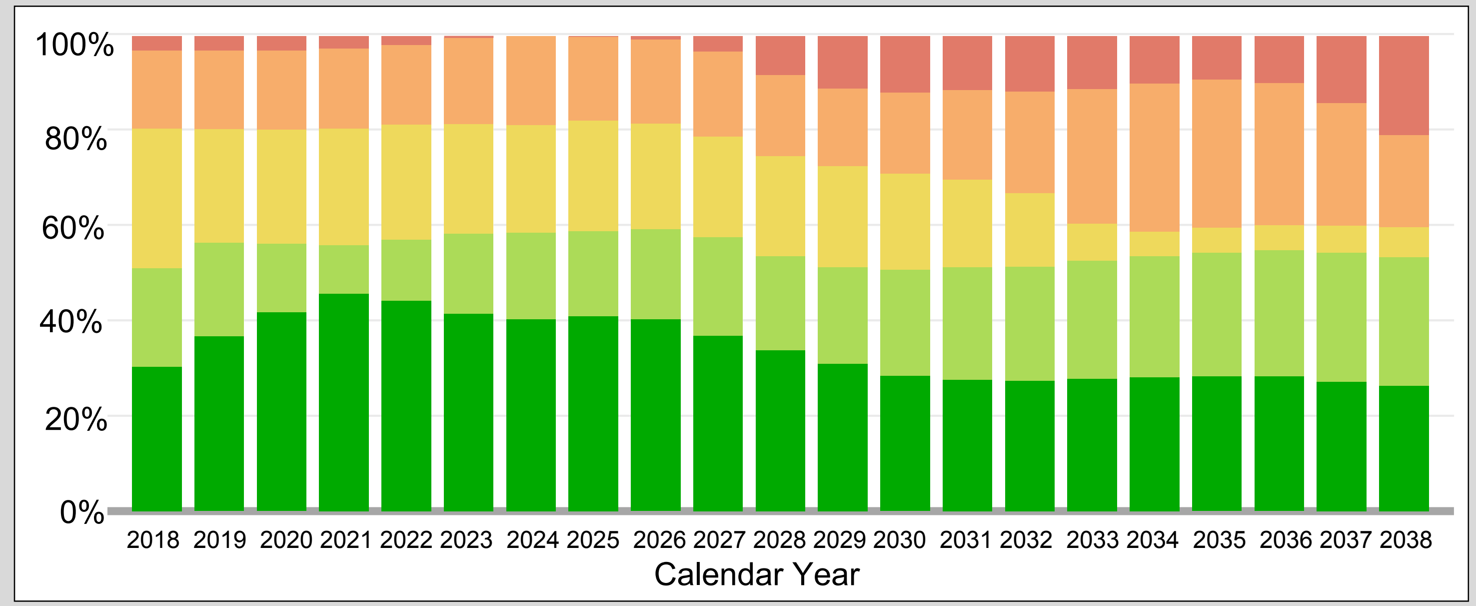


Figure 7.12 Projected 20-year Current Budget Condition Profile (Transportation Services)

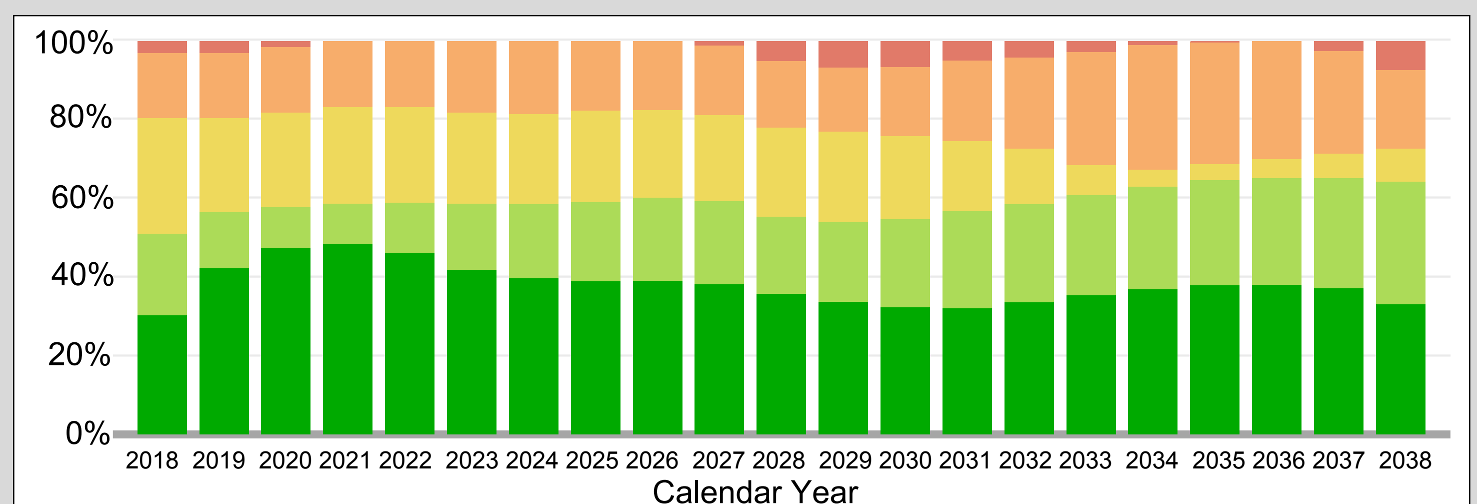


Figure 7.13 Projected 20-year Optimal Budget Condition Profile (Transportation Services)

7.4 FORECASTED INFRASTRUCTURE GAP

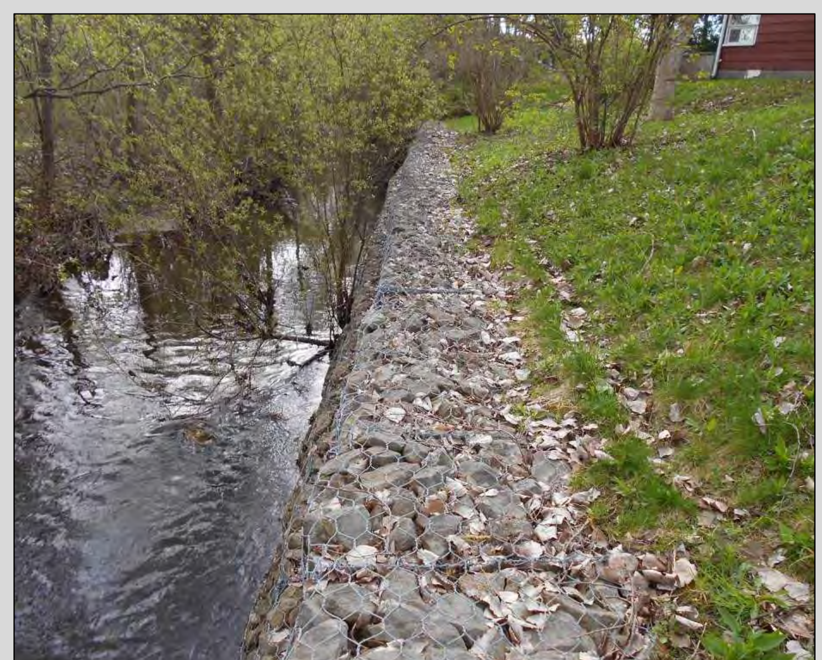
The infrastructure gap is summarized below in Table 7.9 and illustrated in Figures 7.13, 7.14 and 7.15. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Table 7.9 Current and Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Transportation Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average annual)
Transportation Assets	Lifecycle Capital Budget	Roadways	$29,610.6	$47,207.2	$1,633.9	$15,962.7
		Structures	$5,411.1	$9,653.9	$394	$3,848.8
		Traffic	$7,471.6	$10,220	$255	$2,493.4
		Total	**$42,493.3**	**$67,081.1**	**$2,282.9**	**$22,304.9**

Bridge Embankment



Bridge Gabion Baskets

Bridge Elevation

Section 7: Transportation

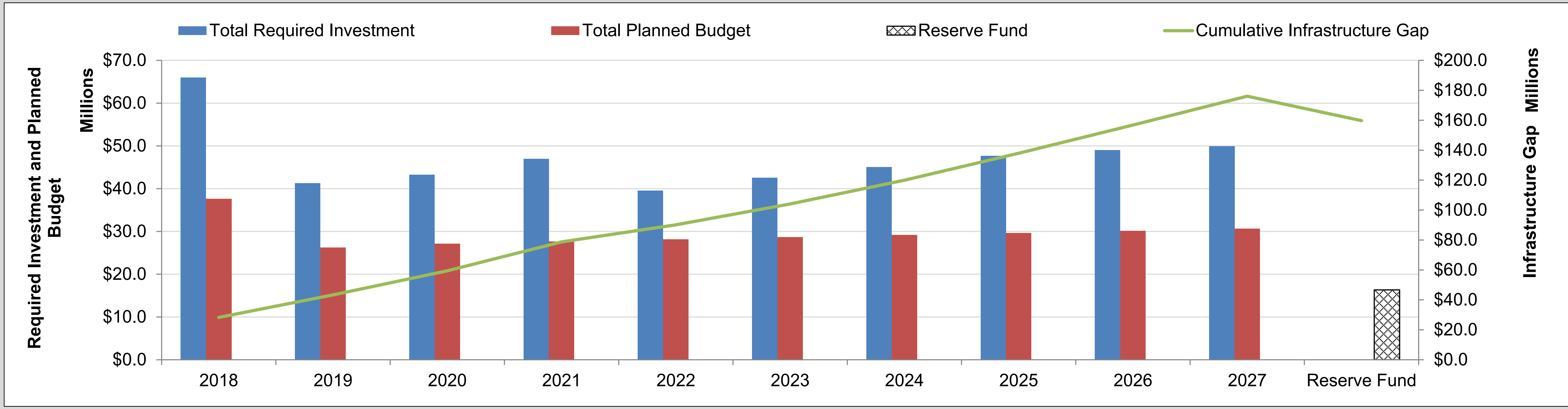


Figure 7.14 Forecasted Infrastructure Gap (Roadways Services)

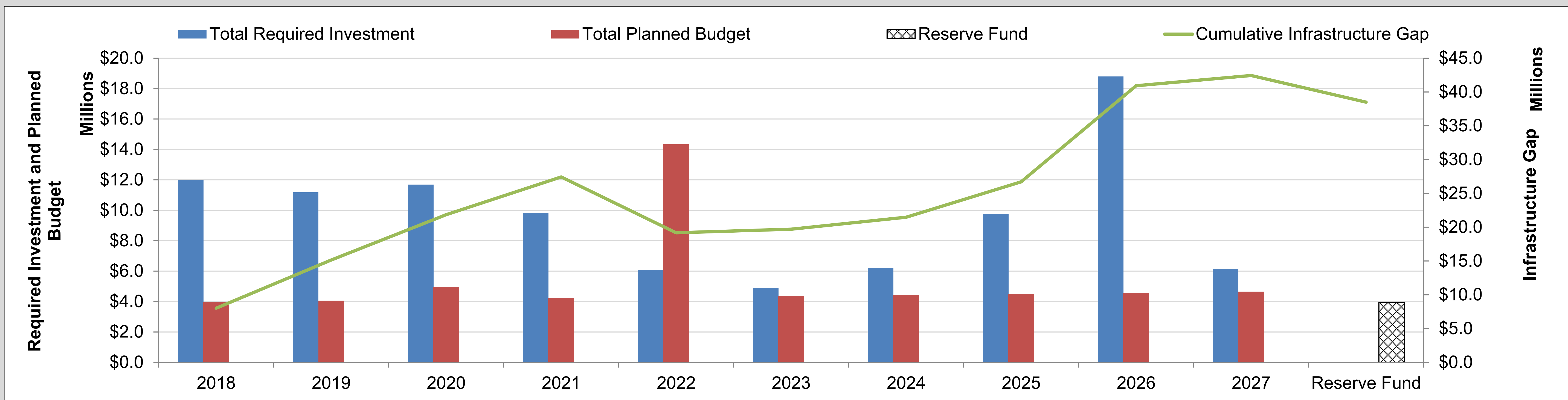


Figure 7.15 Forecasted Infrastructure Gap (Structures Services)

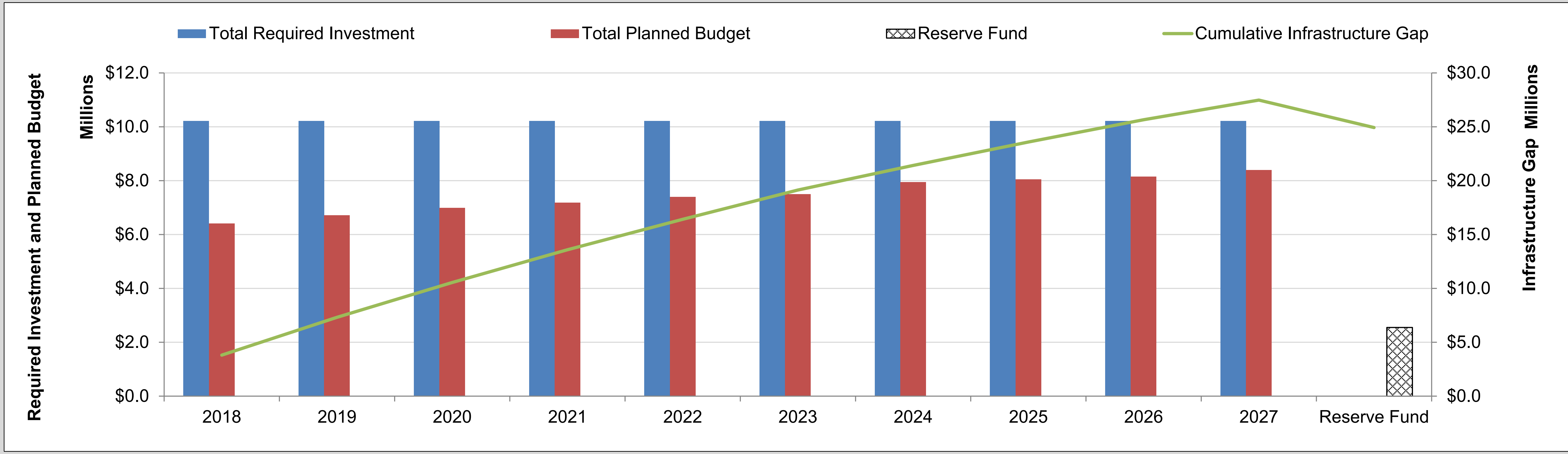


Figure 7.16 Forecasted Infrastructure Gap (Traffic Services)

COMMENTARY ON LIFECYCLE INFRASTRUCTURE GAP

The Cumulative Infrastructure Gap for Transportation assets (Roadways, Structures and Traffic) would grow to more than $223M over the next decade. Trends presented are primarily driven by the Main Roads renewal, which accounts for roughly 72% of this deficit.

Evaluating the base needs forecast for **Roadways Assets** (Roads, Sidewalks and Cycling Facilities) shows that given current investment, the infrastructure gap would grow to about $159 Million over the next decade. These base needs represent the costs to renew and maintain the serviceability of existing infrastructure, and do not account for growth or improvements. Arterial roads including collectors, freeways, and expressways, while still under funded, make up approximately 72% of the projected gap for the roadways assets. Overall the gap continues to increase projecting a general decline in the condition of roads in the City of London.

Evaluating the base needs forecast for **Structures Assets** (Bridges, Culverts, Footbridges, Pedestrian Tunnels, Retaining Walls and Noise Walls) shows that given current investment, the infrastructure gap would grow to over $38 million over the next decade. The total required investment represents the costs to renew and maintain the serviceability of existing infrastructure and do not account for growth or service enhancements. Trends presented are primarily driven by the current available funding levels and do not reflect the actual 'needs' within this class of asset. Without regular investment to maximize their service life, the overall condition of the City's transportation structures will continue to decline.

Evaluating the base needs forecast for **Traffic Assets** (Street Lighting, Signals and Signs) shows that given current investment, the infrastructure gap could grow in excess of $22 million over the next decade. Base needs represent the costs to renew and maintain existing infrastructure, and do not account for growth or the expansion of service to include new service or incorporate new technology. This Infrastructure Gap is driven primarily by the continued use of infrastructure that has surpassed the end of its estimated useful life; 25% of Lighting and 37% of Signals were rated to be in Poor or Very Poor condition. This results in either a significant amount of work to be accomplished over the next 10 years or an alternate solution found through further investigation, especially with regard to the estimated useful life of Lighting and Signal assets. Better condition information on Lighting and Signals assets would improve the accuracy of this finding. Age may not be the best indicator for the condition of an asset.

7.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

ROADS

Transportation infrastructure serves a variety of needs from active mobility by walking and cycling, to transit or personal vehicle. Additionally, it supports the economy by enabling the efficient movement of goods and services. An increased transportation infrastructure gap can lower levels of service that are realized in a number of ways including pavement potholes, bridge load reductions and uneven sidewalks, illegible signs, less reliable streetlights and traffic signals, and other distresses. This can result in:

- Lower levels of customer satisfaction
- Lower levels of road safety
- Challenges to personal mobility, particularly for the less mobile and disabled
- Increased liability and claims
- Longer times to commute to work and school
- Impacts to quality of life

The life expectancy of asphalt is 15-20 years. This is shortened when utility cuts occur. The anticipated time to rehab a local street is now 36 years, almost double the life expectancy of the asphalt.

In extreme cases when pavement conditions deteriorate to very poor conditions, road closures may be necessary. A recent example is Westminster Drive between Colonel Talbot and Westdel Bourne in 2018. Major roadways carrying heavy traffic volumes result in significant congestion and delays for motorists during times of construction and repair. While this work can be planned during off peak and night time hours, there is a cost premium associated with this approach.

Stop Sign

STRUCTURES

Structures form a vital aspect of the City's transportation network creating the connecting links across the various rivers, creeks and tributaries, as well as over/under the various rail lines that transect our City. Maintaining these assets in good, safe condition is important to the prosperity and mobility of our citizens. Previous levels of funding are inadequate to do much more than emergency repairs as summarized in Table 7.10.

Between the late 1940's and the early 1990's, the City constructed 155 of its 204 structures or 76% of our inventory. These structures now range in age from 25 to 75 years. Along with the additional 6% of the inventory that is older than 75 years, the majority of our inventory has reached half of its useful life. The design life of a bridge or footbridge is 80 years, and the design life of a culvert or pedestrian tunnel is 60 years. With regular routine inspection, regular maintenance and ongoing repairs, the design useful life of these structures can be extended. Regular maintenance includes clearing deck drains and expansion joints, spot deck delamination repairs, and expansion joint replacements. While regular repairs are understood to be major rehabilitations which should be done approximately every 25 years. These rehabilitations typically include repairs to all necessary elements including the abutments, piers, girders, deck, and parapet walls while ensuring that the structure meets current requirements of the Canadian Bridge Design Code.

Structures are expensive for the City to maintain. Replacement costs for a bridge run on average $4,000/m2, with major rehabilitation work running on average $2,175/m2 depending on the size of the structure and the scope of the required work. These figures do NOT include allowances for service improvements such as widening for bike lanes or geometric improvements, nor do these figures include costs for engineering, environmental assessments or temporary support works necessary to complete the work; all of which are typical requirements for a major structural rehabilitation. These extras requirements result in the above costs being increased by approximately 25%, or $5,000/m2 and $2725/m2, respectively. In comparison, the cost to reconstruct a four lane arterial road, including sewer and watermain replacement and engineering runs in the order of $600/m2.

As summarized in Table 7.10 below, historically, long term maintenance of the City's transportations structures has been underfunded, with the levels provided in 2003-2007 only adequate to complete emergency repairs.

Table 7.10 Prior Year funding levels for Road Structures

Years	2003-2007	2008-2012	2013-2017
Funding allocated	$ 4,435,656	$10,900,000	$13,600,000

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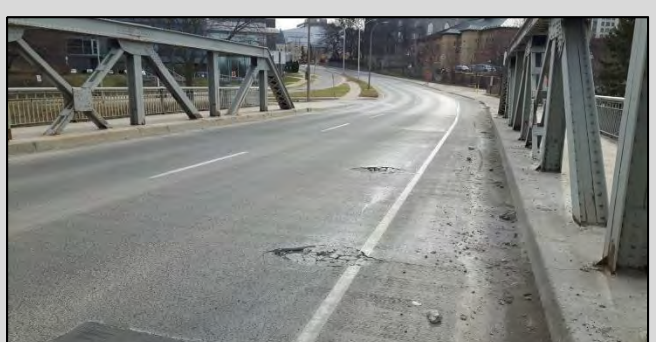
Funding levels have been increasing over the last decade but with the majority of the City's structures in the 49-69 age range and reaching the end of their expected useful life. These funding levels are inadequate to fully address the inventory needs. This means that the need for emergency, temporary repairs (as well as closures) is becoming more prevalent. These emergency repairs normally require unplanned lane closures and result in significant traffic delays, disruption and/or detours. Examples of the City's inventory of aging structures and recent required emergency repairs include:

- Victoria Bridge (Ridout Street South over the South Branch of the Thames River) required lane closures in 2017 to repair a full rust perforation of the truss just above the sidewalk (as illustrated in the photo below) and complete expansion joint repairs. This bridge is now slated for replacement in 2021-2022.
- Kensington Bridge (Riverside Dive into Dundas Street over the North Branch of the Thames River) has had lane closures in 2018 and 2019 to complete localized deck repairs (as illustrated in photo below). Further repairs may still be required in future years as this bridge is not currently scheduled for a major rehabilitation until 2025.
- Riverside Drive Bridge over CN Rail has had many deck delamination repairs over the past 5 years, and the end of the girders supporting the deck are starting to show evidence of deterioration (as illustrated in photo below). Riverside Bridge is having a minor rehabilitation this summer which will address these immediate needs, providing 10 to 15 years of service life before a major rehabilitation is required.
- J. W, Carson Bridge (Clarke Road over North Branch of the Thames River) has had two weekend closures in 2018 and a four week closure in the spring of 2019 to complete deck repairs. Further repairs may still be required in future years as this bridge is not currently scheduled for replacement until 2033 as part of a future widening project.
- Similarly aging structures such as Queens Ave Bridge, Dundas Street E over Pottersburg Creek, Boler Road Bridge, will require increased monitoring and more frequent repairs as they continue to age, until a major rehabilitation or replacement can be scheduled.
- The age profile of the Transportation Structures itemized below in Table 7.11 highlights that this is just the start of a growing need.



Kensington Bridge – Deck Delaminations

Riverside Bridge over CN Rail – Girder End Delamination

The age profile of the Transportation Structures itemized below in Table 7.11 highlights that this is just the start of a growing need.

Table 7.11 Transportation Structure Age detailed profile

Ages (Years)	0 - 24	25 - 49	50 - 74	>75
Bridges	20	32	44	6
Footbridges	2	-	-	2
Culverts	13	40	34	4
Pedestrian Tunnels	2	5	-	-
TOTAL	**37**	**77**	**78**	**12**

Structure projects are complex, multi-faceted, multi-year projects with many stakeholders. Bridge rehabilitation and reconstruction projects typically require environmental reviews and approvals for water crossings, assessments for the impact to Species at Risk (SARS) and appropriate mitigation measures, railway approvals and flagging when working near CN or CP Rail lines. If the structure is over 40 years old, it has to be evaluated for Cultural Heritage. Often existing servicing (watermain, and/or sanitary sewers) and utilities (Bell, Hydro, etc.) are suspended below or attached to the side of a structure. Depending on the scope of work required on the structure, all of these issues require additional effort to coordinate and work around during design and construction. While some structures are small, two lane bridges spanning a small creek (i.e. 150m2), many others spanning the Thames River (i.e. Guy Lombardo on Wonderland Road; approx. 5,775m2) or the rail lines (i.e. Field Marshall Wolseley Bridge over CP Rail on Quebec Street; approx. 3,945m2) need a significant commitment to fund a major rehabilitation or replacement.

Victoria Bridge – Deterioration and Perforation of S-E Diagonal Truss Member above Sidewalk

Section 7: Transportation

With current budget allocations and the time it takes to complete the environmental assessments, detailed design and construction work required, multiple years of budget allocation are required to fund any one project.

Another aspect of transportation structure rehabilitations or replacements that needs to be identified are the impacts to mobility. These structures provide a connecting link over or under a natural or manmade barrier. When it is necessary to close the structure to complete the work it often results in significant detours for traffic to find another route to traverse the barrier (river or rail line). With vehicles, this long detour is annoying but tolerable. For pedestrians or cyclists, this detour may be challenging or excessive. However, the cost of a temporary pedestrian/cyclist crossing can add $1M to the cost of the project. On already tight budgets, these temporary costs, if not included, result in significant disruption to the active transportation corridors within the City.

Transportation structures that bridge natural and manmade barriers within our City form the links between communities, support convenient and connected mobility choices, create beautiful places and spaces, and with our heritage structures acknowledge the City's history. Continued strong investment in these assets is necessary to create a safe and accessible City that promotes a connected and vibrant community.

Noisewall with Vegetative Coverage

Bridge with Parapet Wall

Section 7: Transportation

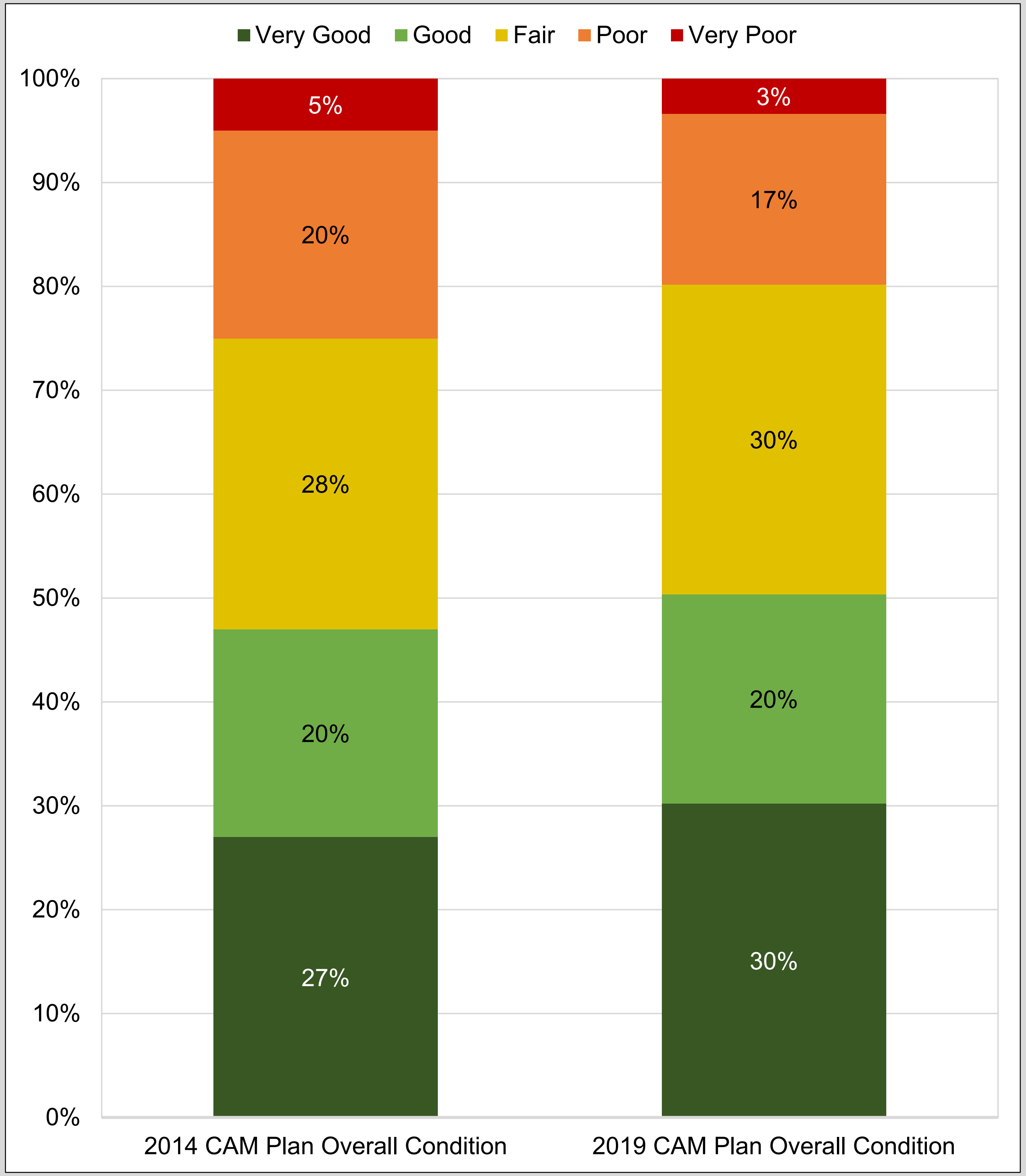


Figure 7.17 2014 CAM Plan to 2019 CAM Plan Condition Summary (Transportation Services)

COMPARING 2014 AND 2019 ASSET MANAGEMENT PLANS

The replacement value of Transportation assets indicated in the 2014 Asset Management Plan was $2.0 billion. The replacement value increased to $2.469 billion due to inflation and constructing or assuming new assets. The 2014 - 2019 Transportation assets condition comparison is provided in Figure 7.15. In the 2014 CAM Plan, the assets were anticipated to deteriorate; however, the condition profile did not change a lot showing less percentages in the Poor and Very Poor conditions due to the investment allocated to the Transportation Assets in the past 4 years. However, due to the rise in construction and restoration costs of infrastructure, the infrastructure gap is expected to increase in the next 10 years, causing an anticipated deterioration in the overall condition of Transportation Assets. More budget is required in order to maintain the current level of service.

The cumulative 10 year forecasted infrastructure gap from the 2014 CAM Plan was $271.6 million. The current cumulative 10 year forecasted infrastructure gap is $223 million. Since the release of the State of Infrastructure Report in 2013 and the CAM Plan in 2014, the focus is on reducing the City's infrastructure gap. In particular, addressing the needs of our Transportation infrastructure which, at the time, accounted for 58% of the City's 10-year projected infrastructure gap. Supported by the asset management plan, the City has made progress towards addressing the Transportation infrastructure gap through increased investment in this area. To date, the efforts have had positive impacts as 80% of Transportation infrastructure now rates in a condition of Fair or better; versus 75% in 2013. While condition has improved over time, acknowledging a slowing of the growth of the infrastructure gap, investment needs of the infrastructure persist. Sustained increased funding for pavement and bridge infrastructure needs is required to reduce the infrastructure gap.

Bridge Abutment

7.6 CONCLUSIONS

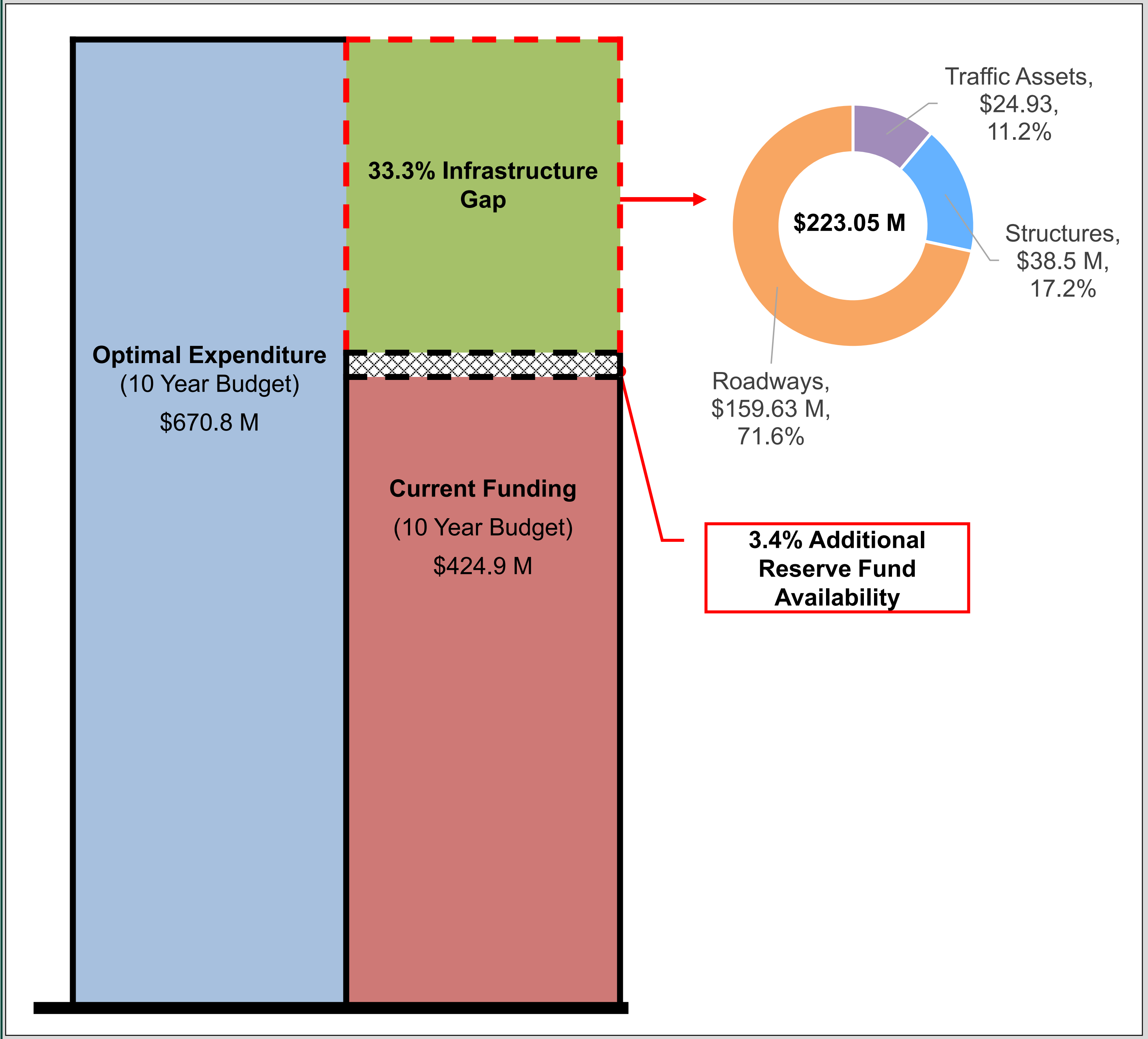


Figure 7.18 Cumulative 10 year Infrastructure Gap Visual (Transportation Services)

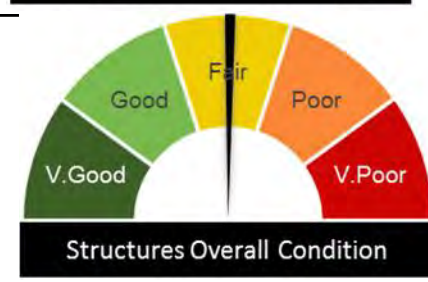
Valued at nearly $2.47 Billion, the City's Roadways, Structures, and Traffic infrastructure assets are currently in overall Good physical condition provided traffic congestion is not considered. Funding shortfalls in all asset groups will result in a degradation of Roads, Structures and Traffic assets over the next decade, particularly for the City's Arterial and Collector Roads. The infrastructure gap will become visible to Londoners through rough roads, potholes, increased vehicle damage claims, reduced road safety, poor pedestrian facilities and increased operating costs, bridge load restrictions, potential closures, and reduced safety. Civic Administration intends to deal with the infrastructure gap through long term strategic planning and continued efforts to lobby senior levels of government for infrastructure funding. As seen in Figure 7.18, the total infrastructure gap will grow to over $223M in the next decade derived mainly by the Roadways which composes about 72% of the Infrastructure Gap.

Bridge Deterioration

Bridge Deterioration

Section 7: Transportation

Table 7.12 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Transportation Services)

	City of London Transportation Services Infrastructure (Roadways, Structures, and Traffic)					
Asset Type	**Replacement Value (millions)**	**Current Condition**	**Current Infrastructure Gap (millions)**	**10 Year Infrastructure Gap (millions)**	**Current Annual Reinvestment Rate**	**Recommended Annual Reinvestment Rate**
Roadways	$1,781		$28.2	$159.62**	1.7%	2.0% to 3.0%*
Structures	$435		$8.0	$38.50**	1.2%	1.0% to 1.7%*
Traffic Assets	$253		$3.8	$24.93**	2.95%	3.5% to 4.5%
Overall Transportation	**$2,469**		**$40.0**	**$223.05****	**1.7%**	**Total Transportation assets** **1.8% to 2.7%**

* Canadian Report Card Recommended Annual Reinvestment Rate.
** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.

DATA RELIABILITY
High Low
DATA ACCURACY

Section 8: Parking

Replacement Value	$5.58 Million
Condition	Good
10 Year Gap	$0.41 Million
City-Wide Infrastructure Gap Contribution	0.1%

Quick Facts
121 Pay Stations
1,116 Surface Lot Stalls
939 Parking Meters

0.1% City-Wide Infrastructure Gap Contribution

Section 8: Parking

8.1 STATE OF LOCAL INFRASTRUCTURE

Parking in the City of London is a complex business not unlike most other municipalities. The City owns both parking lots and on-street parking stalls; some of which are user pay and some of which are free for public use. There is significant competition in the downtown area, where private user-pay parking facilities outnumber municipal lots and garages significantly. The City of London, as a non-profit corporation, provides controlled rate parking to citizens and visitors through convenient short-term on-street parking and long-term off-street parking. This supply supports businesses, commercial and institutional facilities, and entertainment venues. This involves balancing the general need to provide access to convenient parking, while ensuring traffic flows, emergency vehicles access and available accessibility parking for permitted users. A significant task for the City is ensuring compliance with Parking rules that exist to protect the public interest.

8.1.1 Asset Inventory and Valuation

To meet London's parking needs, the City owns and maintains an inventory of 1,769 on-street and 1,321 off-street parking stalls, along with other supporting infrastructure including enforcement assets. Valued at over $5.5 Million, the parking asset base is made up of a mixture of infrastructure (pavement, curbs, etc.[1]), land, and equipment (meters and pay stations). Additionally, the City also manages private parking lots with an additional parking stalls of 375 to total number of off- street owned and managed of 1,696 stalls. City crews operate and maintain functioning meters, though obsolete, as well as updated pay stations. Basic inspections are performed daily in conjunction with the collection of payments. Issues are flagged and combined with call-centre inquiries into a reactive works list. Lots are maintained through contracts with external providers for routine maintenance like snow, litter and minor repairs. Table 8.1 summarizes the Parking assets inventory and their replacement values.

London Convention Center Public Parking – Enforcement sign

Table 8.1 Asset Inventory and Valuation (Parking Services)[2]

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
Parking	Pay Stations	121	Ea.	$1,089
	Pay Stations Shelters	23	Ea.	$92
	Parking Meters[3]	939	Ea.	$329
	Surface Lots	11	Ea.	$4,069
	Stalls in Surface Lots (Both managed and owned)	1,116	Ea.	
TOTAL				**$5,579**

Parking lot # 15 – London Convention Centre

[1] On-street infrastructure replacement value captured in Roads Section.

[2] Note that the City Hall parking garage, parking administrative, maintenance and storage buildings are maintained by the City's Facilities group and reported in the Facilities section. Fleet and associated equipment is provided and serviced by Fleet Management Services and are dealt with in the Fleet section. Land is also excluded from this asset pool and dealt with in the Land section.

[3] Value based on current City of London program to replace, on average, 10 old individual meters with 1 new pay-and-display station.

Section 8: Parking

8.1.2 Age Summary

Figure 8.1 shows the Parking assets average asset age as a proportion of the average useful life by asset type. The average ages for the assets were calculated based on expert opinion. As shown in the figure, generally all asset types are within their average industry standard useful life.

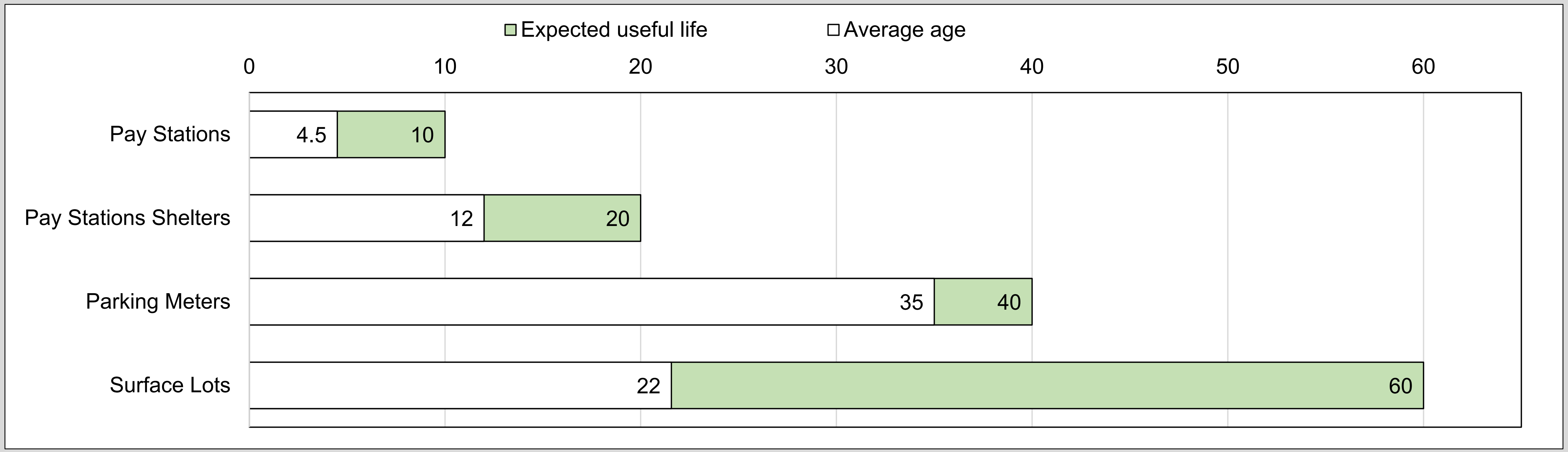
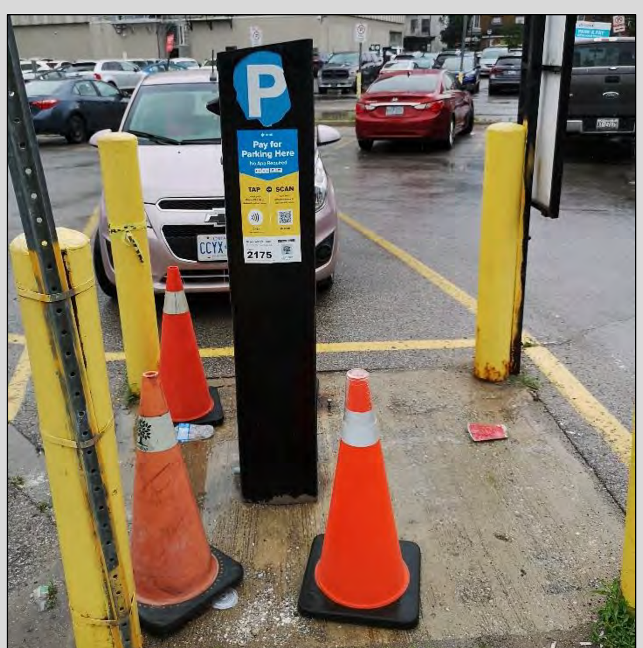


Figure 8.1 Average Parking Assets Age as a Proportion of Average Useful Life (Parking Services)



Parking Meter in Deteriorating Condition

Parking Meter in Deteriorating Condition

Section 8: Parking

8.1.3 Asset Condition

Figure 8.2 shows the condition distribution of all the Parking assets. As seen in the figure, 80% of all assets are in Fair to Good condition, with the majority (74%) in Good condition.

The **Pay Stations** asset group is in **Good** condition. There is a capital program to replace the timing mechanisms in the existing individual meters in 2020. Another capital program to replace the doors on the pay stations to be PCI compliant and move to pay by plate technology. All scheduled replacements of coin operated meters are expected to be completed within the next five years.

The **Pay Station Shelters** asset group are in **Poor** to **Good** condition, with the majority (75%) in **Poor** condition.

The **Parking Meter** asset group is planned to be replaced with a new updated parking meters that support coins, credit cards, and taping parking meters mechanism. The program is pending the capital project approval and scheduled to start in 2020. During the course of the changeover, operating meters will be kept functional with spare meters/parts from the inventory of decommissioned meters, kept by the Parking service. Current Parking meters are generally in **Poor** condition.

Surface lots are generally in **Fair** to **Good** condition, with about 2% in **Poor** condition. The Parking service has completed a condition study for surface lots and addressed any concerns that were raised. The service has completed a number of rehabilitation projects for the parking lots, with remaining planned projects to be completed in the next 3 years.

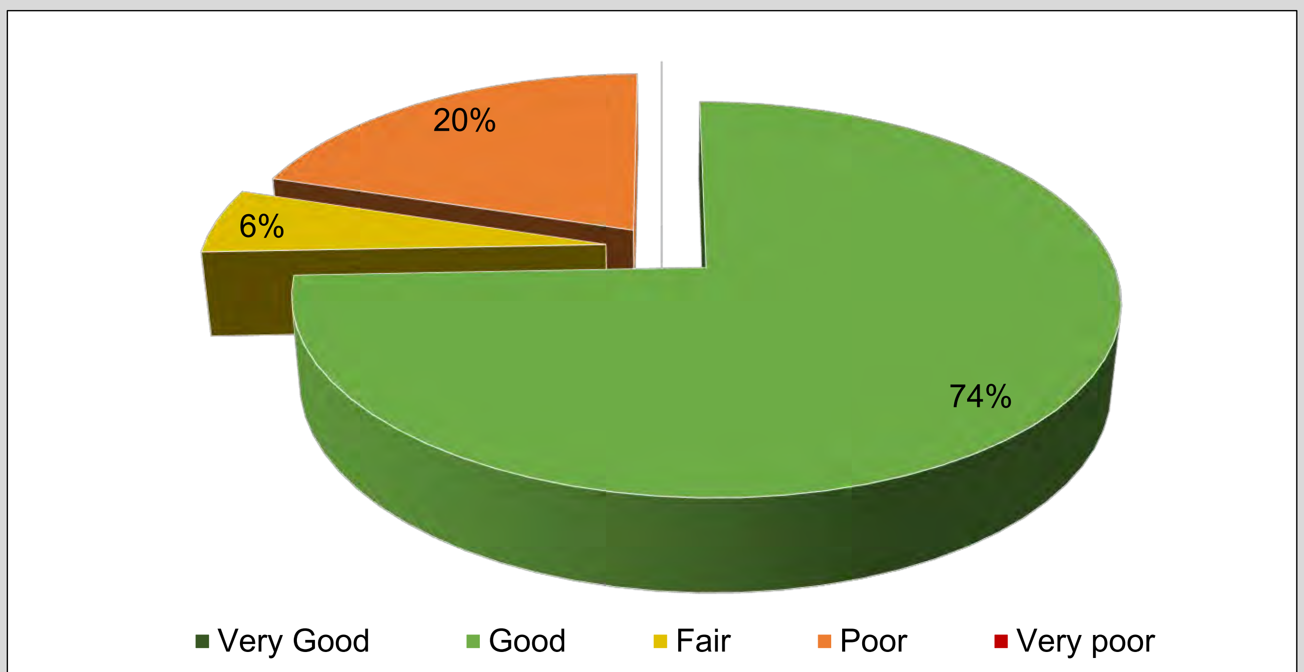


Figure 8.2 Asset Condition Summary (Parking Services)

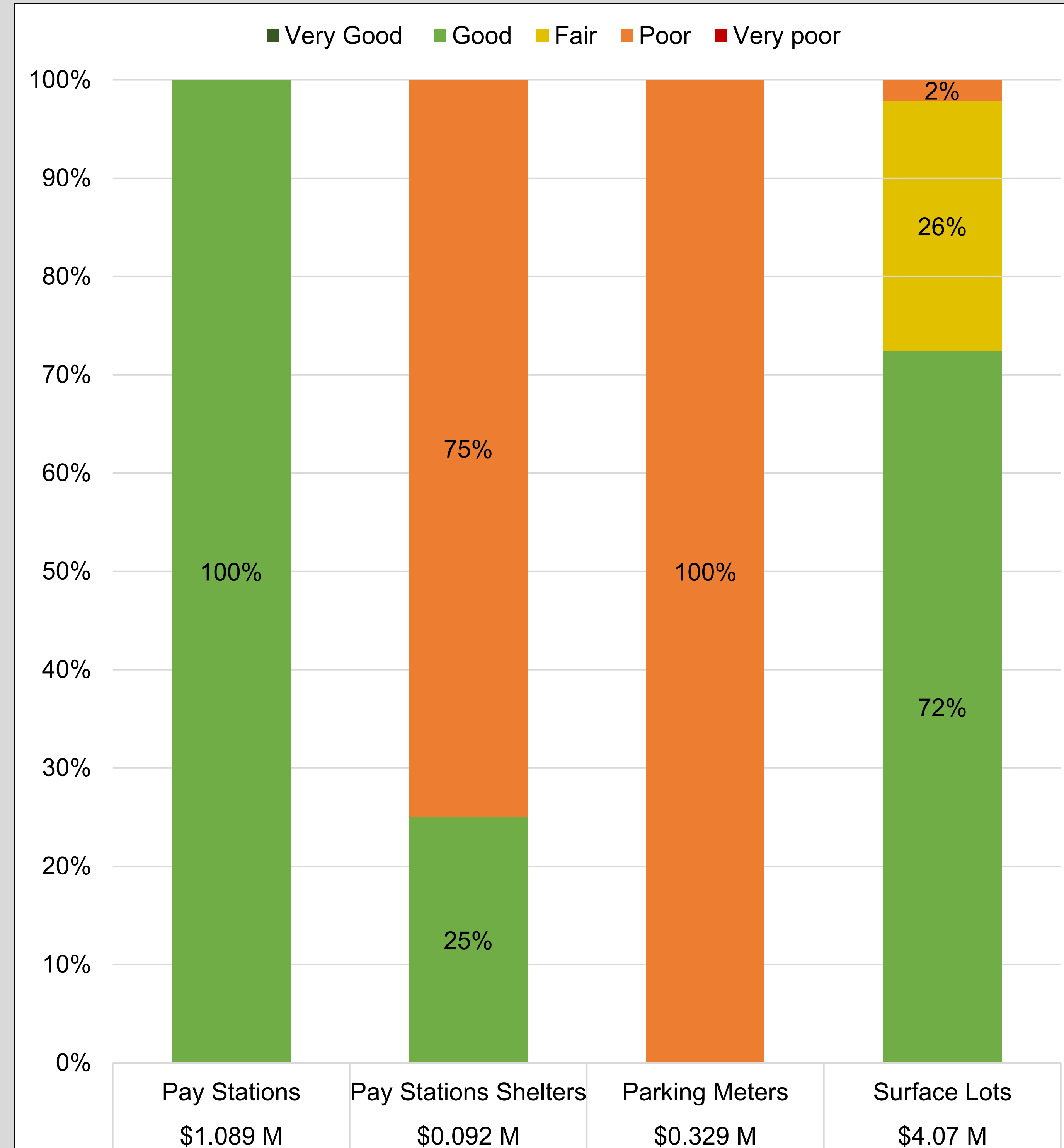


Figure 8.3 Asset Condition Detail (Parking Services)

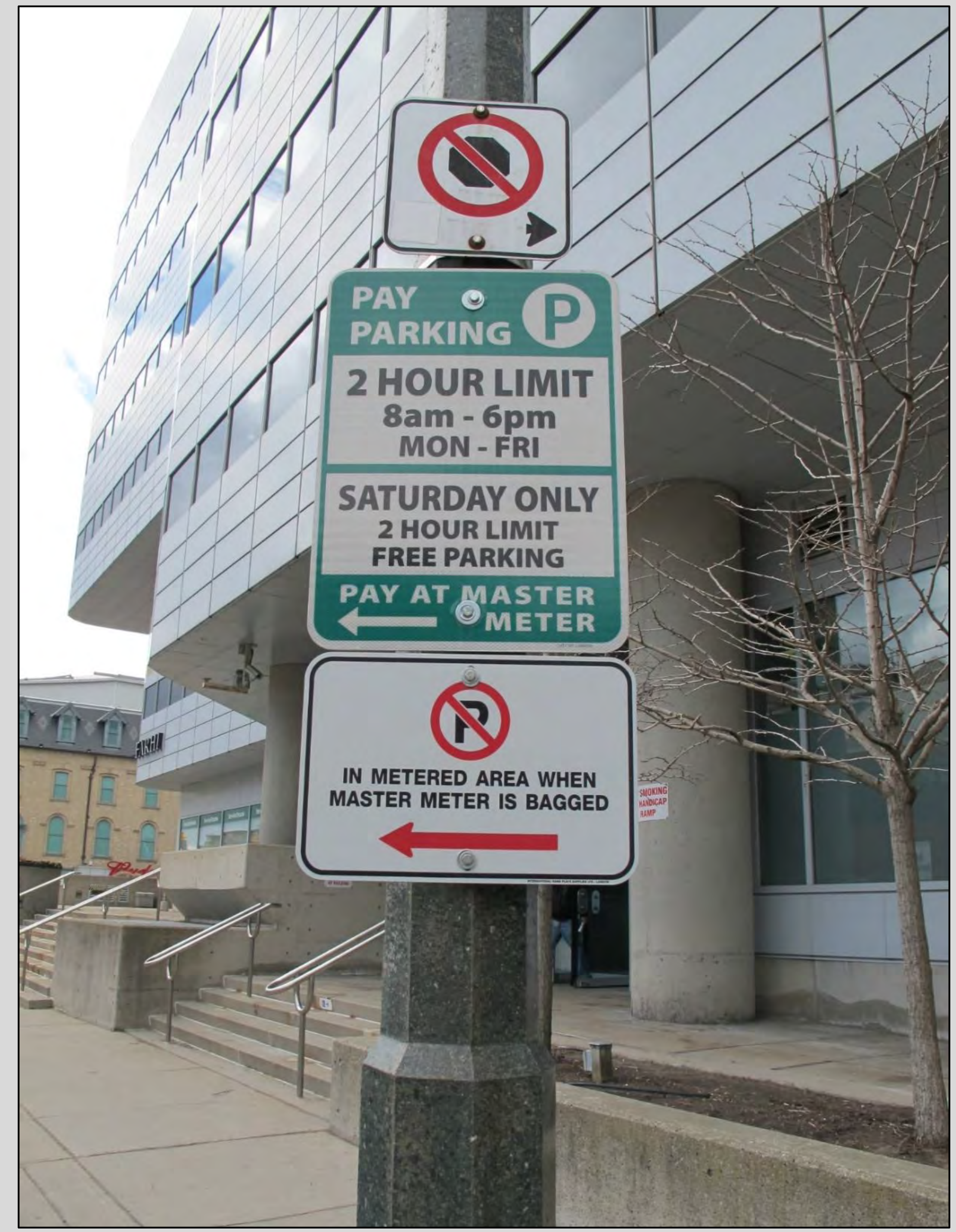
8.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Accessibility, Quality, and Reliability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate services have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or to be approximately equal in future years.

Foundational and advanced metrics are listed in Table 8.2. They are listed as Overall Parking Assets LOS metrics – for Surface lots and other equipment.

Pay Station Shelter at Parking lot #15

Parking Pay Station # 9151



Street Parking Time Limit Signs

Section 8: Parking

Table 8.2 Levels of Service Metrics – Foundational and Advanced (Parking Services)

Performance Measure | Customer / Council Focused | Technical Focused | 1 | 2

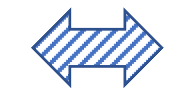
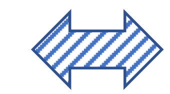
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing parking services in an efficient manner	Cost per space (3,281 spaces)	$780/space	
		Revenue per parking space ($/parking space)	$1,320/space	
Quality	Providing parking at the appropriate quality level	% of residents satisfied with Parking services	52%	
		% of Parking Lot level of service quality rating at fair to very good	98%	
Accessibility	Providing the appropriate number of parking spaces	# of parking spaces	3,281	
	Providing an FADS/AODA compliant parking service	% of spaces that are FADS/AODA compliant	100%	100%
Reliability	Providing a reliable parking service	% of time when payment stations are operating	80%	

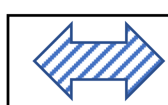
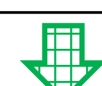
No Change **Positive Upward** **Positive Downward**

Section 8: Parking

Table 8.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Parking Services)

Performance Measure | Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing parking services in an efficient manner	Operating budget for parking services	$2,702,204	
		Parking Reinvestment Rate	2.8%	
		Gross Parking Revenue Collected per On-Street Space	$2,557,378	
		Gross Parking Revenue Collected per Off-Street Surface Space	$1,773,610	
Quality	Providing parking at the appropriate quality level	% Parking Assets in Poor or Very Poor Condition	26%	
		% of Parking Lots level of service quality rating in poor or very poor	2%	0%
		% of parking meter above the target condition	0%	100%
		% of pay stations mechanism below the target quality level	0%	100%
		% of pay stations above the target condition	25%	100%

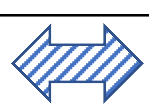
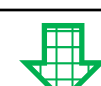
 **No Change**  **Positive Upward**  **Positive Downward**

Section 8: Parking

Table 8.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Parking Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Accessibility	Providing the appropriate number of parking spaces	# of accessible spaces	3,281	
		# of parking spaces in all parking lots	1,696	
		# of on-street parking spaces	1,585	
	Providing an FADS/AODA compliant parking service	% of off-street payment terminals that are FADS/AODA compliant	100%	100%
		% of on-street payment terminals that are FADS/AODA compliant	100%	100%
Reliability	Providing a reliable parking service	% of time when parking meters are operating	65%	
		% of time when pay stations are operating	80%	

 **No Change**  **Positive Upward**  **Positive Downward**

8.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

8.3.1 Lifecycle Activities

Table 8.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Parking assets:

Table 8.3 Current Asset Management Practices or Planned Actions (Parking Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Parking determines their capital projects through business cases and the annual budget process.	• Lack of a realization of the benefit from the activity (i.e. the life is not extended or the cost of managing an asset increases rather than decreases). • Pay stations will be at risk if the technology is not in compliance with PCI legislation as per planned in 2020. • On-street parking rates cannot be increased until new parking meter timing mechanisms are installed, and the existing technology is currently not supported by any vendor.
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• **Parking Surface** lots – Parking service completed a condition study for surface lots and it is the basis for maintenance, rehabilitation, and replacement of surface lots. • **Parking meters and shelters** maintenance is both scheduled and reactive based on responding to observations by staff and feedback from the public.	• Completing planned maintenance activities, while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure. • Poor maintenance can result in the parking meters being out of order, which leads to customer frustration, loss of meter and ticket revenue. • Poor lot maintenance can result in customer dissatisfaction, loss in revenue and/or injury.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• **Parking Surface lots** – Parking service completed a condition study for surface lots and it is the basis for rehabilitation of surface lots. • **Parking meters and shelters** – historically they have not been rehabilitated. Parking meters are near end of life. Shelters are replaced when required.	• Refer to Appendix B.

Section 8: Parking

Table 8.3 (Continued) Current Asset Management Practices or Planned Actions (Parking Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• **Parking Surface lots** – Parking service completed a condition study for surface lots and it is the basis for replacement of surface lots. • **Parking meters and shelters** – generally, specific components are replaced. For example, the parking meter technology within the parking meter structure would be replaced when at end of useful life.	• Failure to replace technology will lead to loss in potential revenue and potential failure of meter functionality.
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• **Parking Surface lot** – Disposal of an entire lot would be uncommon; rehabilitation strategies would ensure proper disposal of old materials.	• Disposal of an entire parking lot would result in loss of annual revenue and/or available parking to serve a specific area.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• Parking meter technology is continuously evolving and best practices need to be reviewed to ensure the City is in compliance with regulations and the service levels are met or exceeded.	• Failure to maintain services would result in loss of revenue and the inability to maintain service levels.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Downtown Parking Strategy implementation. • Capital growth projects are identified by Development Charges and Solid Waste (subject to Development Charges Act, 1997 requirements and City of London policy), or as a part of Assessment Growth Policy (where applicable with municipal policy).	• Incorrect growth assessments may result in overabundance of Parking assets in a particular area and insufficient assets in another.

Section 8: Parking

The cost of these identified Lifecycle Activities is summarized in Table 8.4. Current funding for operating budgets present the average of the budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Table 8.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets (Parking Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Parking Service	Operating Budget*	**Total**	**$2,663**
	Lifecycle Capital Budget**	**Total**	**$153.5**
	Service Improvement Budget	**Total**	**N/A**

Example of Cracked Surface Lot

*(Non-infrastructure solutions and maintenance/operating)

** (Rehabilitation, Renewal, Replacement, and Disposal Activities)

Growth activities are analyzed using the draft 2019 DC Background Study. Parking traditionally does not have growth operating and capital budgets, and the draft 2019 DC Background Study has not identified any growth projects with Parking assets.

Table 8.5 Expected Growth Budgets (Capital and Significant Operating Costs) (Parking)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Parking Service	Growth (Capital Budget and Significant Operating Costs)	Capital	$nil
		Significant Operating Costs	$nil
		Total	**$nil**

8.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not available for the Parking service. Data exists, but not in readily accessible format to provide a representative condition profile. Preparing information sources to fit required information for asset management condition projections will be part of ongoing asset management program implementation.

Parking lot # 15 – London Convention Centre

8.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 8.6 and illustrated in Figure 8.4. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal activities are not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Table 8.6 Current and Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Parking Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Parking	Lifecycle Capital Budget	**Total**	**$153.5**	**$227.28**	**$32.67**	**$41.11**

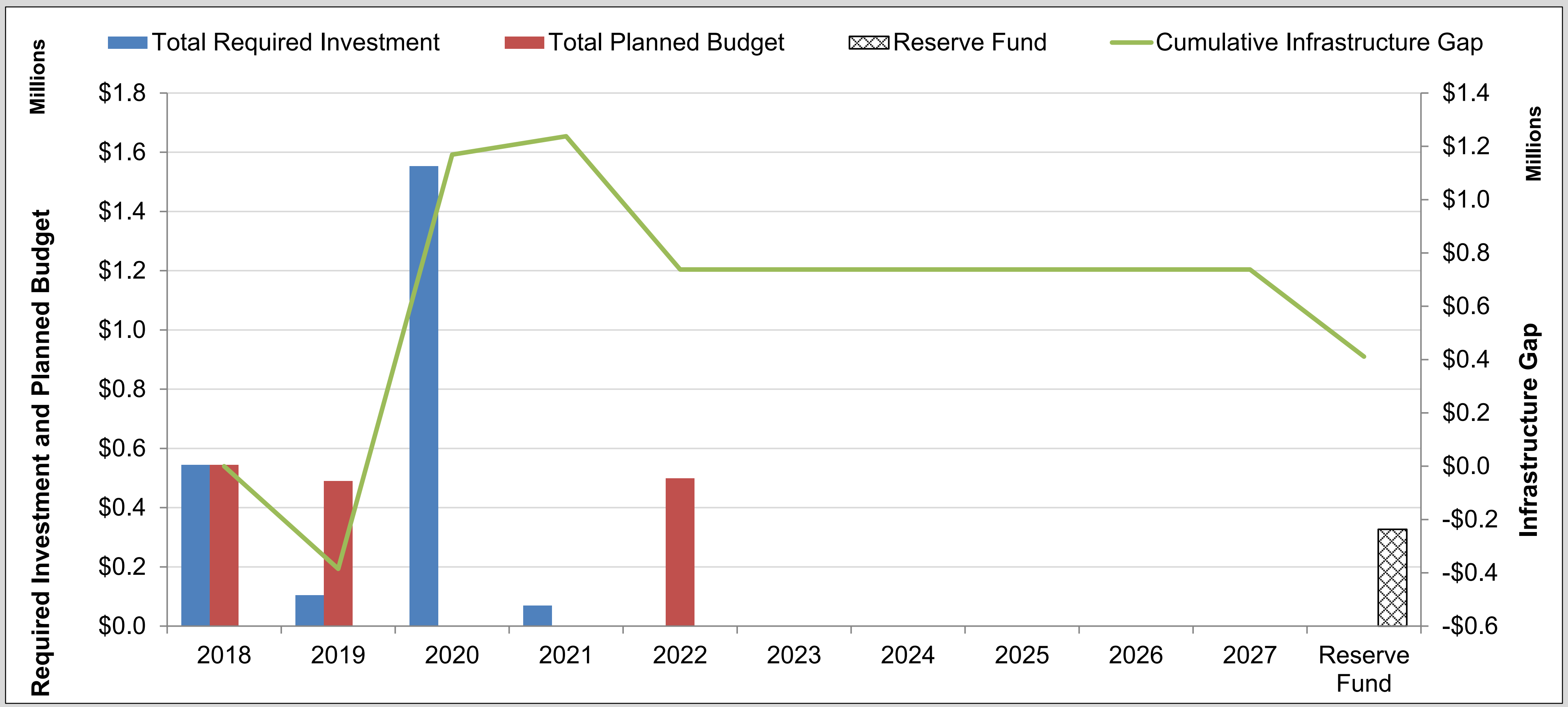


Figure 8.4 Forecasted Infrastructure Gap (Parking Services)

Provided the required investment and planned budget remain unchanged, the Parking infrastructure will grow an infrastructure gap over the next decade, mainly driven by the parking meters, new technology opportunities/needs, parking lot rehabilitations and pay stations replacements/upgrades. This can be reduced using the reserves contribution as planned in Figure 8.4. Proactive financial planning and the use of reserve funding strategies, as well as the revenue received from Parking operations, has resulted in no current infrastructure gap in the Parking service; however, there is a projected need to replace the Pay Stations mechanism and parking meters in the next 5 years which will result in an accumulated infrastructure gap over the next decade. The City is operating and maintaining aged and obsolete parking meters. The City has no control on increasing tariffs on those meters, the cost to operate and maintain them has been increasing, and they are due for replacements. The City is planning for their replacement in the next 5 years, requiring adequate reserve funds to be in place.

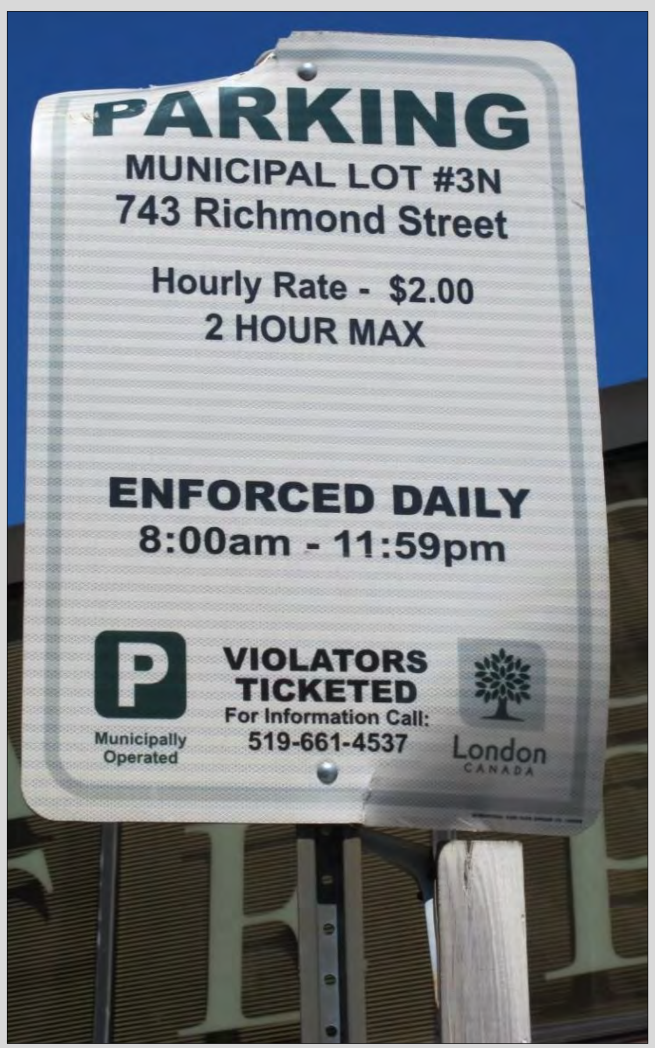
It should be noted that the City of London has undertaken parking studies that show the City offers less municipal parking than peer municipalities. Parking assets may need to increase or change. Changes in technology can have a significant impact on the Parking service. Several visions exist as to the direction of vehicular travel such as electrical charging needs and greater reliance on public transit. The City is well placed to address these parking challenges.

Section 8: Parking

8.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

The Parking assets Replacement value indicated in the 2014 Asset Management Plan was $5.7 million. The replacement value is approximately the same in the 2019 CAM Plan. The 2014 - 2019 Parking assets condition comparison is provided in Figure 8.5. Evaluating required investment versus planned budget shows the infrastructure gap will increase to approximately $0.4 million assuming that that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities. It is also important to note that on-street parking rates cannot be increased until new parking meter timing mechanisms are installed, and the existing technology is currently not supported by any vendor. This increase will lead to an increase in revenues.



Damaged parking time limit sign - Lot #3N

On street parking spaces – Princess Ave.

9.1.1 Asset Inventory and Valuation

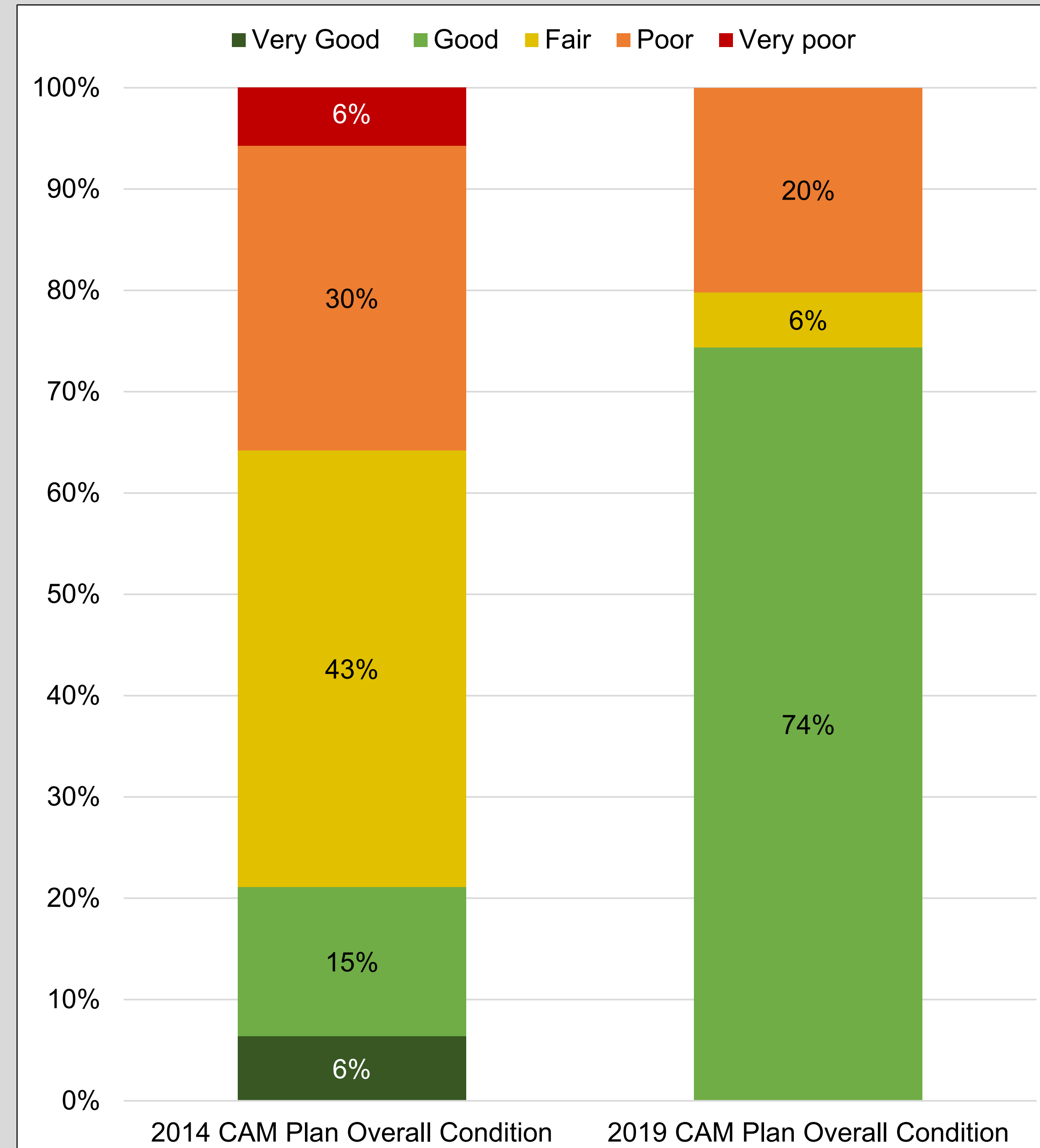


Figure 8.5 2014 CAM Plan to 2019 CAM Plan Condition Summary (Parking Services)

Section 8: Parking

8.6 CONCLUSIONS

Valued at nearly $5.58 Million, the City's Parking assets are overall in **Good** condition, indicating that the current funding from Capital and Operating budgets has been sufficient to maintain the Parking assets in a serviceable condition.

The Parking service will accumulate an infrastructure gap of over $0.4 million in the next decade which means that there is no adequate funding to address its needs over the next 10 years including upgrading the current meter inventory to pay stations and Parking lots repairs. If this circumstance does not change, a lack of parking lot and meter maintenance would result in reduced revenue and increased service complaints. Loss of use of Parking would negatively impact businesses, residents and potential new development. It is important that the funding plans for the Parking service be sufficient in order to preserve its sustainable status and address future infrastructure requirements. Figure 8.6 illustrates the required funding, available budget and reserve contribution over the next decade. Table 8.7 presents the summary of the State of Infrastructure, Infrastructure Gap/surplus, and Reinvestment rates for parking assets.

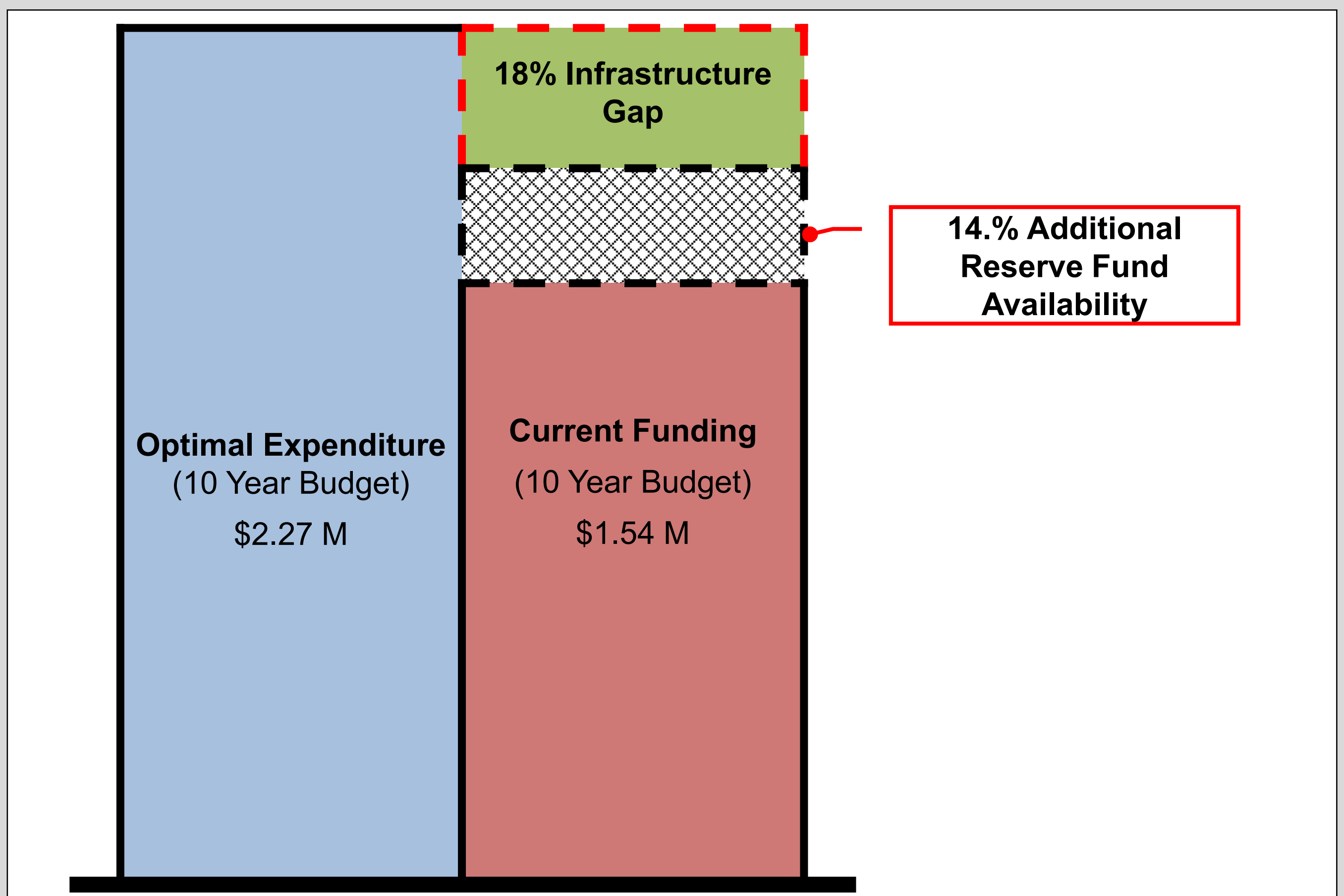


Figure 8.6 Cumulative 10 year Infrastructure Gap Visual (Parking Services)

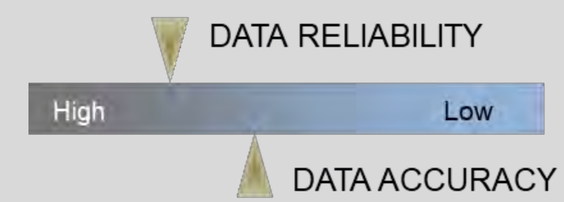
On street Parking Pay Station – King Street

Section 8: Parking

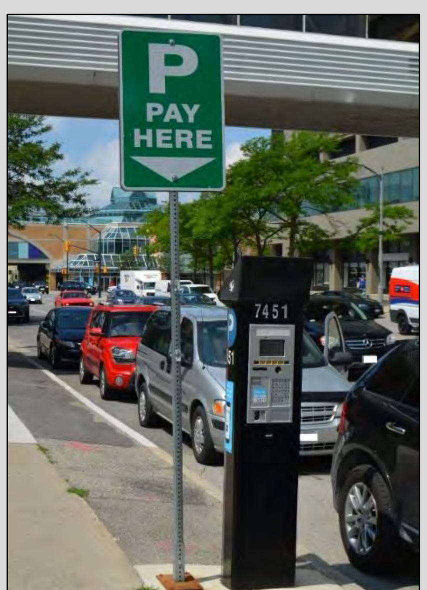
Table 8.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Parking Services)

City of London – Parking Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Overall Parking	$5.58		No Gap	$0.41	2.8%	2.1%*



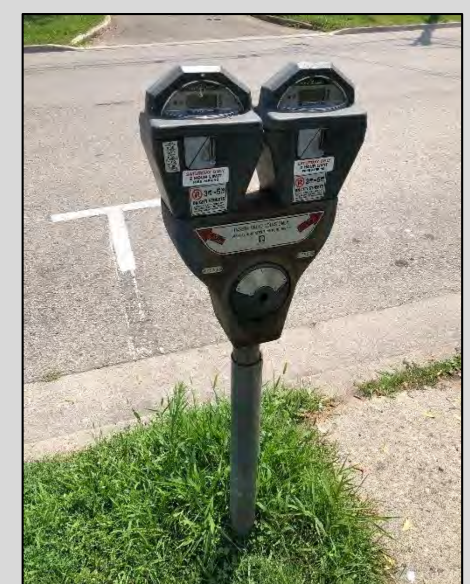
* This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Pay Station – King Street


Accessible Parking


Accessible Parking Permit sign


On street Parking meter

Pay Stations methods of payment

Section 9: Solid Waste

Quick Facts
1 Material Recovery Facility
92 Hectares of Leachate Collection Systems
3 Enviro Depots

8.2% City-Wide Infrastructure Gap Contribution

Replacement Value	$85.0 Million
Condition	Good
10 Year Gap	$46.54 Million
City-Wide Infrastructure Gap Contribution	8.2%

Section 9: Solid Waste

9.1 STATE OF LOCAL INFRASTRUCTURE

The City contributes to the health of the environment and its citizens through appropriate collection and management of garbage, recyclables, yard waste, household special waste, and other designated waste materials. This involves providing pick-up and drop-off services within London, processing and creating products of value from compostable recyclable/reusable/recoverable materials; and disposing of garbage in an environmentally responsible manner, including the ongoing monitoring and management of closed landfills and other sites producing methane.

Material Recovery Facility

9.1.1 Asset Inventory and Valuation

To support these services the City owns and operates an array of Solid Waste disposal and diversion assets valued at over $85 Million. These range from public waste and recycling bins, to drop off depots; and, one active (W12A) and many closed landfill sites. Note that the City of London's fleet of garbage trucks are not included in the Solid Waste inventory but rather are addressed under the Fleet section of this report. Fleet manages and maintains the trucks. Solid Waste operates the trucks.

The City also owns a centralized Material Recovery Facility (MRF) which provides recycling services to London and several neighbouring communities.

General household waste is collected by the City while recycling pick-up and processing services are contracted out. Drop off locations are provided for special wastes including household special waste, yard waste, electronics, scrap metal, tires, roofing, etc.

The Solid Waste assets are broken into eleven categories for which the condition was evaluated based on expert opinion from staff (both Solid Waste and Facilities) and condition assessment reporting for MRF equipment. Solid Waste is responsible for maintaining these assets in serviceable condition between replacement cycles, ensuring compliance with Provincial regulations and maintaining the continuity of solid waste services to the citizens of London and other customers.

Table 9.1 summarizes Solid Waste's asset inventory and their replacement values.

Stormwater Management Pond at W12A Site

Section 9: Solid Waste

9.1.1 Asset Inventory and Valuation (Continued)

Table 9.1 Asset Inventory and Valuation (Solid Waste Services)

Asset Type	Asset*	Inventory	Unit	Replacement Value (000's)
Diversion	Material Recovery Facility & Equipment	1	Ea.	$27,000
	Enviro Depots	3	Ea.	$5,605
	Household Special Waste Depot	1	Ea.	$900
Disposal	Collection Equipment – Containers	750	Ea.	$525
	W12A Buildings (Inc. Site Works & Equipment)	4	Ea.	$8,138
	W12A SWM Ponds	5	Ea.	$1,717
	W12A Leachate Collection System[1]	92	Ha	$22,828
	W12A Landfill Gas Collection System[2]	50	Ha	$3,450
	W12A Land and On-Site buffer	142	Ha	$4,240
	W12A Off-Site Buffer Lands	255	Ha	$7,599
	Closed Landfill with Equipment locations[3] (active mechanical systems)	2	Ea.	$3,002
	Closed landfill locations (active and passive)	32	Ea.	
Total				**$85,004**

* Note that administrative, maintenance and storage buildings are maintained by the City's Facilities group. Fleet and associated equipment is provided and serviced by Fleet Management Services and are dealt with in the Fleet section.

Solid Waste infrastructure is broken into two categories: **Solid Waste Diversion** and **Solid Waste Disposal.**

[1] The size of the Leachate Collection system reflects the area of capture common to this type of system.

[2] The size of the Gas Collection system reflects the area of capture common to this type of system.

[3] This represents the value of leachate and gas collection active equipment at closed landfill sites. The value of land at these sites has been captured in the Land chapter of this report.

Material Recovery Facility

Section 9: Solid Waste

9.1.2 Age Summary

Figure 9.1 shows the Solid Waste average asset age as a proportion of the average useful life by asset. Asset age has been established using data from Solid Waste's W12A annual status report, Facilities database (VFA software), Tangible Capital Asset database, and consultants' reports.

Solid Waste Diversion infrastructure is approximately one-fifth to halfway through its expected useful life. The material recovery facility and equipment was constructed in 2011. The estimated useful life of 37 years reflects that as a result of less than anticipated capacity, equipment is expected to last longer than similar equipment used at full capacity as documented through the original equipment supplier's inspection report. That notwithstanding, additional equipment capital investment will be required within the expected useful life of the building envelope of the material recovery to address changes in the composition of product packaging recovered in the blue box program and the requirements of recovered material end markets.

Enviro Depots are approximately halfway through their expected useful life. Oxford Street has been recently reconstructed, while the Enviro Depot portion of the W12A landfill is approximately 35 to 40 years old. Clarke Road Enviro Depot is nearing the end of its useful life.

The Household Special Waste Depot is nearly 18 years old.

It is important to note that 40 years was selected as the expected useful life for facilities, based on the non-structural components of buildings which have the longest expected service life. In practice the many components that comprise a building are slated for renewal based upon a combination of factors including age, condition, consequence of failure, likelihood of failure etc. and the practical expected life is largely indefinite while the building continues to serve its intended/required purpose in its given geographic location.

Solid Waste Disposal installation dates are regularly documented and maintained through the Tangible Capital Asset Database, and historical land information reported annually in the W12A Annual Status Report. The majority of Disposal assets are a quarter to halfway through their expected useful life. The W12A land and on-site buffer land age is unknown, but it was dedicated as disposal land in 1975. The present rate of consumption indicates the current number of landfill cells will be full by 2024.

The W12A buildings age range from eleven to approximately 37 years of age, however the W12A sitework is relatively newer.

The Closed Landfill Equipment is known where there are active mechanical systems installed. These systems are nearly 20 years old.

W12A

W12A Building

Section 9: Solid Waste

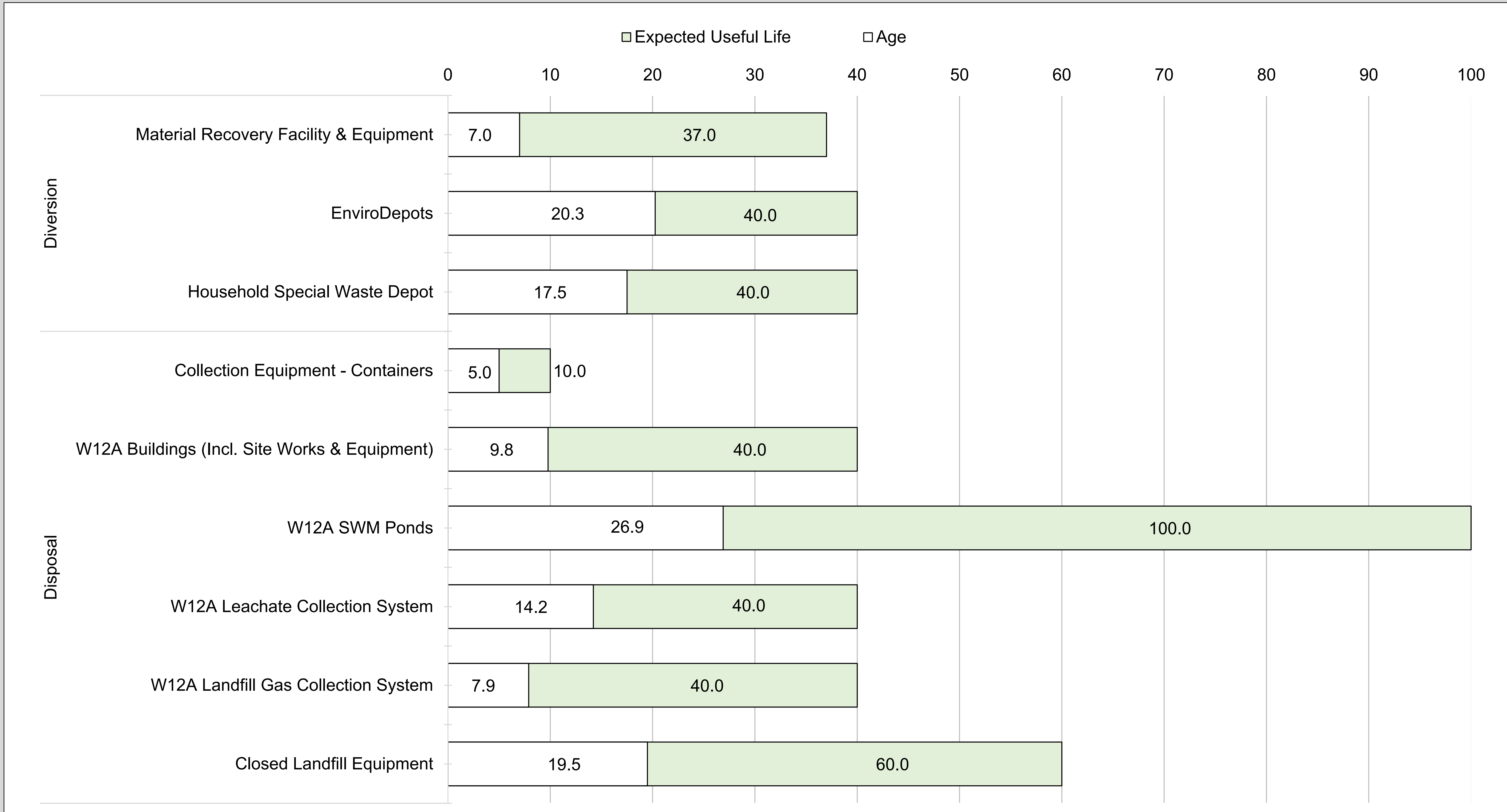


Figure 9.1 Average Assets Age as a Proportion of Average Useful Life (Solid Waste Services)

Section 9: Solid Waste

9.1.3 Asset Condition

As outlined in Figure 9.2, Solid Waste has approximately 93% of assets in **Fair**, to **Very Good** condition. Note that land is not included in the condition assessment. The remainder is approaching the end of their expected useful lives, indicating a need for investment in the short to medium term.

Figures 9.3 and 9.4 show Solid Waste's condition distribution of each asset type. As seen in the figures, Solid Waste assets are in fair to good condition, indicating that they are meeting current needs but certain assets may require attention.

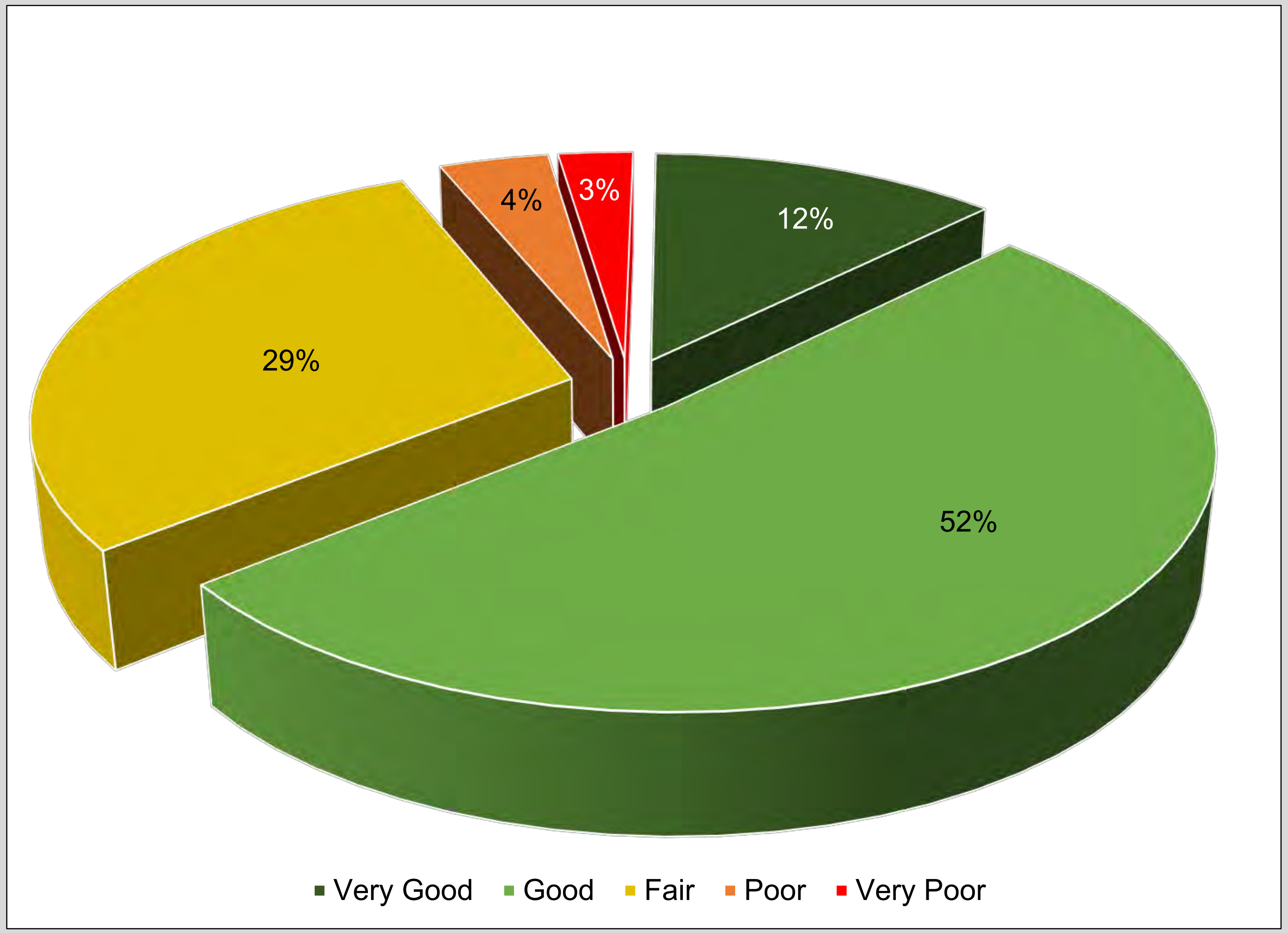


Figure 9.2 Asset Condition Summary (Solid Waste Services)

Asset conditions have been established using data from consultant's reports, Facilities capital planning software VFA database information, and internal expert opinion.

The **Materials Recovery Facility (MRF) and Equipment** are in **Good** to **Fair** condition. This facility was newly constructed in 2011 and is operated and maintained by an outside contractor (currently operated by the same contractor that was responsible for the design and construction of the facility). Planned and reactive maintenance of the facility is the responsibility of the MRF operator in the current contract. Subsequent MRF operation contracts will require the City to fund major repairs and/or equipment replacement.

EnviroDepots and HSW Depot consist of depots where residents can drop off solid waste and/or recyclables. Facilities are currently serviceable but demand is increasing and stretching the capabilities of the existing facilities, from a visitor flow perspective. The condition of the EnviroDepots and HSW Depot infrastructure is in **Good** to **Fair** condition.

Solid Waste **Collection Equipment (Containers)** consists mainly of disposal bins. A detailed asset management listing with the condition of each container does not exist. Expert opinion of the condition of the bins is relied upon, and they are estimated to be in **Fair** condition on average. The containers are maintained in serviceable condition, with replacement occurring on a planned basis as assets reach the end of their useful lives.

The **W12A Landfill** consists of a number of assets including landfill cells, buildings, leachate and landfill gas collection systems, and stormwater maintenance ponds. This facility operates within its Operation Plan, with additional disposal cells being brought online to accommodate waste in accordance with its Environmental Compliance Approval. Based on projected use, the landfill is expected to reach capacity by about 2023/2024, at which point it will require an expansion (or other long term disposal solution) to provide the city with the space needed to meet its future needs. Any expansion or examination of alternatives will be undertaken as per the requirements of an individual Environmental Assessment.

Section 9: Solid Waste

9.1.3 Asset Condition (Continued)

The **W12A Buildings (Incl. Site Works & Equipment)** are generally in **Fair** condition. This includes the roads, curbs and landscaping as well as the administration, maintenance, scale house, and covered buildings.

W12A Stormwater Management Ponds and site drainage infrastructure collect and treat surface runoff from snow and rain that impact the site. These assets are in **Good** to **Very Good** condition and are capable of meeting current and future needs. Maintenance occurs on a planned basis, with investments identified through regular inspections.

The **W12A Leachate Collection System** collects and conveys leachate for treatment. It includes the leachate pumping station at the W12A location. This system is also generally in **Very Good** to **Fair** condition and capable of meeting the current City's needs and is expanded as new disposal cells are constructed. The **Landfill Gas Collection System** collects and conveys landfill gas to the on-site landfill gas flare for destruction. The system is overall in **Good** condition with some mechanical repairs and equipment upgrades required in the future. It is capable of meeting current needs with expansion occurring as new disposal cells are constructed.

The **W12A Land and On-Site Buffer** and **W12A Off-Site Buffer** lands are not rated on a condition scale. Buffer land is comprised of City owned land adjacent or near the W12A Landfill that has been acquired to provide an appropriate buffer from existing operations and to provide buffering for possible future landfill expansion and resource recovery facilities. It is expected that additional land will be acquired for these purposes over the next several years. Land around W12A and the Resource Recovery Area is purchased in accordance with the City's W12A Land Strategy.

Closed Landfills have generally been converted to parkland or other passive uses. Some sites have engineering controls (e.g. leachate collection systems, landfill gas collection systems and monitoring wells). The condition of the **Closed Landfill Equipment** on average is **Fair**. The equipment is maintained in serviceable condition, with replacement occurring on a planned basis as assets reach the end of their useful lives or as identified through regular inspections.

Material Recovery Facility

Section 9: Solid Waste

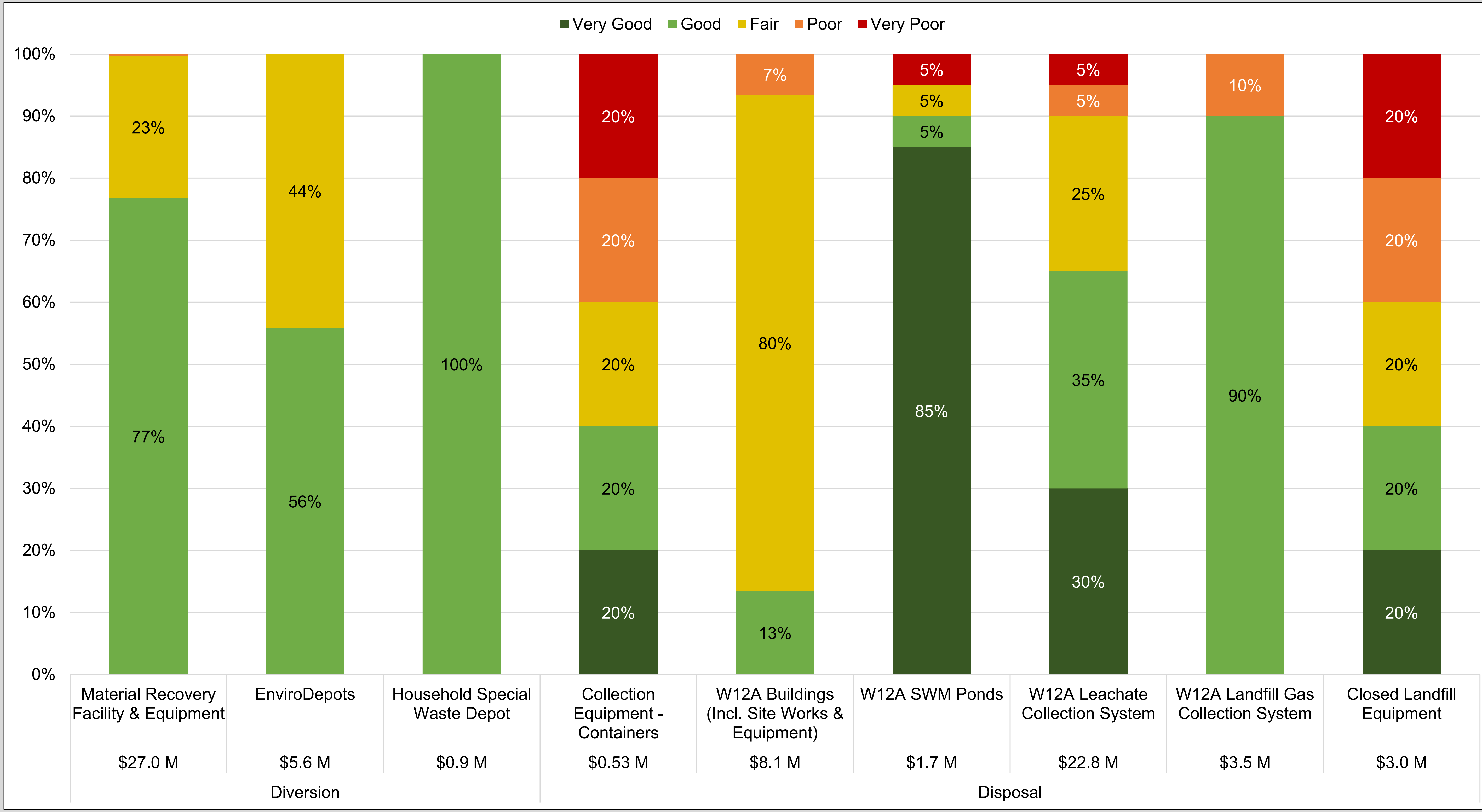


Figure 9.3 Asset Condition Detail (Solid Waste Services)

9.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Reliability, and Environmental Stewardship. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate services have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Table 9.2.

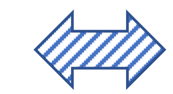
Waste Collection Container

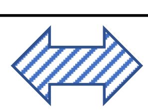
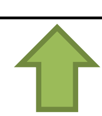
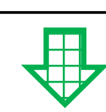
Sign at W12A for Waste Disposal Fees

Section 9: Solid Waste

Table 9.2 Levels of Service Metrics – Foundational and Advanced (Solid Waste Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing Solid Waste services in a cost efficient manner	Cost to provide service ($/serviced households)	$153.04	
Reliable	Providing reliable Solid Waste Recycling, Collection, and Disposal services	% of community satisfied with solid waste collection services (recycling and garbage collection)	84%	
		Pickup household garbage on scheduled day	100%	> 97%
		Pickup household recycling on scheduled day	100%	> 97%
		Landfill open for business on scheduled days	100%	100%
Environmental Stewardship	Providing Solid Waste services that have minimal impacts on the environment	% of facilities operating within Environmental Compliance Approval ("ECA") requirements	100%	100%
		% residential waste diversion	45%	60%
		Methane Destruction	6,380 tonnes/year	
		GHG Destruction	159,500 tonnes/year	

 **No Change**  **Positive Upward**  **Positive Downward**

Section 9: Solid Waste

Table 9.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Solid Waste Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

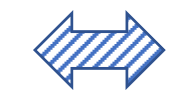
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing Solid Waste services in a cost efficient manner	Operating budget for Solid Waste services (Garbage Recycling & Composting)	$27,065,825	⇔
		Solid Waste Diversion Reinvestment Rate	1.5%	⇔
		Solid Waste Disposal Reinvestment Rate	2.2%	⇔
Reliable	Providing reliable Solid Waste Recycling, Collection, and Disposal services	% of Solid waste infrastructure assets in poor or very poor condition	6.5%	⇔
		% of Diversion infrastructure assets in poor or very poor condition	0.30%	⇔
		% of Disposal infrastructure assets in poor or very poor condition	11.8%	⇔
		# of serviced customers of the HSW Depot	10,660	Between 9,000 - 11,000
		Small Vehicle Drop-off Material received at W12A landfill (Tonnes)	6,290	Target unknown
		Tonnes managed at W12A Landfill	277,400	225,000

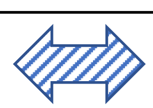
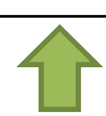
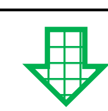
⇔ **No Change** ⇧ **Positive Upward** ⇩ **Positive Downward**

Section 9: Solid Waste

Table 9.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Solid Waste Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing reliable Solid Waste Recycling, Collection, and Disposal services	% of equipment at facilities that meets H&S standards	100%	
Environmental Stewardship	Providing Solid Waste services that have minimal impacts on the environment	% of facilities operating within ECA requirements	100%	100%
		MOE Compliance (# of orders/year)	0	0
		Landfill odour complaints (from W12A report)	35	
		% residential waste diversion	45%	60%
		Methane destruction	6,380 tonnes/year	Target unknown
		GHG reduction	159,500 tonnes/year	Target unknown
		Collection of household hazardous waste (tonnes)	506	Target unknown

 **No Change**  **Positive Upward**  **Positive Downward**

9.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

9.3.1 Lifecycle Activities

Table 9.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Solid Waste assets:

Table 9.3 Current Asset Management Practices or Planned Actions (Solid Waste Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	**Solid Waste Diversion and Disposal** • Use of continuous improvement processes and conservation of Solid Waste and associated infrastructures assets through policy, procedures and public outreach, etc.	• Refer to Appendix B.

W12A Cell Construction

W12A

Table 9.3 (Continued) Current Asset Management Practices or Planned Actions (Solid Waste Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• Maintenance and renewal of the garbage collection fleet is managed by the Fleet service. • Recycling pickup is contracted such that asset management of these vehicles is the responsibility of the contractor. **Diversion Assets** • **Material Recovery Facility** – Equipment and facility maintenance is currently (in accordance with the design build operate agreement with the current facility operator) the responsibility of the contractor operating the Material Recovery Facility (MRF). Future operations contracts will likely see the threshold change for who is responsible for non-routine equipment and facility maintenance, e.g. replacement of conveyor belts and other mechanical consumables will be the responsibility of the operations contractor, however equipment re-builds or refurbishments (e.g. baler refurbishments) will be the responsibility of the City. Equipment and infrastructure changes and/or replacement is and is expected to remain the responsibility of the City. Currently the facility fire suppressant system (interior piping and suppressant water supply system) is being assessed and replaced. • **Enviro/Household Special Waste Depot** – Generally little maintenance is required once constructed and is either completed by staff working at the Depot or requests are made to the Facilities service. Upgrades are currently planned for the Clarke Road EnviroDepot to address aging infrastructure and facility use.	• Refer to Appendix B.

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Table 9.3 (Continued) Current Asset Management Practices or Planned Actions (Solid Waste Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	**Disposal Assets** • **Collection Equipment** – little to no maintenance expected for these assets. • **W12A Leachate Collection and Pumping Station Equipment**. – Generally little maintenance, beyond pipe flushing is required for the leachate collection system piping. This is inherent in the design of the assets as shortly after they are constructed, they are covered with waste and are no longer accessible. Leachate pumping station equipment is maintained on an appropriate schedule by the City's wastewater treatment staff. • **Landfill Gas Collection and Flaring Equipment** – Landfill gas extraction wells and collection system piping requires little maintenance beyond well field balancing and pipe realignment due to settlement. LFG flaring equipment (i.e. centrifugal fans and stack combustion chamber) require routine maintenance appropriate for these types of systems. The landfill gas collection and flaring system is operated and maintained by an external contractor. The contractor is responsible for minor repairs and maintenance with the majority of the maintenance expenses paid for by the City through operating budgets. Significant equipment repairs or replacement are capitalized. The overall system is continuously monitored, adjusted and augmented to most effectively control odour emissions from the landfill. • **W12A Stormwater Management Ponds** – The storm pond assets are maintained by City staff. Sediment removal is undertaken based on monitoring of accumulation by landfill operations staff, and flow discharge monitoring equipment maintenance is performed by wastewater (stormwater) operations staff. • **W12A Buildings -** A work order system and online interface exists for City employees to generate requests of Facilities.	• Refer to Appendix B.

Section 9: Solid Waste

Table 9.3 (Continued) Current Asset Management Practices or Planned Actions (Solid Waste Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	**Solid Waste Diversion** • Routine rehabilitation activities are based on field observations against attributes determined by staff, including mechanic inspection reports. **Solid Waste Disposal** • Rehabilitation is generally not considered an option. • Facilities-related assets are regularly evaluated through comprehensive condition assessments, which establishes and updates an industry-standard Facility Condition Index (FCI) score that reflects accurately the overall condition of the facilities (split into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), determine the cost and timing of rehabilitation requirements.	• Refer to Appendix B.
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	**Solid Waste Disposal** • Equipment and structure assets ideally are used until the end of their useful life. When unexpected events occurs, assets will be replaced but would be in lieu of other planned infrastructure replacements. **Solid Waste Diversion** • Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that reflects accurately the overall condition of the facilities (split into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), determine the cost and timing of replacement requirements.	• Cost over-runs during large, complex design and construction projects.

Table 9.3 (Continued) Current Asset Management Practices or Planned Actions (Solid Waste Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	**Solid Waste Disposal** • Fleet manages disposal of City owned vehicles and other equipment (e.g. portable generators, lawn mowers etc.)	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	**Solid Waste Diversion and Disposal** • The nature of the landfilling business is that it takes many years to garner approval for the creation or expansion of a site. Approval for a new site or expansion of an existing site is obtained through the Environmental Assessment Act. The permanent nature of the land use requires a diligent assessment of alternatives.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Capital growth projects are identified by Development Charges and Solid Waste (subject to Development Charges Act, 1997 requirements and City of London policy) , or as a part of Assessment Growth Policy (where applicable with municipal policy). **Solid Waste Diversion and Disposal** • Growth projects identification is limited for the Solid Waste service. This is a result of the Development Charts Act rendering landfill sites and service, and provision of facilities and service for the incineration of waste to be ineligible for development charges. • Waste Diversion growth projects are eligible services for receipt of development charge funding.	• Incorrect growth assessments may result in overabundance of Solid Waste assets in a particular area and insufficient assets in another. • Growth not completely funded through Development Charges – risk of insufficient remaining funding that could inhibit growth.

Section 9: Solid Waste

Risks described above are compared to current lifecycle and service improvement funding (Table 9.4), and any identified growth budgets in the 2018-2027 period (Table 9.5).

Table 9.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Solid Waste (Diversion and Disposal)	Operating Budget*	**Total**	**$ 2,663**
	Lifecycle Capital Budget**	Solid Waste Diversion	$510
		Solid Waste Disposal	$1,129
		Total	**$1,639**
	Service Improvement Budget	**Total**	**$5,906**

Current funding presented for operating budgets is the average of the budgeted 2016 and 2017 fiscal years. Historically, Solid Waste has portions of operating budgets allocated to capital financing – intended to replenish reserve funds, repay debt, etc. These amounts are not presented in the operating budget.

Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget and discussion with Solid Waste staff. They relate to previously identified projects to increase long term disposal capacity and new and emerging solid waste technologies. It does not include budgeting for the expected Resource Recovery Facility with an expected construction date approximately in 2027-2029 and preliminary estimates of $100 million cost[4]. Current estimates indicate that the Resource Recovery Facility would have a 50% lifecycle component.

There is also a potential landfill flare service improvement project. It is an expected revenue positive project to convert methane to renewable natural gas. The expectation is that it could be completed in 2023/2024 and draft projections approximate a $20 million cost.

[4]As listed in the 60% Waste Diversion Action Plan.

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

Table 9.5 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Solid Waste (Diversion and Disposal)	Growth Capital Budget and Significant Operating Costs	Capital –Total Solid Waste	$2,000
		Significant Operating Costs – Total Solid Waste	$100
		Total	**$2,100**

Growth activities are analyzed using the draft 2019 DC Background Study. Proposed needs are Waste Diversion Facilities planned for construction in 2027-2029. Changes to the Development Charges Act, 1997 allows for development charge funding for Waste Diversion Facilities.

9.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not available for the Solid Waste service. Data exists for such profiles but not easily integrated into condition profile assessments. For example, buffer land is not practically assessed on a condition, and closed landfill equipment cannot be practically assessed or easily inspected.

Section 9: Solid Waste

9.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 9.6, with accompanying graph in Figure 9.4. The analysis documented is related to the lifecycle rehabilitation, renewal, or replacement lifecycle activities.

Disposal activities are considered inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (or revised budgets developed through capital planning) as of December 31, 2017 for the 2018-2027 fiscal years.

Table 9.6 Comparison of Current to Optimal Operating & Capital Budgets, and Funding Gap (Solid Waste Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Solid Waste (Diversion and Disposal)	Lifecycle Capital Budget	Solid Waste Diversion	$510	$5,283	$339	$4,434
		Solid Waste Disposal	$1,129	$1,349	Not Applicable	$220
		Total	**$1,639**	**$6,632**	**$339**	**$4,654**

Material Recovery Facility

Section 9: Solid Waste

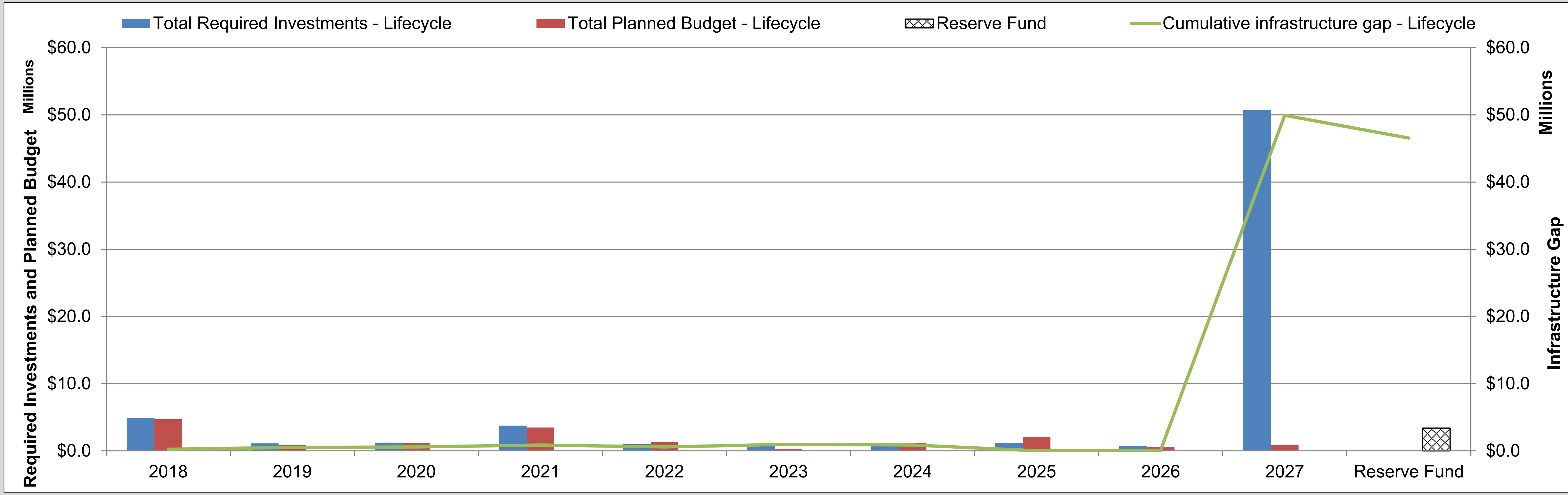


Figure 9.4 Forecasted Infrastructure Gap (Solid Waste Services)

Evaluating required investment versus planned budget shows that the Solid Waste infrastructure gap is projected to be $46.5 million at 2027. Solid Waste has a prudent strategy of saving in advance of forecasted capital expenditures but needs for collection bins have increased the gap as the operating budget has financed these purchases for 2016/2017.

Additionally, recent provincially-directed changes increased household waste diversion rates from 45% to required 60% by end of 2022. The subsequent 60% Waste Diversion Action Plan approved by Council has resulted in additional requirements to manage increased diversion tonnages. Preliminary Resource Recovery Facility cost estimates to handle the expected 100,000 additional tonnes per year could approximate $100 million[5].

Given that provincial targets to be instituted by 2025[6] include:

- 70% reduction/recovery of food and organic waste from single family homes, and
- 50% reduction/recovery of food and organic waste from multi-residential buildings,

These amounts will be integrated to current level of services and thus a portion of the proposed Resource Recovery Facility cost is considered a lifecycle need. The estimated diversion tonnages resulting from 2025 provincial targets are expected to be 50% of diverted tonnes processed by the Resource Recovery Facility, thus 50% of the facility cost are considered lifecycle needs. The construction date is expected to be between 2027-2029. This is partially outside the 10 year analysis period of the CAM Plan, but given the long time frame to construct Solid Waste assets, the funding requirements are considered within the scope of the CAM Plan.

Funding strategies will have to be explored in depth over the next decade to ensure the Resource Recovery Facility is affordable.

[5] As listed in the 60% Waste Diversion Action Plan.

[6] From the ‘Food and Organic Waste Framework’ resulting from the Strategy for a Waste-Free Ontario.

9.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

The expected life of a landfill cell is approximately two to three years. As these cells are filled, they are capped and new cells are established to accommodate waste. While the current landfill footprint will remain constant for a number of years, the landfill will go through three cell replacement cycles over the next ten to eleven year period, at which time the landfill is expected to be full and a new landfill or expansion of the footprint will be required.

Over the past decade, the City has made significant efforts to reduce the amount of solid waste entering its landfill. While it has managed to divert 45% of household waste produced, this is still short of the current Provincial target of 60%. The provincial target of 60% was adopted in 2017 and reconfirmed in 2018 with the intent of being reached by the end of 2022. Several options for further improvement are currently under consideration, including the expansion of existing programs, source separated organics service ("Green Bin") and other resource recovery options. The exact nature and timing of further action has yet to be determined, along with its impact on required spending.

Current challenges primarily relate to assessing whether landfill cells are being filled at a greater rate than the planned forecast. The 2014 Asset Management Plan relied on internal expert opinion for Diversion and Disposal assets. Since that time, quality rating methodologies have been created and used, but are infrequent. The comparison is illustrated in Figure 9.5. The Solid Waste service replacement value increased from approximately $64 million (2014 CAM Plan) to $85 million in the 2019 CAM Plan. The increase is attributed to rising facilities costs. If these costs continue to increase, increased infrastructure funding shortfalls could occur.

Medium term challenges include landfill flare improvement projects. This revenue positive landfill flare improvement would convert methane to renewable natural gas. The project could occur by 2023/2024 and draft projections approximate a $20 million cost.

Longer term challenges relate to how Solid Waste has large dollar value projects that are expected to have a blend of service improvement and lifecycle activity needs. The expected Resource Recovery Facility with a construction date approximately in 2017-2029 has preliminary estimates of $100 million cost (with $50 million relates to lifecycle needs). It requires long term planning to begin promptly to ensure the Resource Recovery Facility is affordable.

The infrastructure gap of approximately $46.54 million assumes that that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities.

The Solid Waste service condition comparison is provided in Figure 9.5. The change in condition profile is attributed mainly to the Material Recovery Facility being completely new in the previous CAM Plan. The cumulative 10 year infrastructure gap from the 2014 CAM Plan was nil. This is attributed to long term planning required for lifecycle activities within the Solid Waste service.

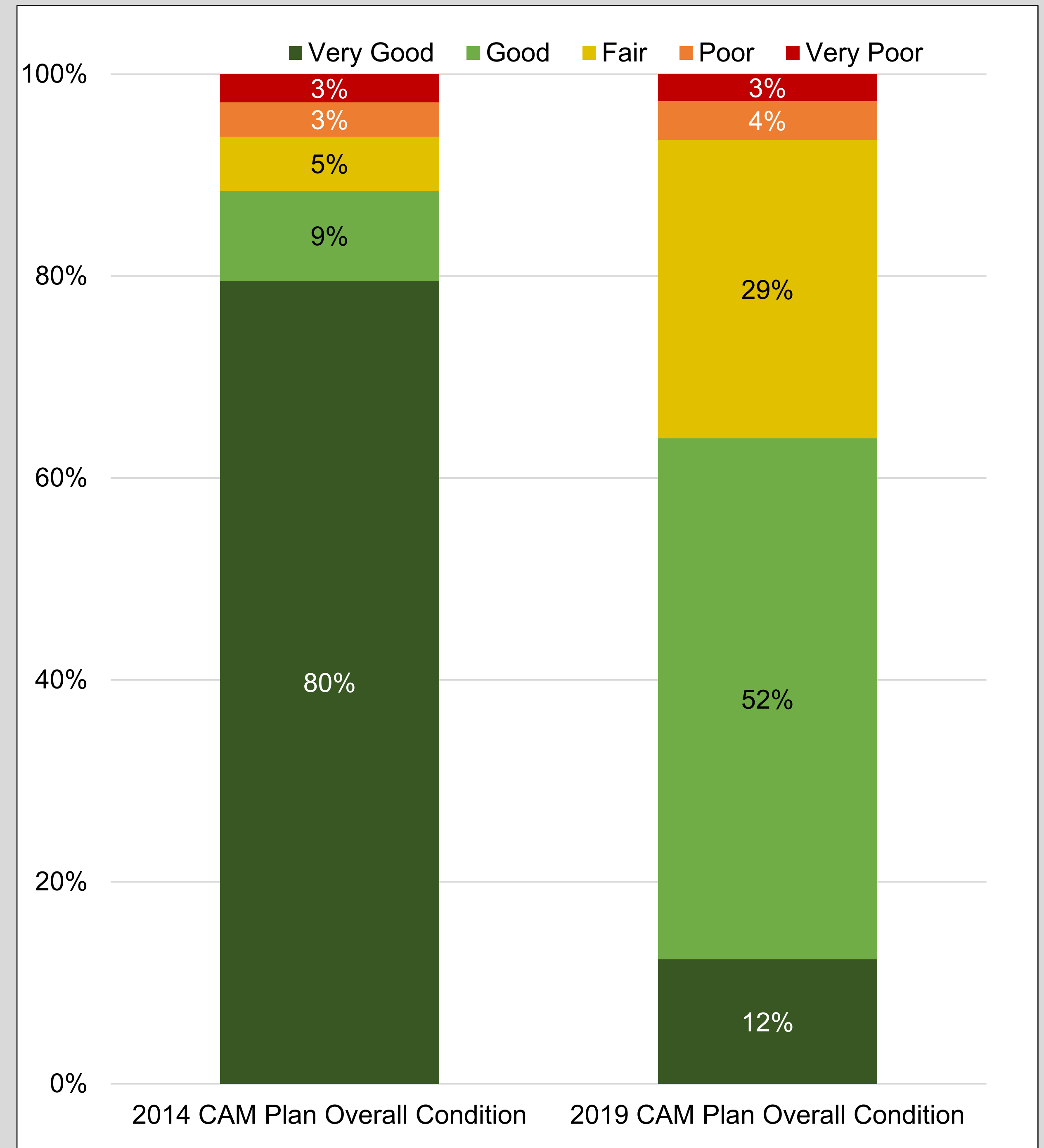


Figure 9.5 2014 CAM Plan to 2019 CAM Plan Overall Condition (Solid Waste Services)

9.6 CONCLUSIONS

Valued at approximately $85 Million, the City's Solid Waste diversion and disposal assets are overall in **Good** condition. Investments in waste diversion and the construction of a new MRF have helped to extend the life of the current landfill to about 2024. Additional investment will be needed to meet the Province's long-term household waste reduction targets and provide landfill service beyond 2024.

Long term planning will be required to finance the Resource Recovery Facility (preliminary cost of $100 million, of which 50% is expected to address lifecycle needs) expected to be constructed in 2027-2029.

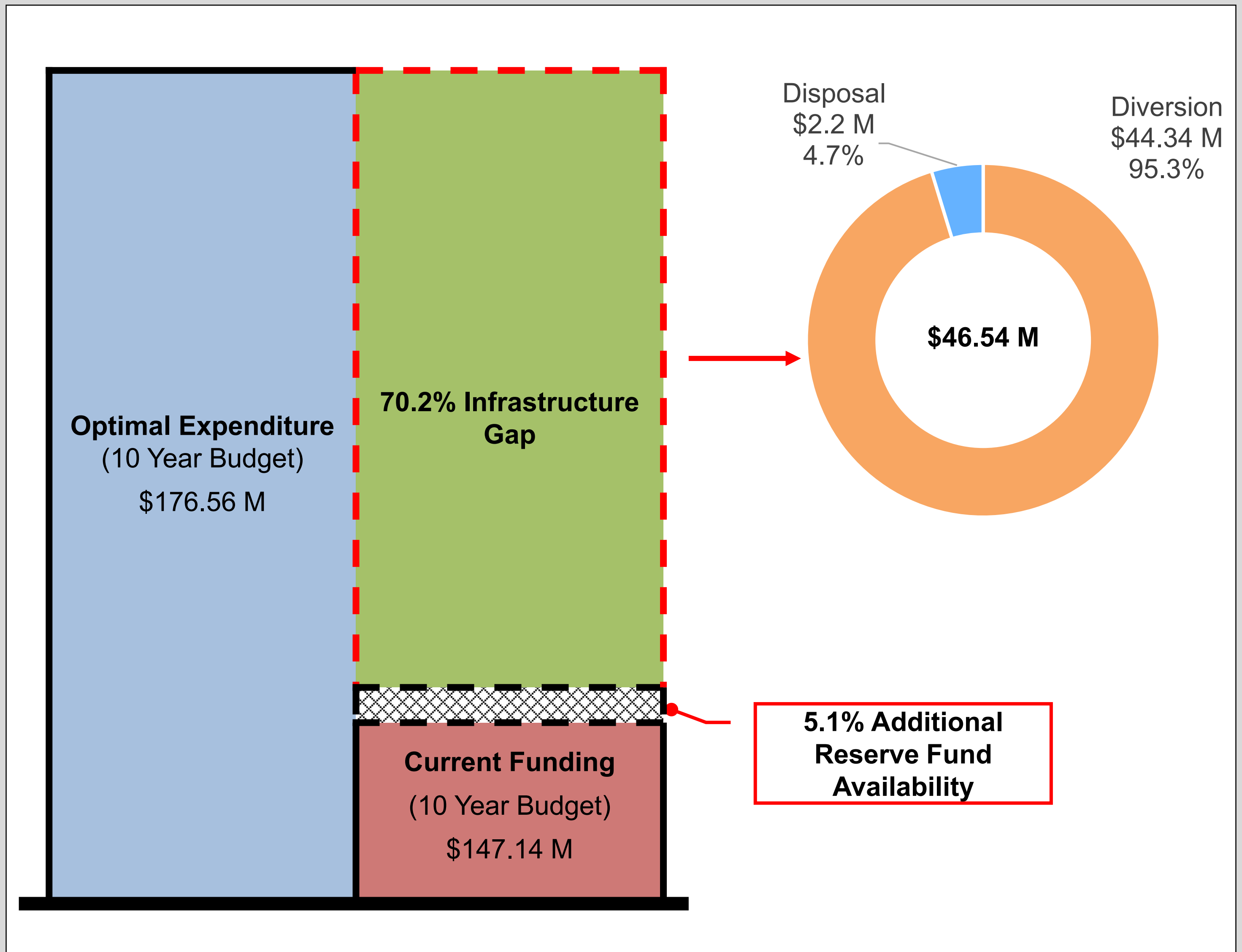


Figure 9.6 Cumulative 10 year Infrastructure Gap Visual (Solid Waste Services)

Material Recovery Facility

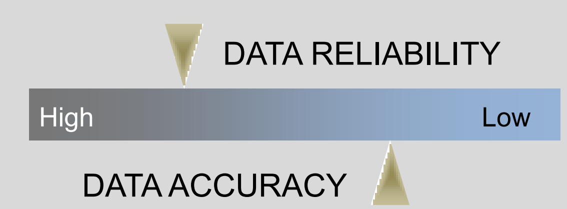
Section 9: Solid Waste

Table 9.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Solid Waste Services)

City of London - Solid Waste Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Solid Waste Diversion	$33.5		$0.03	$44.34**	1.5%	2.7%
Solid Waste Disposal	$51.5		$0.22	$2.2**	2.2%	2.3%
Overall Solid Waste	**$85.0**		**$0.25**	**$46.54****	**1.9%**	**2.4%**

** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Section 10: Parks

Quick Facts
130 km of multi-use pathways
42 km of Thames Valley Parkway
167 Play structures and exercise stations
13 Skateboarding Facilities

5.5% City-Wide Infrastructure Gap Contribution

Replacement Value	$187.3 Million
Condition	Good
10 Year Gap	$31.33 Million
City-Wide Infrastructure Gap Contribution	5.5%

Section 10: Parks

10.1 STATE OF LOCAL INFRASTRUCTURE

Parks assets help 'make London one of the greatest places to live, work, play and visit'. In accordance with the Parks and Recreation Strategic Master Plan (November 2009), 'by investing in neighbourhoods, the City is able to help develop leaders, support families, and build community capacity. In this way, downstream costs and impacts (such as crime, reliance on the social safety net, and poverty) are deterred and positive outcomes (such as increased literacy rates, improved health and physical activity levels, and enhanced quality of life) are strengthened.' Parks is the section of Parks, Recreation & Neighbourhood Services that primarily deals with outdoors activities and natural areas.

10.1.1 Asset Inventory and Valuation

The City's Parks service area is responsible for operating and maintaining a network of parks, paths and facilities valued at over $187 Million not including land. Parks provide a range of amenities that include a large network of trails and pathways, gardens and natural areas, a variety of sports fields and playground equipment, and a variety of public facilities including 'arguably' the oldest baseball field in the world, entertainment venues, public concessions and washrooms. The true asset value of the natural areas and open space is difficult to assess. For the purpose of this report, the 'natural areas and open space' value is assumed to consist largely of land which is reported separately in the Land section and trees which are reported in the Forestry section.

Table 10.1 Asset Inventory and Valuation (Parks Services)

Asset Type	Asset*	Inventory	Unit	Replacement Value (000's)
Parks Linear	Thames Valley Parkway (Incl. Footbridges)	42	km	$28,384
	Multi-use Pathways (Incl. Footbridges)	130	km	$57,998
	Park Road	1	km	$991
	Trail	62	km	$1,859
Parks Amenity	Play Structures (includes exercise stations)	167	Ea.	$23,525
	Soccer Fields	134	Ea.	$4,695
	Baseball Diamonds	73	Ea.	$4,929
	Outdoor Tennis Courts	61	Ea.	$3,813
	Pickleball	6	Ea.	$188
	Cricket pitch	1	Ea.	$60
	Synthetic Turf Football Fields	2	Ea.	$3,122
	Skate Boarding Facilities	13	Ea.	$2,725
	Volleyball	4	Ea.	$120
	Basketball Courts	47	Ea.	$1,551
	Swing Sets	146	Ea.	$1,003
	Multi-use Pads	13	Ea.	$1,066
	Off-leash Dog Park	5	Ea.	$900
	Community Gardens	15	Ea.	$165
Parks Facility	Bandshells	2	Ea.	$3,768
	Building, Clubhouse	9	Ea.	$10,582
	Pavilions	2	Ea.	$1,826
	Shelters	3	Ea.	$242
	Stadium	1	Ea.	$7,795
	Washroom	26	Ea.	$7,592
	Washroom & Concession	7	Ea.	$4,128
	Facilities Site Work	44	Ea.	$12,712
Other Assets***	Other Parks Tangible Assets	Not Specified - Mix		$1,569
TOTAL				$187,308

Section 10: Parks

10.1.1 Asset Inventory and Valuation (Continued)

* Note that administrative, maintenance and storage buildings are maintained by the City's Facilities group. Fleet and associated equipment is provided and serviced by Fleet Management Services and are dealt with in the Fleet section. Land is also excluded from this asset pool and dealt with in the Land section.
Please also note that 'Site Work', includes parking spaces and lighting surrounding Facilities are shared with Recreation facilities. For the purposes of this report, Site Work replacement value is split equally between Parks and Recreation. Lighting surrounding the Park is not captured in this listing.
** Other assets include assets not separately identified above – general equipment, benches, signs, barbecues, etc.

Parks infrastructure is broken into four categories: Parks Linear Assets, Parks Amenity Assets, Parks Facility Assets and Other Assets. The City owns and maintains approximately 235 kilometres of **Parks Linear Assets**, consisting of multi-use pathways (including the Thames Valley Parkway), park roads, and hiking trails.

The **Parks Amenity Assets** allow the citizens of London to participate in and enjoy a wide range of sports and outdoor activities. These include a collection of over 680 sport fields and playgrounds such as football, basketball, baseball, soccer, skateboarding, tennis, children's playgrounds, manicured public gardens and off-leash dog parks. Recent additions include a cricket pitch, volleyball courts, and exercise stations. The City also owns and operates 50 **Parks Facilities** (structures), including Bandstands, Pavilions, Shelters, a Stadium, Washrooms & Concessions, and Parks Site Work (which includes all site development work such as paved roads, parking, electrical work, stormwater, pedestrian paving, signage, exterior stair, etc.). **Other Assets** include miscellaneous accessory equipment. This includes benches, trash receptacles, lighting, barbeques, and signage.

Park Bench

10.1.2 Age Summary

Figure 10.1 shows the Parks average asset age as a proportion of the average useful life by asset. Asset ages have been established using data from the City's Geomatics (GIS) database, Facilities database (VFA software), and Tangible Capital Asset database.

Parks Linear infrastructure is approximately one-third through its expected useful life. Pathway installation and rehabilitation dates have been regularly tracked since the last Asset Management Plan; however, approximately 75% of linear assets have unknown installation/rehabilitation dates. Internal expert opinion is that the average pathway age is approximately 15 years.

Parks Amenity installation dates are regularly documented and maintained through the GIS database. They indicate that Park Amenity assets are more than halfway through their expected useful life.

Parks Facility data exists in the Facilities database VFA and also in GIS databases. It indicates that Parks Facility assets' age exceed their expected useful life.

It is important to note that 40 years was selected as the expected useful life based on the non-structural components of buildings which have the longest expected service life. In practice, the many components that comprise a building are slated for renewal based upon a combination of factors including age, condition, consequence of failure, likelihood of failure etc. and the practical expected life is largely indefinite while the building continues to serve its intended/required purpose in its given geographic location.

Footbridge

Section 10: Parks

Limited **Other Asset** information is available. Equipment is tracked with the TCA database, with approximations of data provided by Parks. Estimates indicate Other Assets are approximately halfway through their expected useful life.

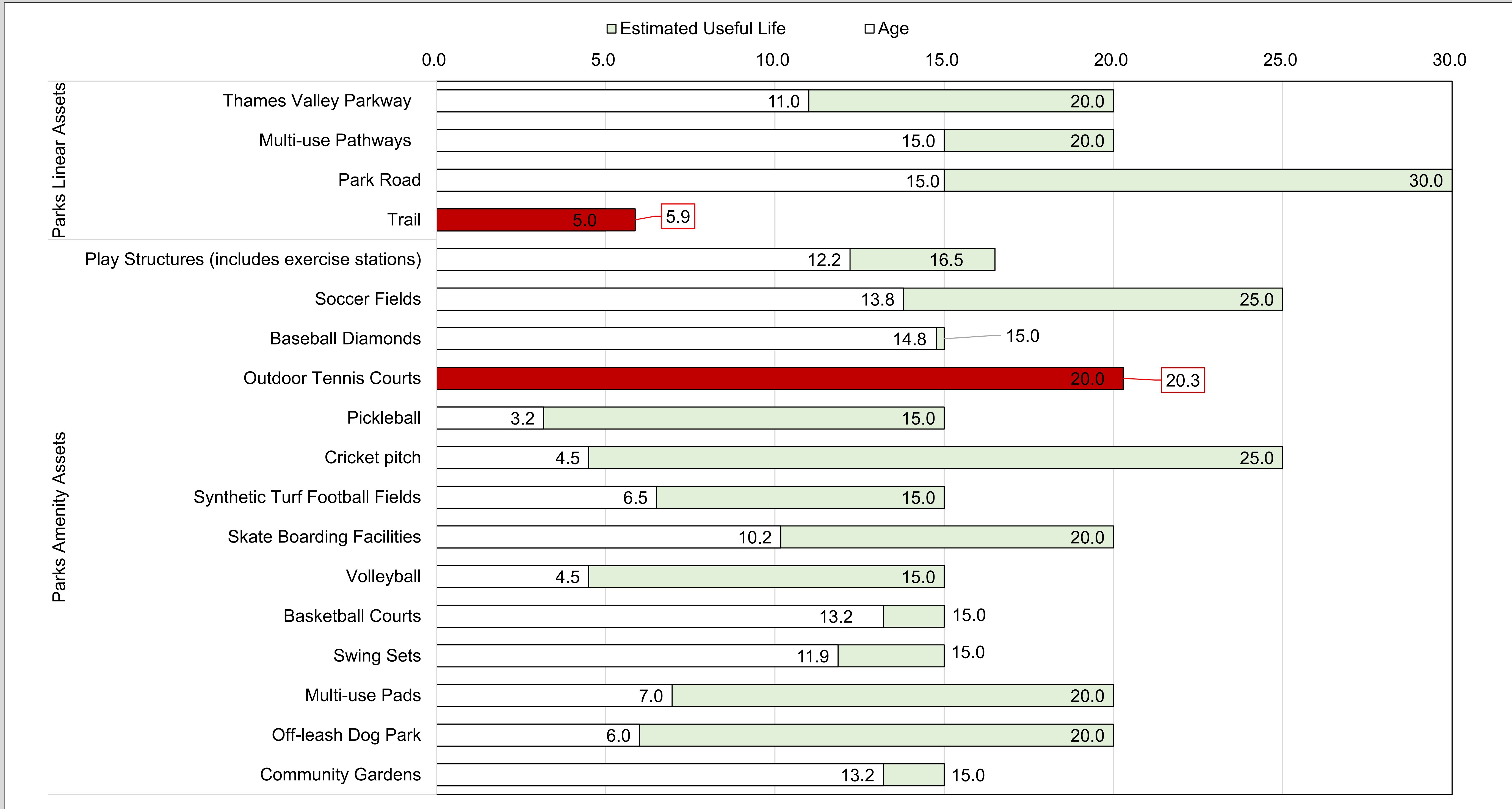


Figure 10.1 Average Asset Life as a Proportion of Average Useful Life (Parks Services - Linear and Amenity Assets)

Section 10: Parks

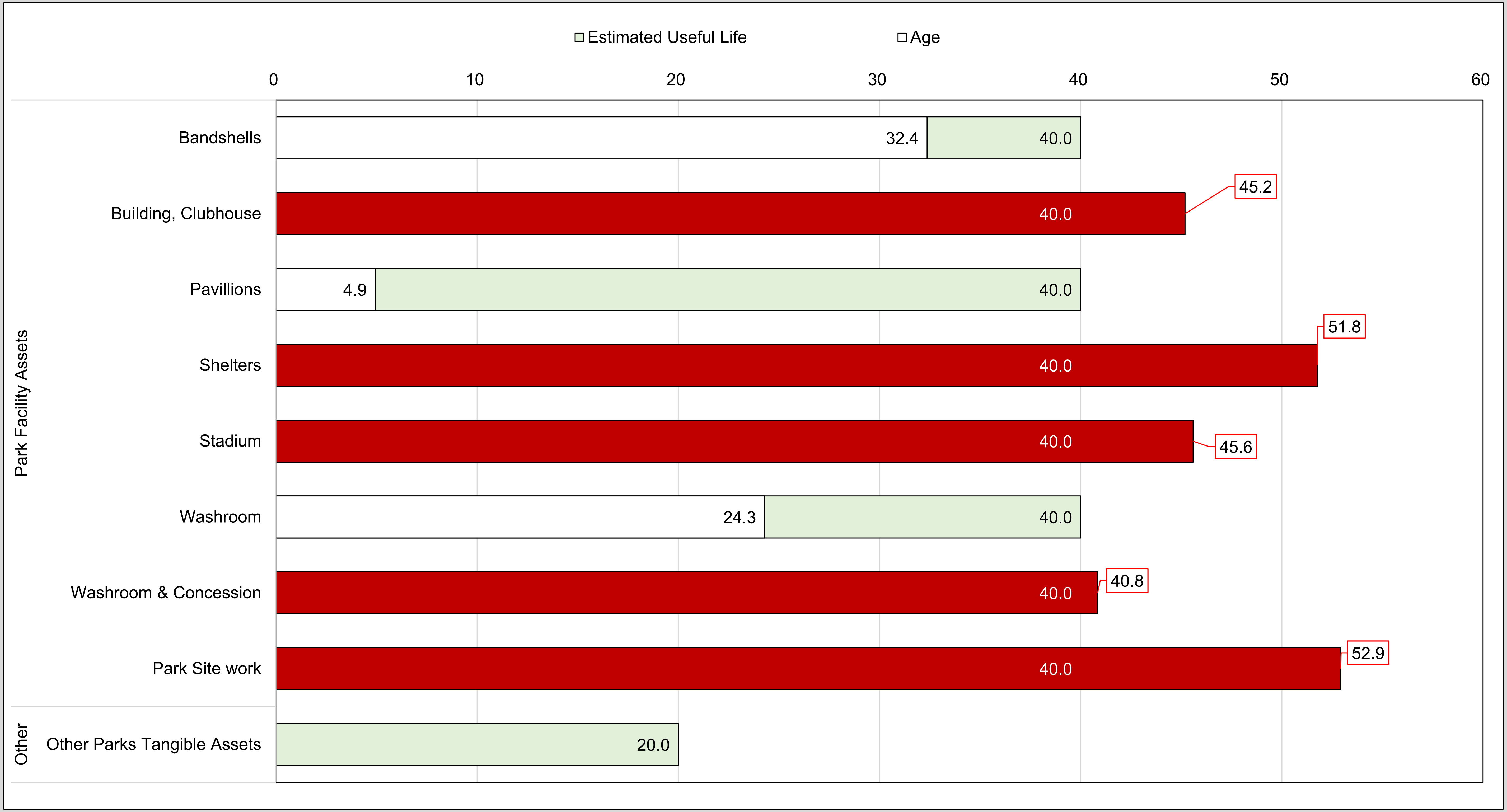


Figure 10.1 (Continued) Average Asset Life as a Proportion of Average Useful Life (Parks Services - Facility and Other)

Section 10: Parks

10.1.3 Asset Condition

The Parks service area has approximately 80% of assets in **Fair**, to **Very Good** condition. The remainder is approaching the end of their expected useful lives, indicating a need for investment in the short to medium term. The City's Parks assets are overall in fair to good condition, indicating that they are meeting current needs but are aging and may require attention.

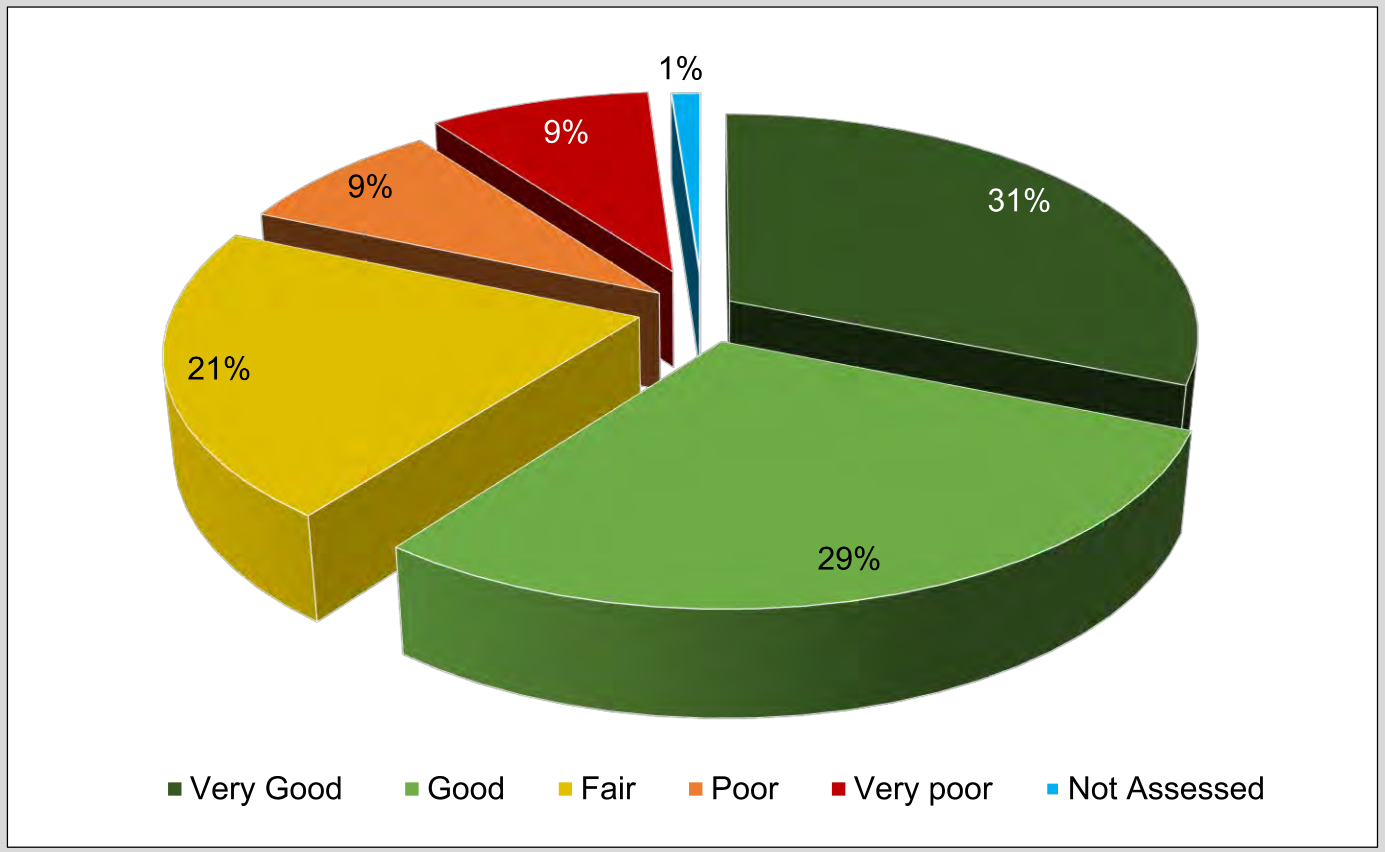


Figure 10.2 Asset Condition Summary (Parks Services)

Parks does not currently have computerized asset management or maintenance management capability although work has been initiated to implement a computerized maintenance management system. The majority of data on asset condition is formally collected and recorded, but is not frequent. All significant safety issues are addressed immediately. Maintenance issues, along with concerns identified by staff and the public are prioritized and addressed based on needs. Other assets are informally evaluated and needs addressed reactively.

Maintenance issues, along with concerns identified by staff and the public are prioritized and addressed based on needs. Other assets are informally evaluated and needs are addressed reactively.

Asset conditions have been established using data from condition models and visual assessments completed by Parks staff with assistance from Corporate Asset Management section, VFA database information, the City's Geomantic (GIS) database, and internal expert opinion.

Parks Linear Assets including roadways, trails and multi-use pathways, are in **Fair** to **Good** condition, based on expert opinion from staff. Paved roads are evaluated as part of the City's pavement management program, with issues identified and prioritized for replacement under the Parks capital program. Trails and pathways, while not formally evaluated, are assessed for safety and trip hazards as part of normal maintenance activities indicating that surfaces are functional and show few signs of deterioration or reduced service. Known issues are prioritized and addressed reactively through operations or capital projects.

Since the last Asset Management Plan Park Amenity Assets have created a formal asset management assessment methodology that has been performed twice. They are evaluated regularly for safety, with urgent issues flagged and targeted for resolution by operations staff. Over 97% of Park Amenity Assets are assessed to be in **Fair** or better condition, indicating that they are functional, but subject to superficial deterioration and intermittent closures for maintenance and repair. Parks would benefit greatly from frequent condition assessments and monitoring system to help manage these key assets.

Park Facilities are evaluated through the City's facility assessment program, with issues resolved operationally or as part of capital improvements. Park Facilities are noted as being in **Fair** to **Very Poor** Condition, indicating that they require replacement in the short term.

Other Assets are not assessed given a comprehensive database does not exist for these assets. Assessments would occur as part of City regular maintenance activities.

Gibbons Park Picnic Site Sign

Section 10: Parks

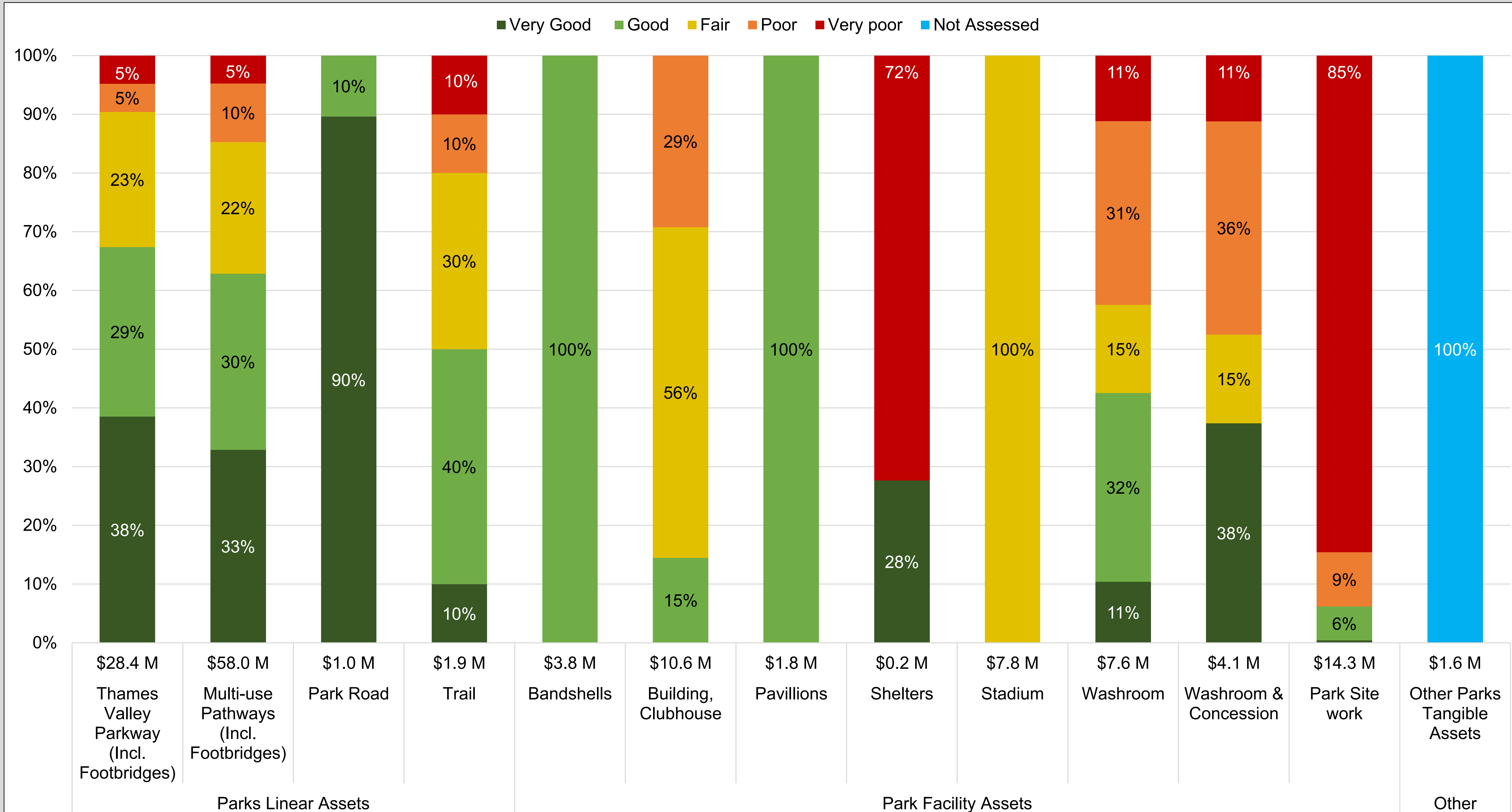


Figure 10.3 Asset Condition Detail (Parks Services - Linear, Facility, and Other Assets)

Section 10: Parks

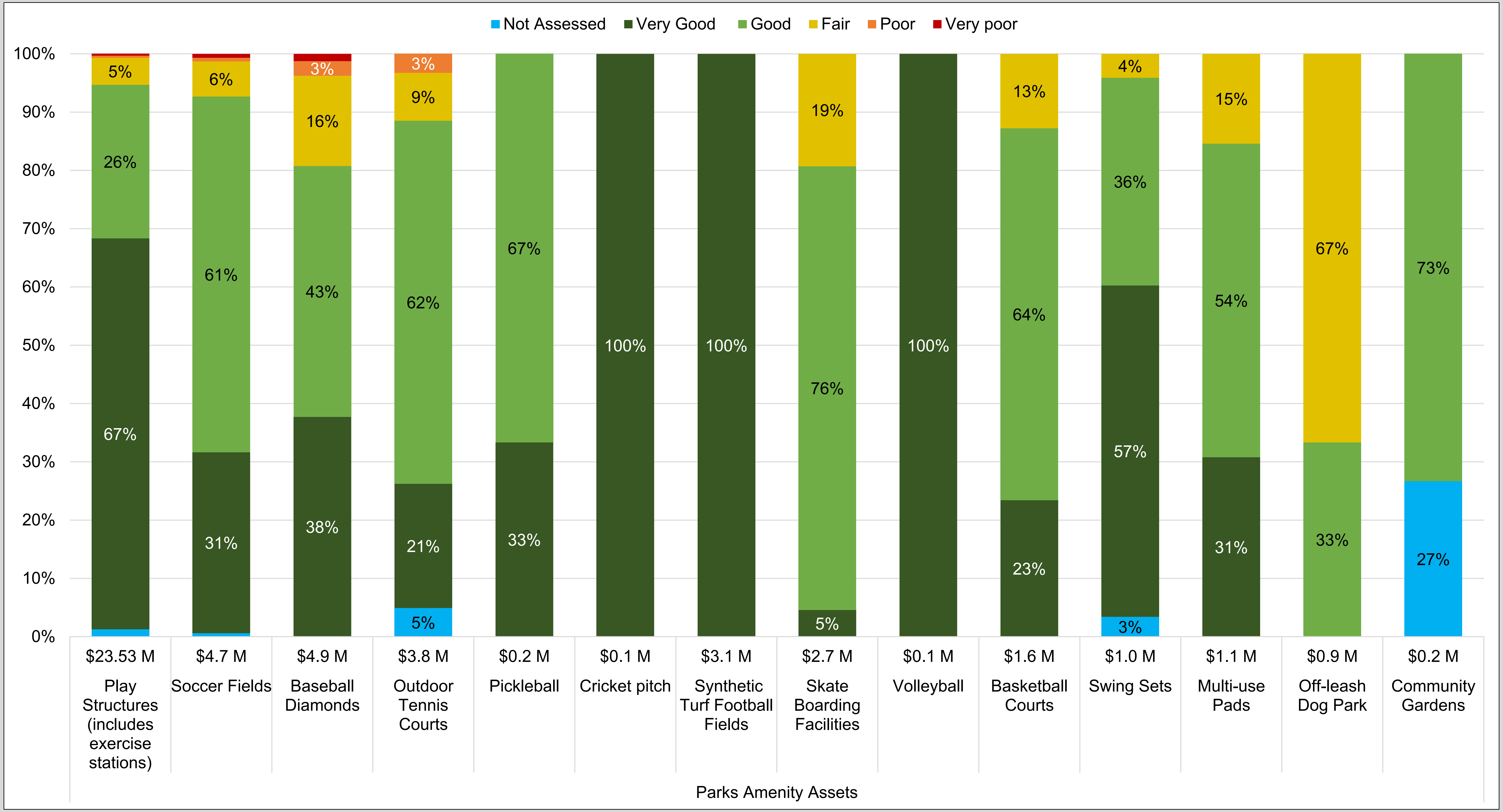


Figure 10.4 Asset Condition Detail (Parks Services - Amenity Assets)

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10.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Customer Service, Cost Efficiency, Accessibility, Reliability/Availability, Legislative, Quality, Safety, and Environmental Stewardship/Sustainability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.
Foundational and advanced metrics are listed in Table 10.2.

Victoria Park – Clarence St

Medway Park Play Structure – Wonderland Rd N

Section 10: Parks

Table 10.2 Levels of Service Metrics – Foundational and Advanced (Parks Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Customer Satisfaction via survey	% of Park visitor survey respondents rating overall somewhat to very satisfied with experience	92%	>90%
Cost Efficient	Providing Parks services in a cost efficient manner	Annual operating cost to provide Parks service ($/household - 176,859 in 2017)	$52.09	
Accessibility	Providing adequate accessibility to Parks pathways, facilities, and amenities	% of Parks amenities that are Accessibility compliant	60%	>90%
Reliability/Availability	Providing reliable Parks services	Ensure Parks are consistently open and available	>90%	>95%
Quality	Providing Parks at the right design standard	Parks Linear pathways quality level fair to very good	87%	
		Average Parks Linear pathways level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.19	
		Thames Valley pathway quality level fair to very good	90%	
		Average Parks Thames Valley pathways level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.08	
		Parks Amenities quality level fair to very good	98%	

No Change **Positive Upward** **Positive Downward**

Section 10: Parks

Table 10.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Parks Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2 3

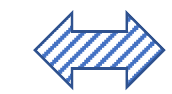
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Quality	Providing Parks at the right design standard	Average Parks Amenities level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	1.59	
		Parks Facilities quality level fair to very good	58%	
		Average Parks Facilities level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	3.40	
Safety	Ensuring that Parks are safe for visitors	# of reported major incidents per 10,000 users (resulting from infrastructure failing)	Under review	0
Environmental Stewardship/ Sustainability	Providing Park services that are energy efficient and environmental stewardship and biodiversity	% of Natural Parkland in Municipality per total parkland	59%	>60%
		Annual electric energy consumption per square foot	16.824 KWH/sf	
		Annual natural gas consumption per square foot	1.317 m^3/sf	
		Annual water consumption per square foot	1.242 m^3/sf	

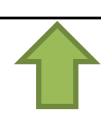
No Change | Positive Upward | Positive Downward

Section 10: Parks

Table 10.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Parks Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Customer Satisfaction via survey	% of Park visitor survey respondents rating overall somewhat to very satisfied with the experience	92%	>90%
Cost Efficient	Providing Parks services in a cost efficient manner	Operating budget for Parks services (Parks & Horticulture, Parks, Natural Areas Planning & Design budgets)	$9,212,178	
		Parks Linear Reinvestment Rate	0.7%	
		Parks Amenity Reinvestment Rate	5.8%	
		Parks Facility Reinvestment Rate	2.7%	
		Parks Other Reinvestment Rate	4.0%	
Accessibility	Providing adequate accessibility to Parks pathways, facilities, and amenities	% of population < 800 m walk to a park	87%	>90% in urban growth boundary
		Hectares of Maintained Parkland in Municipality per 100,000 Population	293.05	290.00
		# of kilometres of multi-use asphalt pathways	173	210 by 2025

 **No Change**  **Positive Upward**  **Positive Downward**

Section 10: Parks

Table 10.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Parks Services)

Performance Measure: Customer / Council Focused 1 2 — Technical Focused 1 2 3

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliability/Availability	Providing reliable Parks services	# of unplanned Park Amenities closures/use restrictions per year excluding weather based disruptions	3	<5
		# of unplanned Sports fields closures/use restrictions per year excluding weather based disruptions	<5	<5
		# of unplanned pathway closures/use restrictions per year excluding weather based disruptions	<5	<5
Quality	Providing Parks at the right design standard	% of Parks Pathways level of service quality level of poor to very poor	13%	⇩
		% of Thames Valley pathways level of service quality level of poor to very poor	10%	⇩
		% of Parks Amenities level of service quality level of poor to very poor	1%	⇩
		% of Parks Facilities level of service quality level of poor to very poor	42%	⇩

⇔ **No Change** ⇧ **Positive Upward** ⇩ **Positive Downward**

Section 10: Parks

Table 10.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Parks Services)

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Safety	Ensuring that Parks are safe for visitors	% playgrounds achieving CSA compliance based on monthly inspections	100%	100%
		# of reported major incidents per 10,000 users	Under review	0
Environmental Stewardship/ Sustainability	Providing Park services that are energy efficient and environmental stewardship and biodiversity	% of Natural Parkland in Municipality per total parkland	59%	>60%
		Annual electric energy consumption per square foot	16.824 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	1.317 m^3/sf	10% reduction by 2020 from 2014 baseline
		Annual water consumption per square foot	1.242 m^3/sf	10% reduction by 2020 from 2014 baseline

No Change | Positive Upward | Positive Downward

Adult Exercise Station – Capulet Lane

10.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

10.3.1 Lifecycle Activities

Table 10.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Park assets:

Table 10.3 Current Asset Management Practices or Planned Actions (Parks Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	***Parks Linear, Parks Amenity, Parks Facility, and Parks Other Assets*** • Encouragement of conservation of Parks and associated infrastructures assets through policy, procedures, public outreach, etc. • Continue researching and implementing park infrastructure in conformance with Provincial, Federal and Municipal policies. • Review the capital and operating costs of the City's Commemorative Program for trees and benches bi-annually to ensure donor fess are sufficient to maintain the Program.	• Refer to Appendix B.

Bandshell at Victoria Park

Table 10.3 (Continued) Current Asset Management Practices or Planned Actions (Parks Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	***Parks Linear*** • Parks linear (pathways) is monitored and problems addressed when triggered by staff observations, anticipated lifecycle timing, and public feedback. • Smaller wooden structures, such as boardwalks, require an enhanced inspection and maintenance program to extend their lifespan. • Coordinate condition assessment reports of existing infrastructure, as needed. For example, Thames Valley Parkway condition assessment. ***Parks Amenity*** • A work order system and online interface exists for Parks City employees to generate requests of Facilities. • Equipment and park structures are monitored and problems addressed when triggered by staff observations and public feedback. • The approach to asset management for the living portion of Parks assets is somewhat unique because it entails living assets, grass, trees, etc. The product can be qualitative and not easily measured. Typically maintenance is undertaken based on available resources, routine schedules like grass cutting, and field observations. • Coordinate condition assessment reports of existing infrastructure as needed. For example, playground assessment report. ***Parks Facility*** • Parks Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), determine the cost and timing of replacement requirements. • A work order system and online interface exists for Parks City employees to generate requests of Facilities. ***Parks Other*** • Ecological monitoring, which can include invasive species management, public access and bylaw enforcement to ensure park infrastructure is being utilized as planned and that it is sustainable with respect to surrounding natural heritage system.	• Completing planned maintenance activities while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure.

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Table 10.3 (Continued) Current Asset Management Practices or Planned Actions (Parks Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	**Specific Actions** ***Parks Linear*** • Pathways are generally rehabilitated – it is considered the most effective and proactive method to manage assets that are continuously used by City residents. ***Parks Amenity*** • Equipment and structures rehabilitation is generally not considered an option. The lifecycle activity is regular maintenance and the decision to replace the asset. ***Parks Facilities*** • Corporate Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), determine the cost and timing of replacement requirements. ***Parks Other*** • Rehabilitation is generally not considered an option.	• Incorrect assumptions regarding improved expected useful life after rehabilitating a pathway.

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Table 10.3 (Continued) Current Asset Management Practices or Planned Actions (Parks Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	***Park Linear*** • Considered not feasible for the 'entire system' to be replaced (160+ km), instead replace larger sections as one unit (1-2 km). ***Parks Amenity*** • Equipment and structure assets ideally are used to end of useful life. When unexpected events occur, assets will be replaced but would be in lieu of other planned infrastructure replacements. ***Parks Facilities*** • Corporate Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), determine the cost and timing of replacement requirements. ***Parks Other*** • Other assets ideally are used to end of useful life. When unexpected events occur, assets will be replaced but would be in lieu of other planned infrastructure replacements.	• Refer to Appendix B.

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Table 10.3 (Continued) Current Asset Management Practices or Planned Actions (Parks Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	<u>**Specific Actions**</u> ***Park Linear*** • Disposal is done as efficiently as possible. For example asphalt is recycled into 'recycled asphalt granular'. ***Park Facilities*** • Refer to Appendix B. ***Parks Amenity*** • Amenities would be recycled and the Ministry of Environment guides disposal of earth and fill.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	***Park Linear, Amenity, Facility, and Other*** • Consultation with public and users of Parks assets; and, in conjunction with Facilities and/or Transportation would determine service improvement needs.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	***Park Linear, Amenity, Facility, and Other*** • Capital growth projects are identified by Development Charges and the Parks and recreation master plan (subject to Development Charges Act, 1997 requirements and City of London policy), or as a part of Assessment Growth Policy (where applicable with municipal policy). • Growth needs are known, based upon parks and recreation master plan, bike master plan, etc. City staff plan for that accordingly within new growth areas. Consultation does happen associated with master plans, but not necessarily on each individual growth related project. Collaboration could occur with Transportation for input into pathways and footbridges.	• Incorrect growth assessments may result in overabundance of Parks assets in a particular area and insufficient assets in another • Growth not completely funded through Development Charges – risk of insufficient remaining funding that could inhibit growth.

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The cost of these identified Lifecycle activities is summarized in Table 10.4. Current funding for operating budgets present the average of budgeted 2016 and 2017 fiscal years.

Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Current funding presented for operating budgets presented is the average of budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Table 10.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Parks (Linear, Amenities, Facilities, and Other)	Operating Budget*	Total (Parks Linear, Amenity, Facility, and Other)	**$9,089**
	Lifecycle Capital Budget**	Parks Linear	$637.5
		Parks Amenities, Facility, and Other	$4,142.8
		Total	**$4,780.3**
	Service Improvement Budget	Total (Parks Linear, Amenity, Facility, and Other)	**$240**

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

Table 10.5 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Parks (Linear, Amenities, Facilities, and Other)	Growth (Capital Budget and Significant Operating Costs)	Growth Capital –Total Parks	$5,136
		Significant Operating Costs – Total Parks	$1,218
		Total	**$6,354**

Noting that the asset management plan has been completed prior to the finalization of the draft DC Background Study. It is assumed the draft DC Background Study is representative of the final version.

Parks approved growth budgets are split approximately equally between district parks, field houses, major open space network, neighbourhood parks, sports parks, Thames Valley Parkway, and Urban Parks.

The total cost to provide new park linear and amenities is not fully covered by development charges, resulting from to the regulated reduction on "soft" services of 10% (currently in effect as of the 2019 CAM Plan). In addition, current Development Charges rules place a cap on the total overall expenditure for new parks based on the previous 5 year growth percentage, not the current or projected growth. **As a result, many planned parks in growth areas will not receive any growth capital funding for park amenities. Capital budgets for new parks may need to be augmented by tax revenue.**

10.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is not sufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 10.5 presents the condition profile for the next 20 years based in the current budget.

OPTIMUM CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the level of service metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. Figure 10.6 presents the condition profile for the next 20 years based in the optimal budget.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

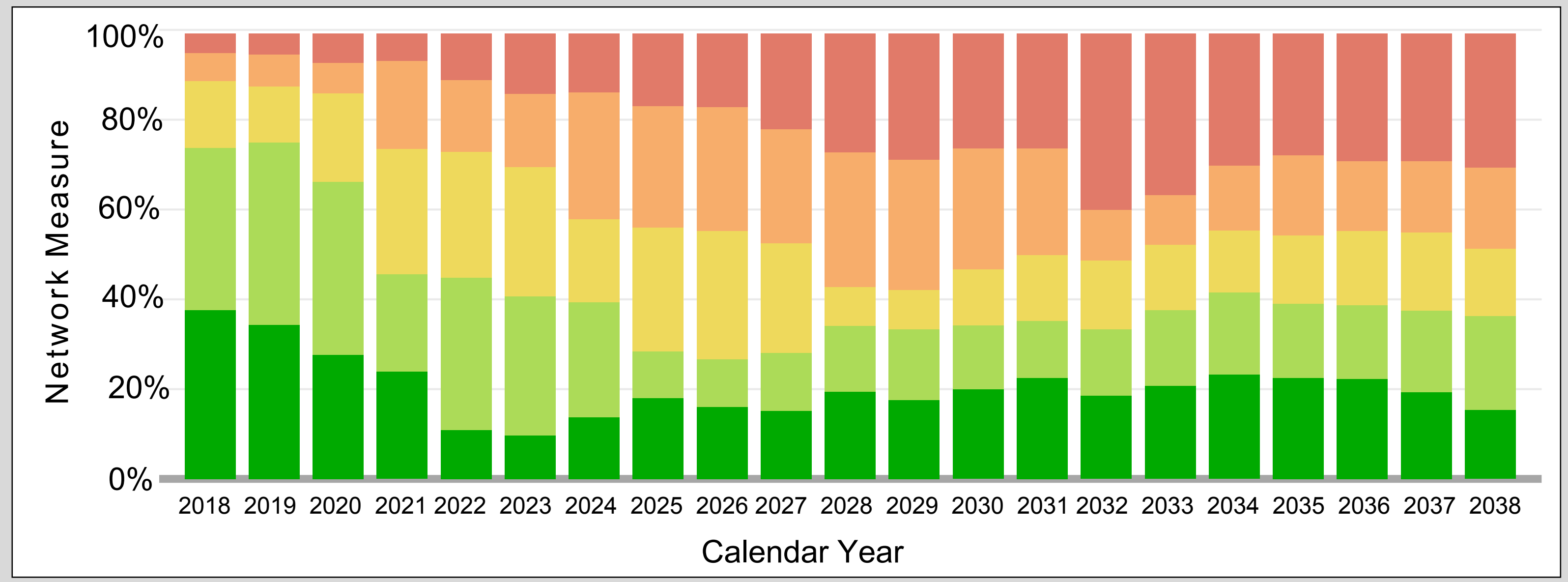


Figure 10.5 Projected 20 year Current Budget Condition Profile (Parks Services)

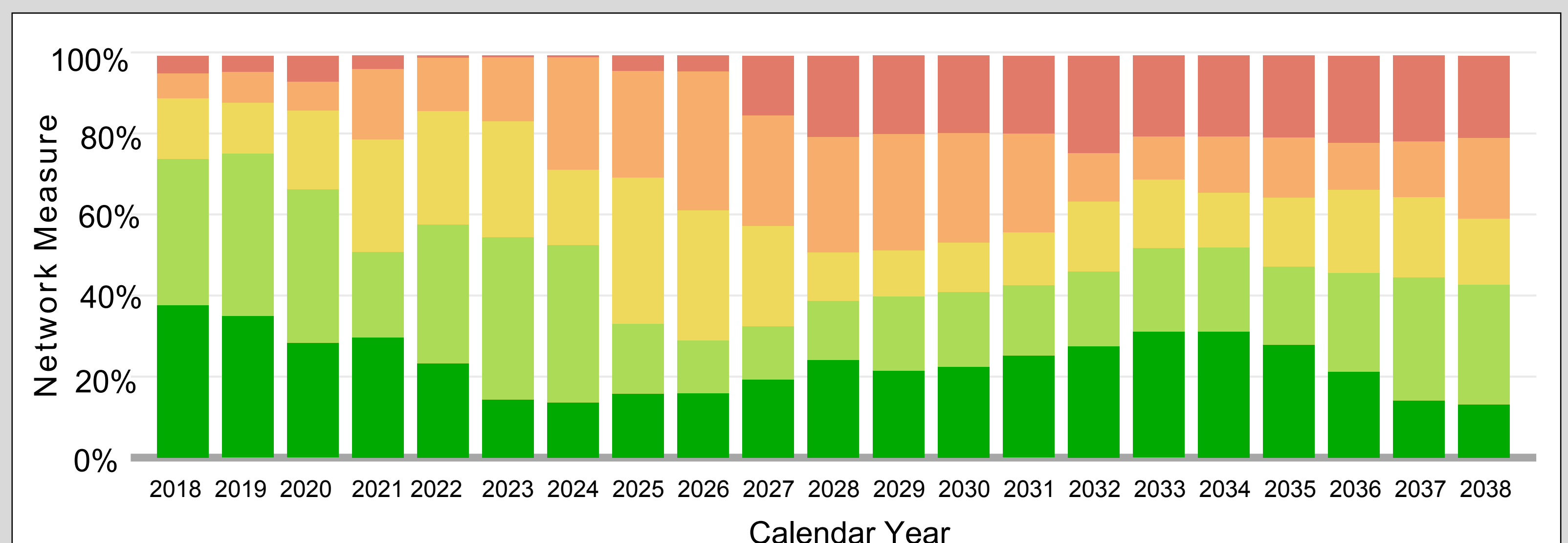


Figure 10.6 Projected 20 year Optimal Budget Condition Profile (Parks Services)

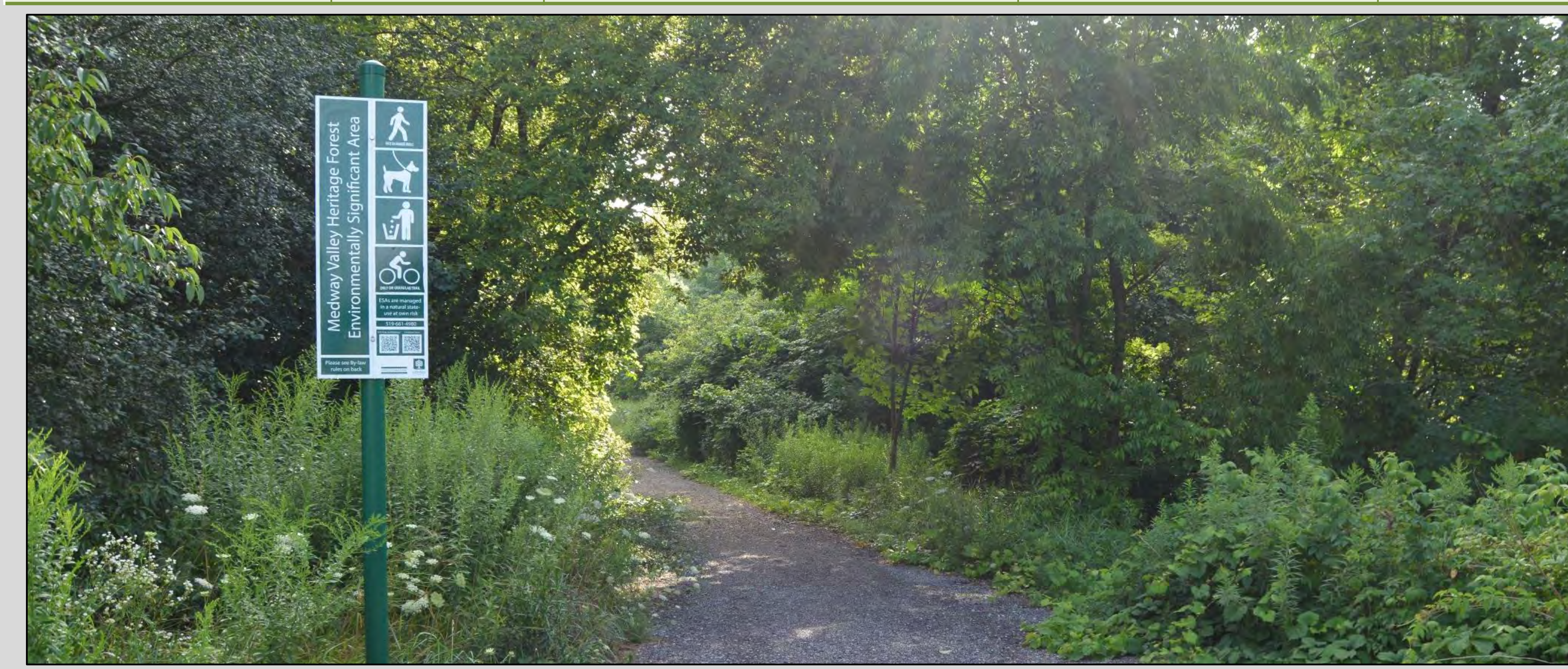
10.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 10.6. The analysis documented is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years. Current funding presented for operating budgets presented is the average of budgeted 2016 and 2017 fiscal years.

Table 10.6 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Parks Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's) (Average Annual)	Funding Gap (000's) (Average Annual)
Parks (Linear, Amenities, Facilities, and Other)	Lifecycle Capital Budget	Parks Linear	$637.5	$2,775.4	$55.5	$2,082.4
		Parks Amenities, Facility, and Other	$4,142.8	$5,221.9	$28.5	$1,050.6
		Total	**$4,780.3**	**$7,997.3**	**$84.0**	**$3,133.0**



Medway Valley Heritage Forestry Environmentally Significant Area

Play Structures – Plane Tree Park

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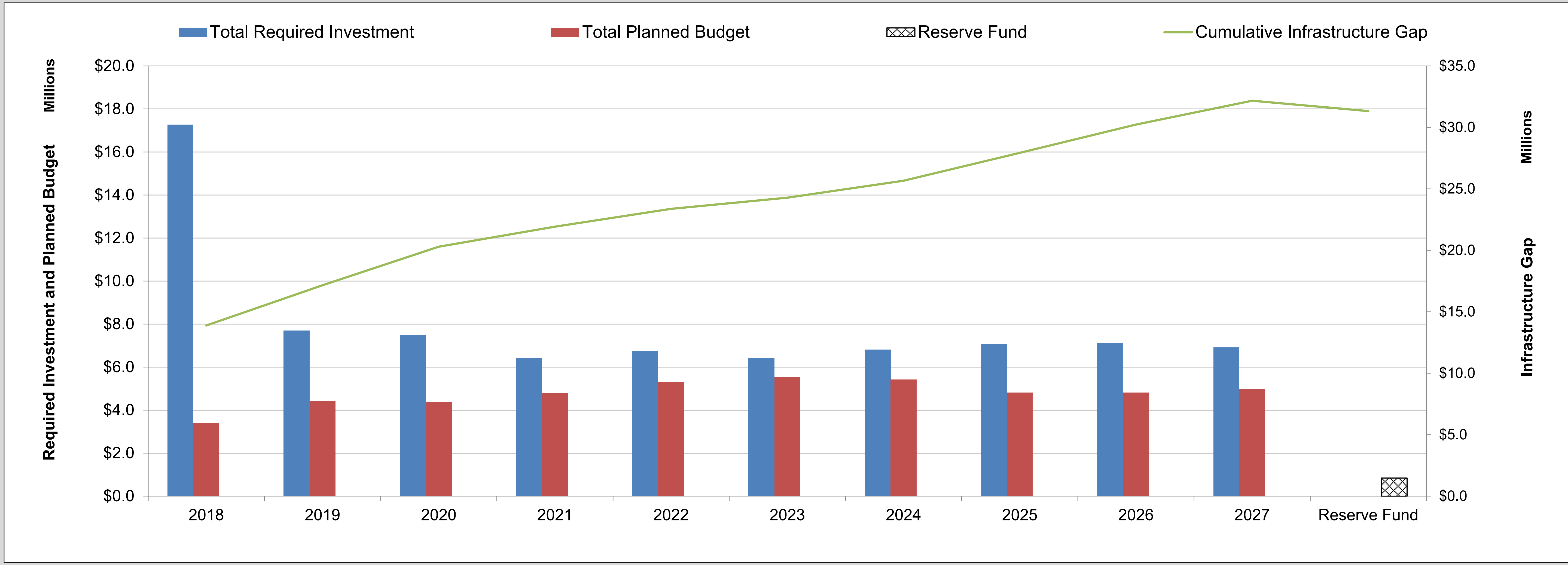


Figure 10.7 Forecasted Lifecycle Infrastructure Gap (Parks Services)

Parks has a $13.9 Million current infrastructure gap growing significantly to $31.3 Million over the next decade largely driven by the needs of the Thames Valley Parkway, multi-use pathway systems and park amenities. There is a projected annual shortfall of $2.07 Million for capital maintenance and renewal of the Thames Valley Parkway, multi-use pathway system and park amenities based on estimated useful life. There is a backlog of Park Facility requirements, but over a 10 year period should be reduced to approximately $3 Million. Total required investment represents the costs to renew and maintain the existing assets so services can continue to be delivered. The forecast does not account for any costs to improve service, accommodate growth or expand service to new areas or customers.

The estimates for the Parks infrastructure gap are based on anticipated useful lives and replacement values derived from expert opinion. Frequent condition assessments would lead to better information for planning the renewal needs for parks and the pathways in particular. Historically Parks has relied on field observations as the trigger for work but is now in the process of developing computerized maintenance management and asset management processes which can be expected to provide more robust information regarding their infrastructure gap.

Furthermore, it is noted that risk assessment and consequence of failure is not explicitly addressed for park assets in this CAM Plan analysis. Once a risk assessment methodology is embedded in asset management analysis, it may have a material impact on needs identified for Parks infrastructure gap.

10.5 DISCUSSION

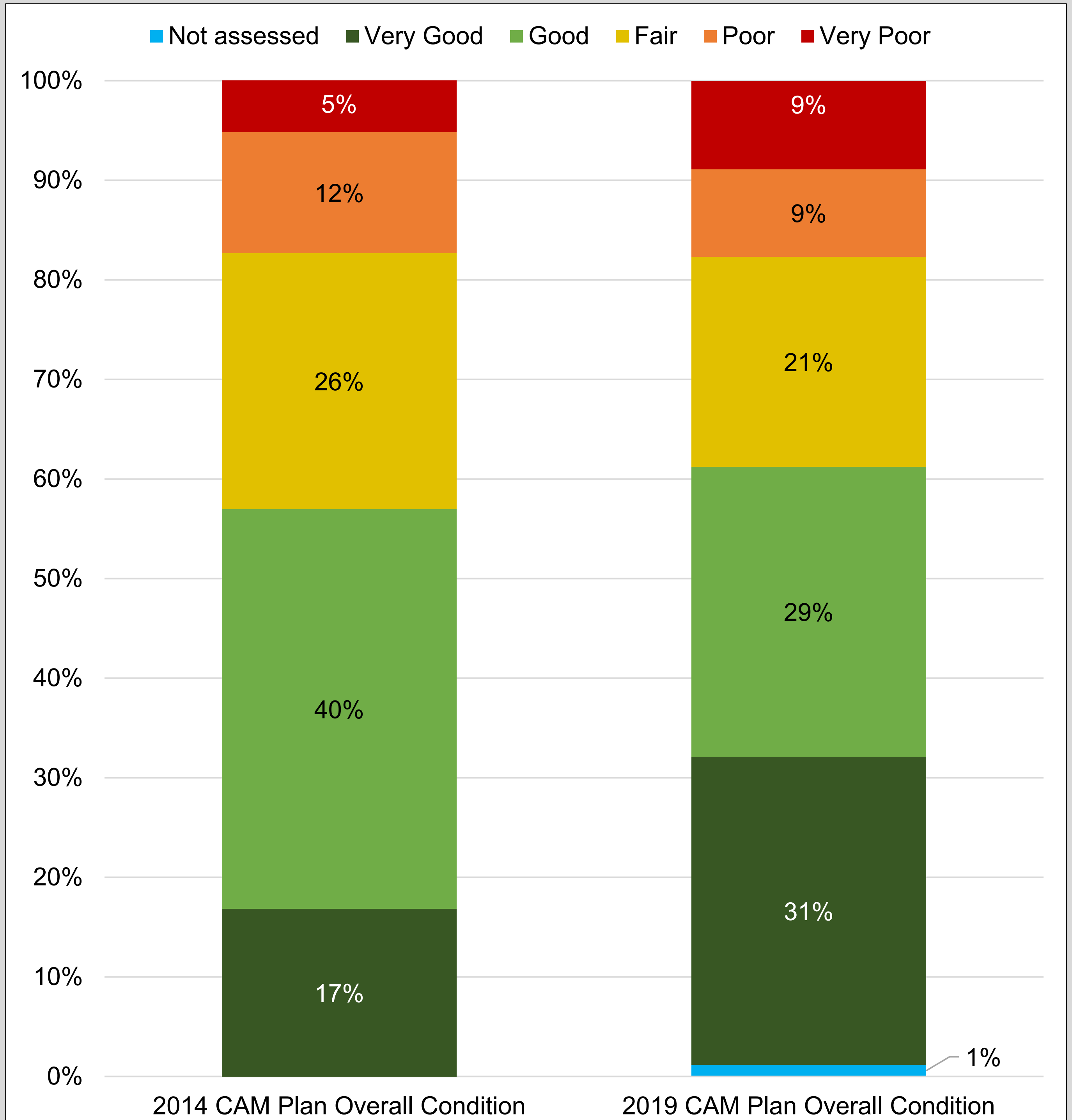


Figure 10.8 2014 CAM Plan to 2019 CAM Plan Condition Summary (Parks Services)

CURRENT AND FUTURE CHALLENGES

Current challenges primarily relate to continuously assessing representative condition ratings, a backlog of Park Facility requirements, and increasing pathway and facility costs. The 2014 Asset Management Plan relied on internal expert opinion for Linear and Amenity assets. Since that time, quality rating methodologies have been created and used but are infrequent. The Parks service replacement value increased from approximated $141 million (in 2014) to $187 million. The increase is attributed to increasing pathway costs and Facility assets, such as field houses with washroom and concessions. If these costs continue to increase, infrastructure funding shortfalls will increase.

The infrastructure gap of approximately $31.36 million assumes that that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities.

Park infrastructure is highly desired by residents. It supports healthy/active lifestyles, community building efforts, social inclusion, quality public spaces and civic pride, and helps protect natural heritage features. Continued and increased investment in park infrastructure is needed in order maintain accepted levels of service and to ensure public safety and accessibility.

Without addressing the lifecycle gap, decisions will need to be made on reducing service standards and removing amenities from parks, such as playgrounds.

Re-prioritization of investment goals, through the Parks & Recreation Master Plan could help reduce the funding gap, but this may be at the expense of other lower priority investments.

Previous infrastructure replacements, such as play grounds have been accomplished by funding infusions by other levels of government. If this funding is discontinued, infrastructure gaps for Parks Amenities will increase.

Given Development Charges regulations and a cap on the total funding available for future parks tied to previous growth levels, the possibility exists that many future parks will not have funding for park amenities – a significant change in service level.

The Parks service area condition comparison is provided in Figure 10.8. The change in condition profile is attributed mainly to incorporating a more detailed quality rating system for Park assets based on internal expert opinion. The cumulative 10 year infrastructure gap from the 2014 CAM Plan was approximately $44 million compared to $31.3 Million in the 2019 CAM Plan. The gap decrease is attributed to efficiencies in pathway replacement requiring asphalt surface replacement and granular base, as opposed to replacing the entire pathway.

10.6 CONCLUSIONS

Valued at approximately $187 Million, the City's Parks assets are overall in Fair to Good condition, indicating that assets are functional but showing signs of deterioration. Maintaining current investment will result in an infrastructure gap of approximately $31.3 Million over the next decade. Failure to address the infrastructure gap could result in localized reductions to service, such as visual signs of deterioration, potential closure of amenities, high maintenance costs or global service reductions such as fewer parks per capita, reductions to operating hours, etc. Additional effort in the evaluation of asset condition and long-term investment requirements is needed to verify these findings.

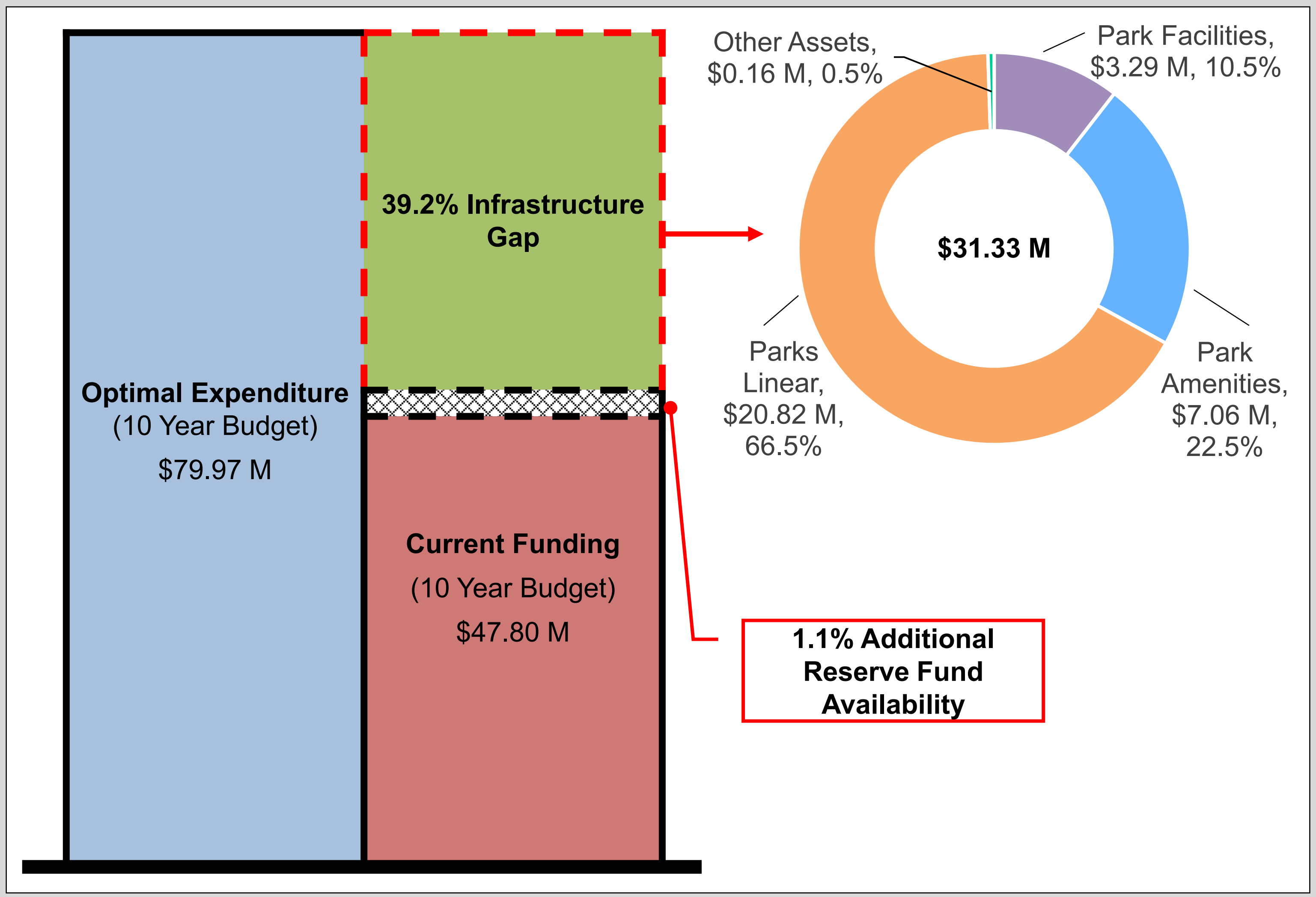


Figure 10.9 Cumulative 10 Year Infrastructure Gap Visual (Parks Services)

*We note the infrastructure gap is proportionally allocated based on needs of each Asset Type.

Kiwanis Skateboard Structure - Sign

Play Structures – Plane Tree Park

Section 10: Parks

Table 10.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Parks Services)

City of London - Parks Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Parks Linear	$ 89.2		$2.73	$20.82**	0.7%	5.1%
Park Amenities	$47.9		$1.27	$7.06**	5.8%	6.2%
Park Facilities	$48.6		$9.86	$3.29**	2.7%	1.7% to 2.5%*
Other Park Assets	$1.6	Not Available	$0.02	$0.16**	4.0%	5.0%
Overall Parks	**$187.3**		**$13.88**	**$31.33****	**2.6%**	**3.4% to 4.1%**

*Based on 2016 Canadian Infrastructure Report Card.
** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.

DATA RELIABILITY
High Low
DATA ACCURACY

Section 11: Recreation

Quick Facts
11 Arenas
13 Community Centres
3 Indoor Pools
11 Outdoor Community Pools
90 Holes of Golf

18.7% City-Wide Infrastructure Gap Contribution

Replacement Value	$372.3 Million
Condition	Fair
10 Year Gap	$106.48 Million
City-Wide Infrastructure Gap Contribution	18.7%

11.1 STATE OF LOCAL INFRASTRUCTURE

Recreation assets help 'make London one of the greatest places to live, work, play and visit'. The City aims to provide affordable, accessible, high quality recreation opportunities and facilities that promote a safe, healthy and fun life style. Recreation plays a significant role in community building through the facilitation of active and passive activities, opportunities for structured and spontaneous play, strengthening of neighbourhood connections and more. Recreation is delivered by Parks, Recreation as well as Neighbourhood, Children & Fire Services, and includes indoor activities like the services offered in arenas and indoor pools, community centres, seniors' centres, as well as important outdoor facilities like outdoor pools, spray pads, golf courses and Storybook Gardens. The Parks and Recreation Master Plan is being updated in 2019. It will update the overall vision, direction, and guidance for planning and making decisions about parks, recreation programs, sport services, and facilities. It is informed by public input and is aligned to local, provincial, and national policies, strategies, best practices, trends, demographics, and growth forecasts. The Master Plan has a timeframe of ten years (2019 to 2028) and includes a longer-term outlook for major capital projects to 2039. The Plan identifies broad needs and strategies and contains a series of recommendations that will assist the City and the community to achieve the vision and goals. The information and individuals involved in the Parks and Recreation Master Plan also informed the Parks and Recreation CAM Plan section.

11.1.1 Asset Inventory and Valuation

The replacement value of the City of London's recreation facilities is nearly $372 million. These facilities enable a wide range of recreational and competitive year round activities including: recreation and leadership programs, membership based activities, indoor tennis, roller-skating, skating, hockey, swimming and diving, various community based meetings, events, rentals, Canadian Professional Golfers Association (CPGA) sanctioned municipal golf courses and special attractions Table 11.1 summarizes the Recreation Inventory and Valuation.

Table 11.1 Asset Inventory and Valuation (Recreation Services)

Asset Type	Asset	Inventory	Unit	Replacement Value ($000's)
Arena & Equipment	Arenas	11	Ea.	$140,354
	Outdoor Ice Rinks*	3	Ea.	$1,409
Aquatics & Equipment	Outdoor Community Pool	11	Ea.	$20,628
	Wading Pools	10	Ea.	$3,725
	Spray Pads*	16	Ea.	$6,471
	Indoor Pools	3	Ea.	$37,333
Community Centers & Equipment	Community Centres	13	Ea.	$63,248
	T-Block and JA Building	2	Ea.	$7,241
	Indoor Tennis Courts	1	Ea.	$6,347
Attractions	Storybook Gardens	1	Ea.	$13,861
Recreation Site work	Site Work**	17 sites, with 44 shared sites	Ea.	$36,583
Golf	Courses (18 holes)	5.0	Ea.	$20,578
	Clubhouses	3	Ea.	
	Service Buildings	5	Ea.	
	Washrooms and Concessions	1	Ea.	
Senior Centre and Equipment	Senior Centres	2	Ea.	$14,508
Total				**$372,286**

* One spray pad and one outdoor ice rink is located at Storybook Gardens. For State of Infrastructure presentation purposes, these values are allocated to spray pad and outdoor ice rink asset types.
** Recreation shares 44 sites with Parks. The replacement value is equally split between the Parks and Recreation services.

Section 11: Recreation

11.1.1 Asset Inventory and Valuation (Continued)

Nearly half of the value of Recreation assets can be attributed to Arenas, which include 11 arena facilities and 3 outdoor ice rinks. Arenas serve organized sports leagues by providing opportunities to participate in ringette, hockey, figure skating, special events, ball hockey, inline hockey, shuffleboard, day camps and lacrosse. Arenas also serve participants in public recreational skating, pick-up shinny hockey, senior's skates and tots skates. Arenas are used as dry pads in summer months providing space for camps, ball hockey, etc.

The City's 3 indoor and 37 outdoor aquatics facilities are used by thousands of Londoners from infants to seniors. Facilities support community based recreation and learn-to-swim programs, as well as training and competition both at the development level and national level.

The City's 13 community centers and 2 seniors and community centres provide accessible, quality, welcoming spaces for community recreation and leadership programs, activities, rentals/events and neighbourhood gatherings in support of strong neighbourhoods. Some of the community centers are shared with arenas in the same recreation building.

The City of London owns and operates 90 holes of golf - the 9 hole Hickory Course located at Thames Valley GC, the Parkside 9 at Fanshawe Golf Course and four 18-hole golf courses (Thames Valley, Fanshawe Traditional, Fanshawe Quarry and River Road). These courses include three clubhouses, and several maintenance buildings providing affordable golf opportunities to residents and visitors.

The Recreation service manages one of London's biggest children's attractions; composed of 15 facilities, the famous Storybook Gardens, a village of imagination offering year round activities for the children of London and visitors to our great city.

Parks and Recreation shares 44 sites, in which, for this Asset Management Plan, all the values and projected needs of the assets included in these sites are split between parks and recreation services.

11.1.2 Age Summary

Figure 11.1 shows the Recreation average asset age as a proportion of the average useful life by asset type. In most of the cases, the average ages for all facilities were calculated using the recorded construction date in the VFA (Facilities Management software), otherwise the City GIS databases were also used as another source in case of information was not available. As shown in Figure 11.1, there are several assets that exceeded their average industry standard useful life, such as the senior & community centres, arenas, outdoor rinks, outdoor pools, golf washrooms and concessions, and clubhouses. This leads to an increase in the operation and maintenance cost of these facilities. It is important to note that 40 years was selected as the expected useful life based on the non-structural components of buildings which have the longest expected service life. In practice the many components that comprise a building are slated for renewal based upon a combination of factors including age, condition, consequence of failure, likelihood of failure etc. and the practical expected life is largely indefinite while the building continues to serve its intended/required purpose in its given geographic location.

Farquharson Arena – Tecumseh Ave E

Section 11: Recreation

11.1.2 Age Summary

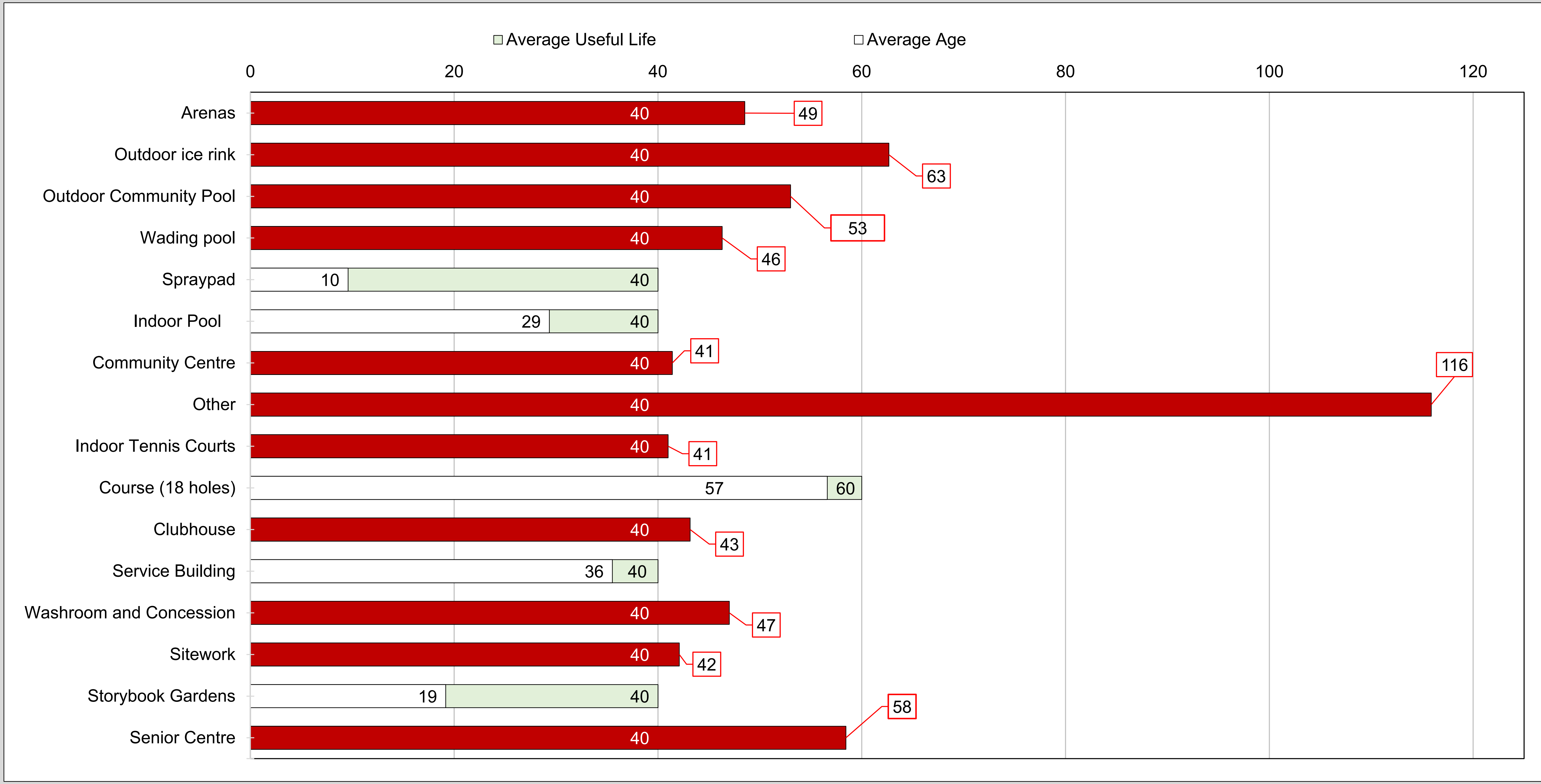


Figure 11.1 Average Assets age as a Proportion of Average Useful Life (Recreation Services)

Section 11: Recreation

11.1.3 Asset Condition

The condition of the Recreation facilities is regularly evaluated through comprehensive condition assessments using an industry-standard Facility Condition Index (FCI) that accurately reflects the overall condition of the facilities (building envelope, mechanical and electrical systems, etc.). Similar programs do not exist for the equipment inside the facilities. However, the equipment is a minor component of the total Recreation asset value albeit critical to the function of the facility and services provided. Equipment is monitored and problems are addressed when triggered by staff observations or regular inspections and public feedback. The Facility Condition Index is also not used for golf courses, just the clubhouses and other associated buildings. As seen in Figure 11.2, nearly 56% of the city's recreation services assets (arenas, aquatics, community centres, etc.) are in **Fair** to **Very Good** condition, with the remainder assessed as **Poor** or **Very Poor** condition, indicating a need for investment in the short to medium term.

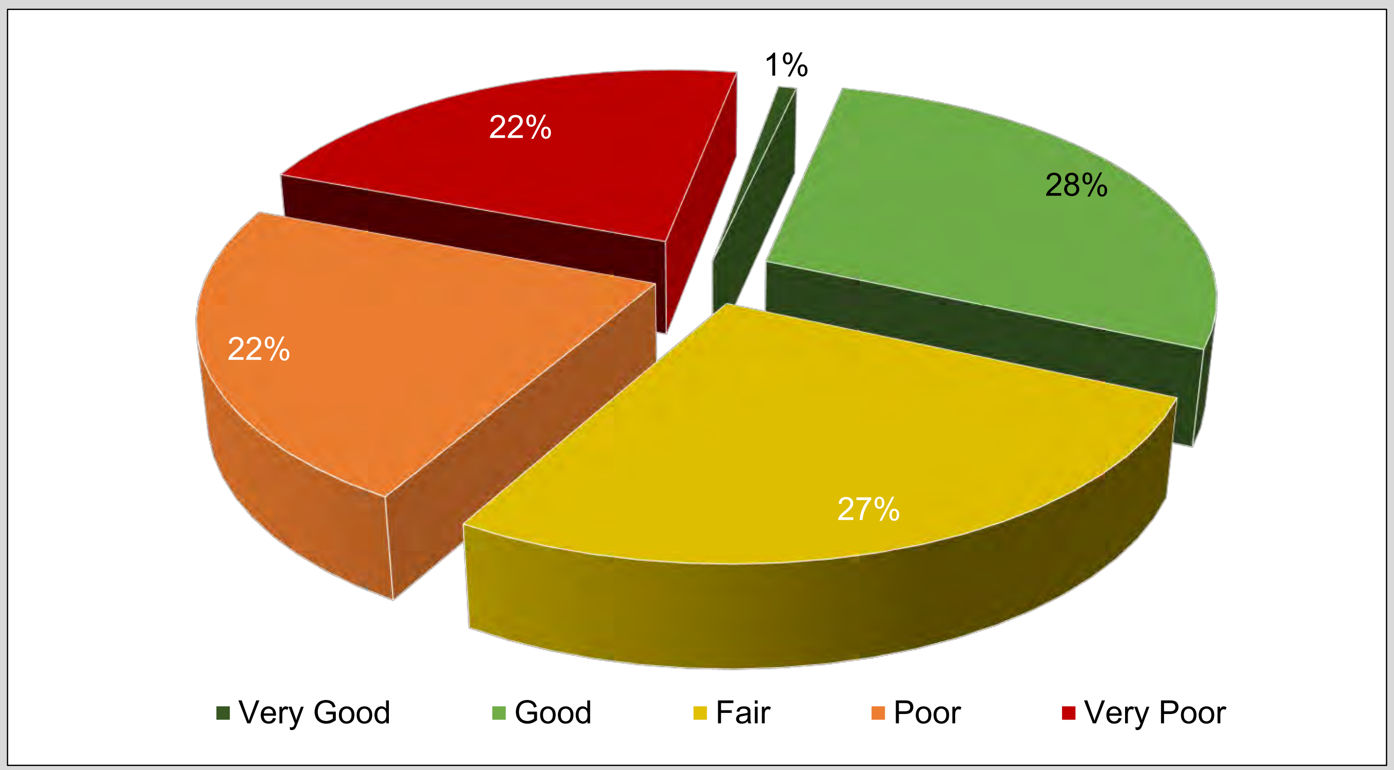


Figure 11.2 Asset Condition Summary (Recreation Services)

The Recreation Facilities have about 44% of their inventory in **Poor** to **Fair** condition, showing that the City is having some challenges to accommodate the current needs of its citizens. Generally speaking, this means that some Recreation Facilities reflect signs of wear and deterioration; however they operate reliably, meeting current and short to mid-term needs.

A significant portion of Aquatics facilities fall within the **Poor** to **Fair** condition categories. This result is driven by the existence of a number of older wading pools in **Poor** condition and a select number of outdoor community pools in **Poor** to **Fair** condition. There is a general trend towards replacing wading pools with splash pads. Indoor community pools and spray pads are noted as generally being in **Good** to **Very Good** condition. The condition of some aquatics building assets indicates short term investments are required.

Golf courses are generally maintained in **Good** to **Very Good** condition as required for playability. Golf buildings, including clubhouses and other on course facilities like washrooms, concessions and maintenance buildings, have less priority than the golf courses and are predominantly in **Fair** to **Very Poor** condition. The condition of some golf building assets indicates short term investments are required.

The allocation of recreation assets by replacement value is provided for context when assessing condition values of recreation assets in the following graph. For example, an asset may have a great amount of replacement value in **Very Good** or **Very Poor** condition, but in the context of the entire service it could represent a small amount of the replacement value. Figure 11.3 shows the recreation assets condition by asset type.

Kinsmen Recreation Centre – Granville St

Section 11: Recreation

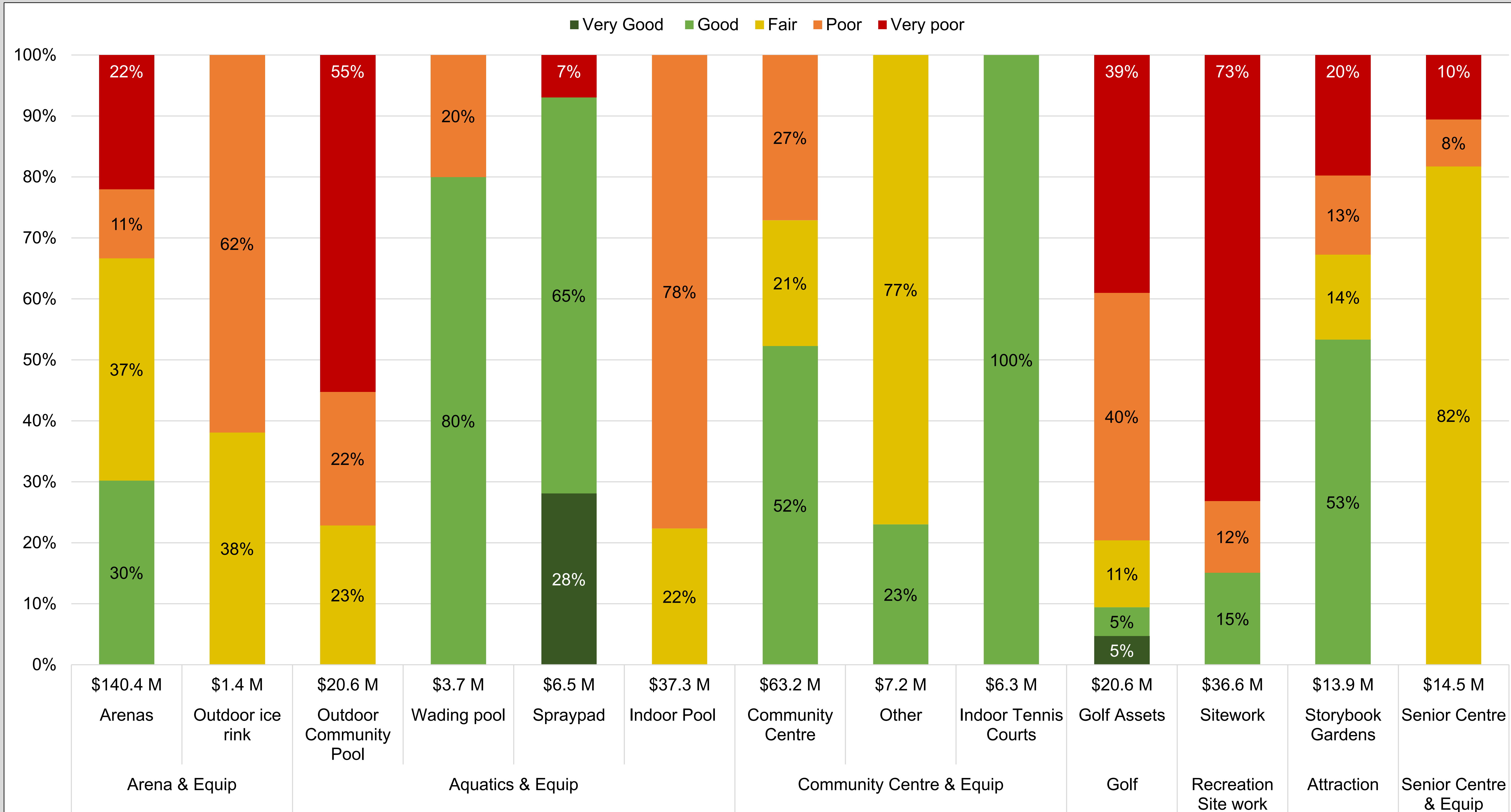


Figure 11.3 Asset Condition Detail (Recreation Services)

11.2 LEVELS OF SERVICE

Levels of Service performance measures are related to Corporate Values of Customer Service, Cost Efficiency, Accessibility/Legislative, Quality, Safety, and Environmental Stewardship/Sustainability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate services have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Tables 11.2 to 11.7. They are listed as Overall Recreation LOS metrics – for senior centres, golf, and other recreation assets (including arenas, aquatics, Storybook Gardens, and community centres). The asset types are grouped in this manner as a result of budgeting – golf and senior centres have capital budgets allocated to their asset types, while the other recreation asset types have a few capital budgets intended for the remaining services.

Canada Games Aquatic Centre

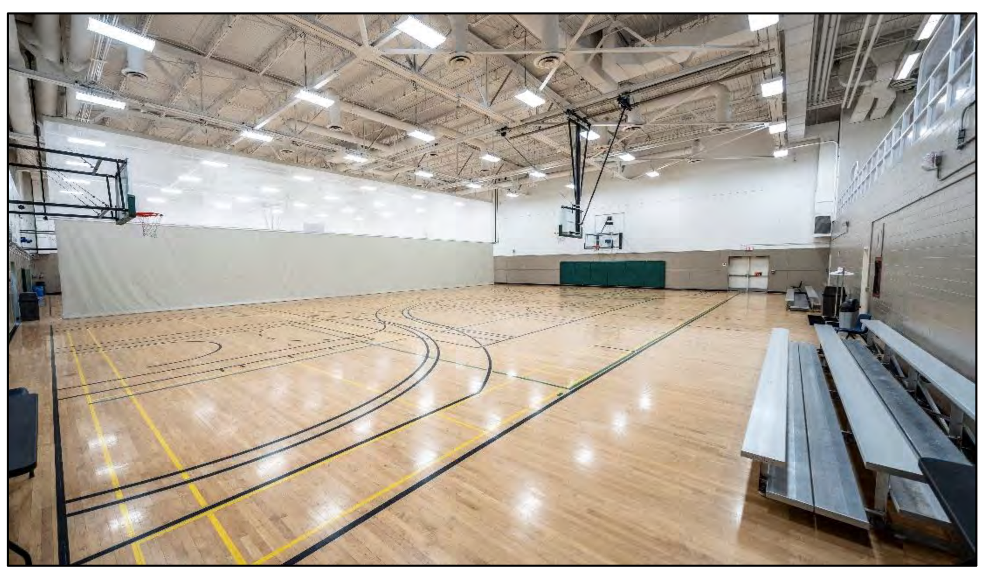
Byron Optimist Community Centre – Norman Ave

Section 11: Recreation

Table 11.2 Levels of Service Metrics – Recreation Service Assets
Golf, Senior Centres, and Other (Arenas, Aquatics, Storybook Gardens, and Community Centres)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing Recreation services (Arenas, Aquatics, Children's Services, Community Centres, Community Development and Funding, Community Rec and Leisure Program, Special Events Coordination, Sport services, and Storybook Gardens) in a cost efficient manner	Cost to provide Recreation Services ($/serviced households)	$413.88	No Change
	Providing Senior Centre services in a cost efficient manner	Cost to provide Senior Centre service ($/serviced households)	$6.04	No Change
	Providing Golf services in a cost efficient manner	Cost to provide Golf service ($/serviced households)	$20.61	No Change


Carling Heights Optimist Community Centre – Elizabeth St

South London Community Centre – Bradley Avenue


Boyle Community Centre – Charlotte Street

No Change | **Positive Upward** | **Positive Downward**

Section 11: Recreation

Table 11.2 (Continued) Levels of Service Metrics – Recreation Service Assets
Golf, Senior Centres, and Other (Arenas, Aquatics, Storybook Gardens, and Community Centres)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing Recreation services (Arenas, Aquatics, Children's Services, Community Centres, Community Development and Funding, Community Rec and Leisure Program, Special Events Coordination, Sport services, and Storybook Gardens) in a cost efficient manner	Operating budget for Recreation services (excluding Golf and Senior Centres)	$77,912,560	⇔
		Recreation Services Reinvestment Rate - (Arenas, Aquatics, Community Centres, and Storybook Gardens)	1.2%	↑
	Providing Senior Centre services in a cost efficient manner	Operating budget for Senior Centre services	$1,068,092	⇔
		Senior Centre Reinvestment Rate	1.1%	↑
	Providing Golf services in a cost efficient manner	Operating budget for Golf services	$3,645,703	⇔
		Golf Reinvestment Rate	1.0%	↑

⇔ **No Change** ↑ **Positive Upward** ⇩ **Positive Downward**

Table 11.3 Levels of Service Metrics – Aquatics (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

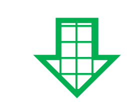
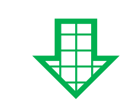
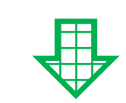
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of survey respondents satisfied with their Aquatics experience	92%	>90%
Cost Efficient	Providing Aquatics services in a cost efficient manner	Cost to provide Aquatics service ($/serviced households)	$21.51	
Accessibility	Providing adequate accessibility to Community Pool	% of occupied facilities that are accessibility compliant	100%	100%
Reliability/Availability	Providing reliable Aquatics services	Ensure Aquatics facilities are consistently open and available	99% availability (2 unplanned closures)	100%
Quality	Providing Aquatics facilities at the right design standard	% of Indoor Community Pools level of service quality rating system ranked fair to very good	100%	
		Average Indoor Community Pool level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	1.73	
		% of Outdoor Community Pools quality rating system ranked fair to very good	67%	
		Average Outdoor Community Pool level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.85	
		% of Spray Pad level of service quality rating system ranked fair to very good	100%	

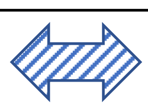
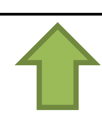
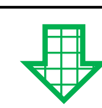
No Change **Positive Upward** **Positive Downward**

Section 11: Recreation

Table 11.3 (Continued) Levels of Service Metrics – Aquatics (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Quality	Providing Aquatics facilities at the right design standard	Average Spray Pad level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.36	
		% of Wading Pool level of service quality rating system ranked fair to very good	60%	
		Average Wading Pool level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.97	
Safety	Ensure Aquatics facilities that are safe for visitors	# of reported incidents requiring lifeguard intervention per 10,000 users	2.73	0
Environmental Stewardship/ Sustainability	Providing Aquatics facilities that are energy efficient and environmentally conscious	Annual electric energy consumption per square foot	12.223 KWH/sf	
		Annual natural gas consumption per square foot	1.443 m^3/sf	
		Annual water consumption per square foot	0.247 m^3/sf	

 **No Change**  **Positive Upward**  **Positive Downward**

Section 11: Recreation

Table 11.3 (Continued) Levels of Service Metrics – Aquatics (Recreation Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of survey respondents satisfied with their Aquatics experience	92%	>90%
Cost Efficient	Providing Aquatics services in a cost efficient manner	Operating budget for Aquatics services	$3,804,809	⇔
Accessibility	Providing adequate accessibility to Community Pool	% of Aquatics facilities that are FADS compliant	100%	100%
Reliability/Availability	Providing reliable Aquatics services	# of indoor aquatic centres per 100,000 population	1.03	>1
		# of outdoor aquatic centres per 100,000 population	3.10	>2
		# of unplanned closures/use restrictions per year	2	<5
Quality	Providing Aquatics facilities at the right design standard	% of Indoor Community Pool level of service quality level of poor to very poor	0%	⇔
		% of Outdoor Community Pool level of service quality level of poor to very poor	33%	⇩
		% of Spray Pad level of service quality level of poor to very poor	0%	⇔
		% of Wading pools level of service quality level of poor to very poor	40%	⇩

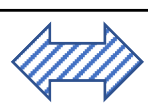
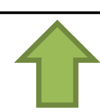
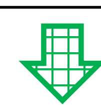
⇔ **No Change** ⇧ **Positive Upward** ⇩ **Positive Downward**

Table 11.3 (Continued) Levels of Service Metrics – Aquatics (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Safety	Ensure Aquatics facilities that are safe for visitors	% of indoor and outdoor pools with security cameras	46%	
		# of reported incidents requiring lifeguard intervention per 10,000 users	2.7	0
Environmental Stewardship/ Sustainability	Providing Aquatics facilities that are energy efficient and environmentally conscious	Annual electric energy consumption per square foot	12.223 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	1.443 m^3/sf	10% reduction by 2020 from 2014 baseline
		Annual water consumption per square foot	0.247 m^3/sf	10% reduction by 2020 from 2014 baseline

Canada Games Aquatic Centre – Wonderland Rd N

 **No Change**  **Positive Upward**  **Positive Downward**

South London Community Pool – Bradley Avenue

Section 11: Recreation

Table 11.4 Levels of Service Metrics – Arenas (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of survey respondents satisfied with Arenas	92%	>90%
Cost Efficient	Providing Arena services in a cost efficient manner	Cost to provide Arena service ($/serviced households)	$43.08	
Accessibility	Providing adequate accessibility to Arena	% of occupied facilities that are accessibility compliant	100%	100%
Reliability/Availability	Providing reliable Arena services	Ensuring Arena facilities are consistently open and available	100% availability	100%
Quality	Providing Arenas at the right design standard	% of Arenas level of service quality rating at fair to very good	100%	
		Average Arena level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.08	
		% of Outdoor Ice Pad level of service quality rating at fair to very good	100%	
		Average Arena level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	1.65	

No Change **Positive Upward** **Positive Downward**

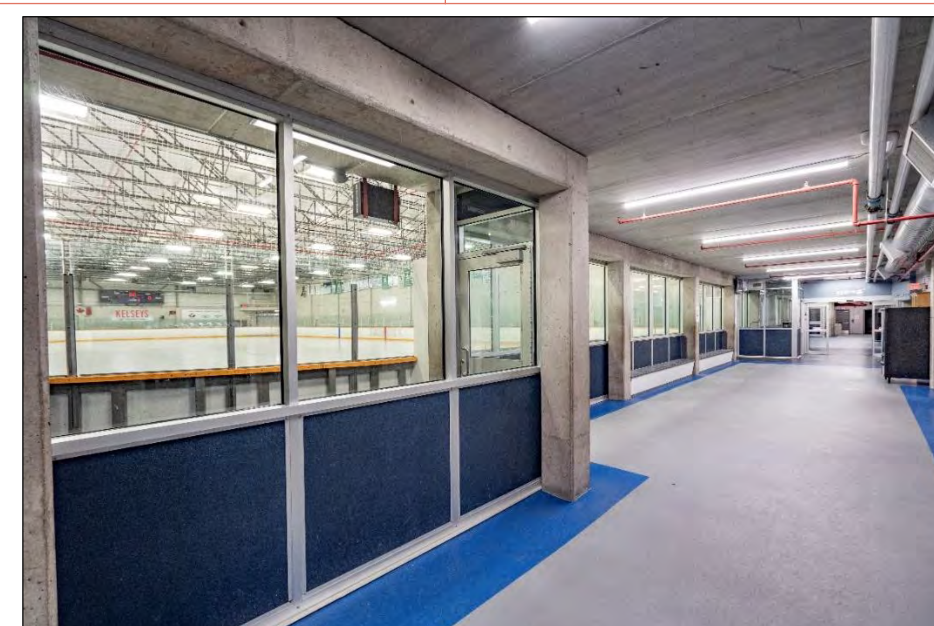
Section 11: Recreation

Table 11.4 (Continued) Levels of Service Metrics – Arenas (Recreation Services)

Performance Measure Customer / Council Focused 1 2 Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Safety	Ensuring Arena Centres that are safe for visitors	# of reported major incidents per 10,000 users	0	0
Environmental Stewardship/ Sustainability	Providing Arena Centres that are energy efficient and environmentally conscious	Annual electric energy consumption per square foot	18.522 KWH/sf	
		Annual natural gas consumption per square foot	1.542 m^3/sf	
		Annual water consumption per square foot	0.234 m^3/sf	

Lambeth Arena – Beattie St



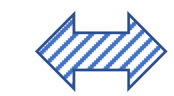
Carling Arena– Beattie St

No Change	**Positive Upward**	**Positive Downward**

Section 11: Recreation

Table 11.4 (Continued) Levels of Service Metrics – Arenas (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNCIAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of survey respondents satisfied with Arenas	92%	>90%
Cost Efficient	Providing Arena services in a cost efficient manner	Operating budget for Arena services	$7,619,621	
Accessibility	Providing adequate accessibility to Arena	% of Arena facilities that are FADS compliant	100%	100%
Reliability/Availability	Providing reliable Arena services	Number of Operational Outdoor Refrigerated Ice Rinks (with Municipal Influence) per 100,000 Population	0.77	0.50
		# of Operational Indoor Ice pads per 100,000 Population	5.68	> 5.5
		# of unplanned closures/use restrictions per year	1	0
Quality	Providing Arenas at the right design standard	Arena quality level poor to very poor	0%	0%
		Outdoor Ice Pad quality level poor to very poor	0%	0%

No Change **Positive Upward** **Positive Downward**

Section 11: Recreation

Table 11.4 (Continued) Levels of Service Metrics – Arenas (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNCIAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Safety	Ensure Arena Centres that are safe for visitors	% Arenas with security cameras	73%	100%
		# of reported major incidents per 10,000 users	0	0
Environmental Stewardship/ Sustainability	Providing Arena Centres that are energy efficient and environmentally conscious	Annual electric energy consumption per square foot	18.522 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	1.542 m^3/sf	10% reduction by 2020 from 2014 baseline
		Annual water consumption per square foot	0.234 m^3/sf	10% reduction by 2020 from 2014 baseline

No Change **Positive Upward** **Positive Downward**

Medway Arena Ice Pad – Sherwood Forest Square

Section 11: Recreation

Table 11.5 Levels of Service Metrics – Community/Senior Centres (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of visitors rating overall Community/Senior Centre experience as good or excellent	95%	Positive Upward
Cost Efficient	Providing Community/Senior Centre services in a cost efficient manner	Cost to provide Community Centre service ($/serviced households)	$14.17	No Change
		Cost to provide Senior Centre service ($/serviced households)	$6.04	No Change
Accessibility	Providing adequate accessibility to Community Centre	% of occupied facilities that are accessibility compliant	100%	100%
Reliability/Availability	Providing reliable Community Centre services	Ensure Community Centre facilities are consistently open and available	100%	100%
Legislative	Meet regulatory requirements	% of occupied facilities that are accessibility compliant	100%	100%

No Change | **Positive Upward** | **Positive Downward**

North London Optimist Community Centre Front Lobby – Cheapside Street

Table 11.5 (Continued) Levels of Service Metrics – Community/Senior Centres (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Quality	Providing Community/Senior Centre at the right design standard	Percentage of Community Centre level of service quality rating at fair to very good	100%	↔
		Average Community Centre level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.10	↑
		Percentage of Senior Centre level of service quality rating at fair to very good	100%	↔
		Average Senior Centre level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	1.99	↑
Safety	Ensure Community/Senior Centres that are safe for visitors	Number of reported major incidents per 10,000 users	0	0
Environmental Stewardship/ Sustainability	Providing Community/Senior Centres that are energy efficient and environmentally conscious	Annual electric energy consumption per square foot	7.136 KWH/sf	↓
		Annual natural gas consumption per square foot	0.780 m^3/sf	↓
		Annual water consumption per square foot	0.083 m^3/sf	↓

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 11: Recreation

Table 11.5 (Continued) Levels of Service Metrics – Community/Senior Centres (Recreation Services)

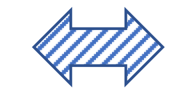
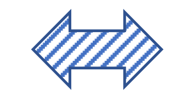
Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

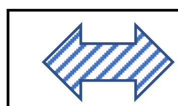
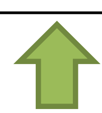
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of visitors rating overall Community/Senior Centre experience as good or excellent	95%	> 90%
Cost Efficient	Providing Community/Senior Centre services in a cost efficient manner	Operating budget for Community Centre services	$2,506,344	⇔
		Operating budget for Senior Centre services	$1,068,092	⇔
		Senior Centre Reinvestment Rate	1.1%	⇧
Accessibility	Providing adequate accessibility to Community Centre	% of Community & Senior Centre facilities that are FADS compliant	100%	100%
Reliability/Availability	Providing reliable Community Centre services	# of operational gyms per 100,000 population	2.6	> 2
		# of unplanned closures/use restrictions per year	0	0
Legislative	Meet regulatory requirements	% of Community & Senior Centres that are AODA Compliant	100%	100%

⇔ **No Change** ⇧ **Positive Upward** ⇩ **Positive Downward**

Table 11.5 (Continued) Levels of Service Metrics – Community/Senior Centres (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Quality	Providing Community/Senior Centre at the right design standard	Community Centre quality level poor to very poor	0%	
		Senior Centre quality level poor to very poor	0%	
Safety	Ensure Community/Senior Centres that are safe for visitors	% facilities with security cameras	100%	100%
		# of reported major incidents per 10,000 users	0	0
Environmental Stewardship/ Sustainability	Providing Community/Senior Centres that are energy efficient and environmentally conscious	Annual electric energy consumption per square foot	7.136 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	0.780 m^3/sf	10% reduction by 2020 from 2014 baseline
		Annual water consumption per square foot	0.083 m^3/sf	10% reduction by 2020 from 2014 baseline

 **No Change**  **Positive Upward**  **Positive Downward**

Section 11: Recreation

Table 11.6 Levels of Service Metrics – Golf (Recreation Services)

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Golf Customer Satisfaction (via survey)	% of Golf visitor survey respondents rating overall somewhat to very satisfied with experience	40%	>90%
Cost Efficient	Providing Golf services in a cost efficient manner	Cost to provide Golf service ($/serviced households)	$20.61	
Accessibility	Providing adequate accessibility to Golf	% of Golf amenities that are FADS compliant	100%	100%
Legislative	Meet Golf regulatory requirements	No infractions	Under Review	0
Reliability/Availability	Providing reliable Golf services	Ensure Golf facilities are consistently open and available (# of opening hours)	Under Review	

No Change **Positive Upward** **Positive Downward**

Table 11.6 (Continued) Levels of Service Metrics – Golf (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

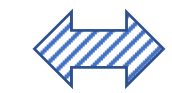
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Quality	Providing Golf at the right design standard	% of Golf course level of service quality rating at fair to very good	90%	
		Average Golf course level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.34	
		% of Golf Facility level of service quality rating at fair to very good	90%	
		Average Golf Facility level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.57	
Safety	Ensuring Golf facilities that are safe for visitors	% Golf courses with security cameras	100%	100%
Environmental Stewardship/ Sustainability	Providing Golf that is energy efficient and environmentally conscious	Minimize pesticide use	Under Review	
		Annual electric energy consumption per square foot	15.594 KWH/sf	
		Annual natural gas consumption per square foot	0.125 m^3/sf	
		Annual water consumption per square foot	0.053 m^3/sf	

No Change **Positive Upward** **Positive Downward**

Section 11: Recreation

Table 11.6 (Continued) Levels of Service Metrics – Golf (Recreation Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Golf Customer Satisfaction (via survey)	% of Golf visitor survey respondents rating overall somewhat to very satisfied with experience	40%	>90%
Cost Efficient	Providing Golf services in a cost efficient manner	Operating budget for Golf services	$3,645,703	
		Golf Reinvestment Rate	1.0%	
Accessibility	Providing adequate accessibility to Golf	% of Golf amenities that are FADS (or AODA) compliant	100%	100%
Legislative	Meet Golf regulatory requirements	% of Golf courses amenities that are AODA compliant where applicable	Under Review	Under Review
		# of infractions	Under Review	0
Reliability/Availability	Providing reliable Golf services	# of 18-hole equivalent operational golf courses per 100,000 population	1.30	>1
		# of unplanned Golf course closures/use restrictions per year excluding weather based disruptions	Under Review	Under Review

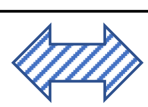
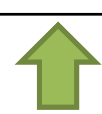
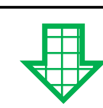
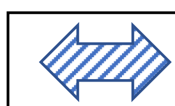
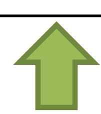
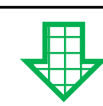
 **No Change**  **Positive Upward**  **Positive Downward**

Table 11.6 (Continued) Levels of Service Metrics – Golf (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

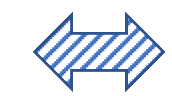
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Quality	Providing Golf at the right design standard	% of Golf course level of service quality rating at poor to very poor	90%	
		% of Golf Facility level of service quality rating at poor to very poor	10%	
Safety	Ensuring Golf facilities that are safe for visitors	% Golf courses with security cameras	100%	100%
Environmental Stewardship/ Sustainability	Providing Golf that is energy efficient and environmentally conscious	Annual electric energy consumption per square foot	15.594 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	0.125 m^3/sf	10% reduction by 2020 from 2014 baseline
		Annual water consumption per square foot	0.053 m^3/sf	10% reduction by 2020 from 2014 baseline

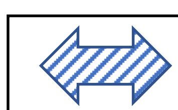
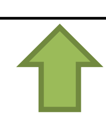
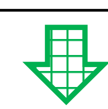
 **No Change**  **Positive Upward**  **Positive Downward**

Section 11: Recreation

Table 11.7 Levels of Service Metrics – Storybook Gardens (Recreation Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of Storybook Gardens visitor survey respondents rating overall satisfaction with experience as good or excellent	95%	>90%
Cost Efficient	Providing Storybook Gardens services in a cost efficient manner	Cost to provide Storybook Gardens service ($/serviced households)	$8.28	
Accessibility	Providing adequate accessibility to Storybook Gardens	% of Storybook Gardens amenities that are FADS compliant	64%	100%
		% of Storybook Gardens amenities accessibility compliant where applicable	70%	100%
Reliability/Availability	Providing reliable Storybook Gardens services	Ensure Storybook Gardens are consistently open and available	99% availability (2 unplanned closures)	100%
Quality	Providing Storybook Gardens at the right design standard	% of Storybook Gardens level of service quality rating at fair to very good	0%	
		Average Storybook Gardens level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	3.22	

 **No Change**  **Positive Upward**  **Positive Downward**

Section 11: Recreation

Table 11.7 (Continued) Levels of Service Metrics – Storybook Gardens (Recreation Services)

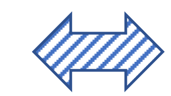
Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Safety	Ensuring Storybook Gardens that are safe for visitors	# of reported major incidents per 10,000 users	0.30	0
Environmental Stewardship/Sustainability	Providing Storybook Gardens that is energy efficient and environmentally conscious	Annual electric energy consumption per square foot	28.806 KWH/sf	
		Annual natural gas consumption per square foot	0.096 m^3/sf	
		Annual water consumption per square foot	0.686 m^3/sf	

No Change | Positive Upward | Positive Downward

Section 11: Recreation

Table 11.7 (Continued) Levels of Service Metrics – Storybook Gardens (Recreation Services)

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Customer Satisfaction (via survey)	% of Storybook Gardens visitor survey respondents rating overall satisfaction with experience as good or excellent	95%	>90%
Cost Efficient	Providing Community Storybook Gardens services in a cost efficient manner	Operating budget for Storybook Gardens services	$1,464,523	
Accessibility	Providing adequate accessibility to Storybook Gardens	% of Storybook Gardens amenities that are FADS compliant	64%	100%
		% of Storybook Gardens amenities that are AODA compliant where applicable	70%	100%
Reliability/Availability	Providing reliable Storybook Gardens services	# of unplanned amenity closures/use restrictions per year excluding weather based disruptions	<10	0
Quality	Providing Storybook Gardens at the right design standard	% Storybook Gardens level of service quality rating poor to very poor	100%	

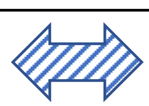
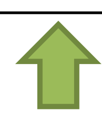
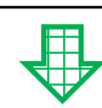
 **No Change**  **Positive Upward**  **Positive Downward**

Table 11.7 (Continued) Levels of Service Metrics – Storybook Gardens (Recreation Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Safety	Ensuring Storybook Gardens that are safe for visitors	% Storybook Gardens with security cameras	100%	100%
		# of reported major incidents per 10,000 users	0.30	0
Environmental Stewardship/Sustainability	Providing Storybook Gardens that is energy efficient and environmentally conscious	Annual electric energy consumption per square foot	28.806 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	0.096 m^3/sf	10% reduction by 2020 from 2014 baseline
		Annual water consumption per square foot	0.686 m^3/sf	10% reduction by 2020 from 2014 baseline

No Change | Positive Upward | Positive Downward

11.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

11.3.1 Lifecycle Activities

Table 11.8 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Recreation assets:

Table 11.8 Current Asset Management Practices or Planned Actions (Recreation Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Recreation buildings are maintained and renewed through the Facilities group and their use of VFA, which combined with comprehensive condition assessments and facilities experience, determines the lifecycle management needs of a facility. Recreation provides input to Facilities to ensure the appropriate level of service is met for supporting London's resident recreation programming and community gathering. • The lifecycle management needs includes the direct care of the building envelope, mechanical and electrical systems, etc. • Equipment - Equipment is monitored, inspected by Facilities and problems are addressed when triggered by staff observations and public feedback. • Recreation asset management decisions are made using criteria from the Planning Act, policy, the Official Plan, bylaws, ORFA, CPRA, PRO and are guided by design standards and Master Plans.	• Refer to Appendix B.

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Table 11.8 (Continued) Current Asset Management Practices or Planned Actions (Recreation Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• A work order system and online interface exists for Recreation City employees to generate requests of Facilities. • A program to maintain equipment is in place. Equipment is monitored and inspected regularly and problems addressed when triggered by staff observations and public feedback.	• Completing planned maintenance activities while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure. • Not Enough resources available to complete a series of unplanned, urgent work requests that are submitted in close succession. • Customer expectations for Recreation assets are higher than other assets.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• Corporate facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (split into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), the cost and timing of replacement requirements. • Equipment rehabilitation is not performed in a systematic format and available for only certain assets (Arena scoreboards for example).	• Refer to Appendix B.
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• Recreation facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (split into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), the cost and timing of replacement requirements.	• Cost over-runs during large, complex design and construction projects.

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Table 11.8 (Continued) Current Asset Management Practices or Planned Actions (Recreation Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• Appropriate and proper disposal occurs when assets are replaced or renewed.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• Consultation with public and users of Recreation Facilities, and in conjunction with Facilities service would determine service improvement needs.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Consultation with public and users of recreation facilities would determine growth needs. • Capital growth projects and analysis in conjunction with Development Charge service (where applicable with regulatory and municipal policy), or as a part of Assessment Growth Policy (where applicable with Municipal Policy).	• Incorrect growth assessments may result in overabundance of Recreation assets in a particular area and insufficient assets in another.

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The cost of these identified Lifecycle activities is summarized in Table 11.9. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years.

Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Table 11.9 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets (Recreation)

Asset Type	Budget Type	Asset Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Recreation Assets	Operating Budget*	Recreation (other than Senior Centres and Golf operating budget)	$66,393
		Senior Centres	$1,056
		Golf Assets	$3,622
		Total	**$71,071**
	Lifecycle Capital Budget	Recreation (other than Senior Centres and Golf operating budget)	$3,998
		Senior Centres	$163
		Golf Assets	$200
		Total	**$4,361**
	Service Improvement Budget	Total	**$510**

*(Non-Infrastructure , Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

The draft DC Background Study has identified $9.1 million total related to funding for Recreation Development Charges Studies. The asset management plan relies on draft amounts as it has been completed prior to the finalization of the draft DC Background Study.

Of the growth needs identified in 2018-2027 time horizon, approximately 68% relate to multipurpose recreation centres. Approximately 29% related to neighbourhood community centres, with the remainder related to spray pads and to future studies. It is assumed that the parks and recreation studies are split equally between parks and recreation.

Table 11.10 Expected Growth Budgets (Capital and Significant Operating Costs) (Recreation)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 Year Period)
Recreation Assets	Growth Capital Budget and Significant Operating Costs	Growth Capital	$9,131
		Significant Operating Costs	$1,817
		Total	**$10,948**

Springbank Gardens Community Centre - Wonderland Rd S

11.3.3 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in Poor or Very Poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is insufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a Poor or Very Poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 11.4 presents the expected Recreation assets condition profile for the next 20 years based on the current budget. As seen, the percentages of good condition assets are decreasing and the percentage of the poor and very poor assets are increasing.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the LOS metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. Figure 11.5 presents the expected Recreation assets condition profile for the next 20 years based on the optimum budget. As seen, an increased budget will eliminate the very poor condition assets and sustain an overall fair condition assets profile.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual optimal expenditure to maintain the current condition profile.

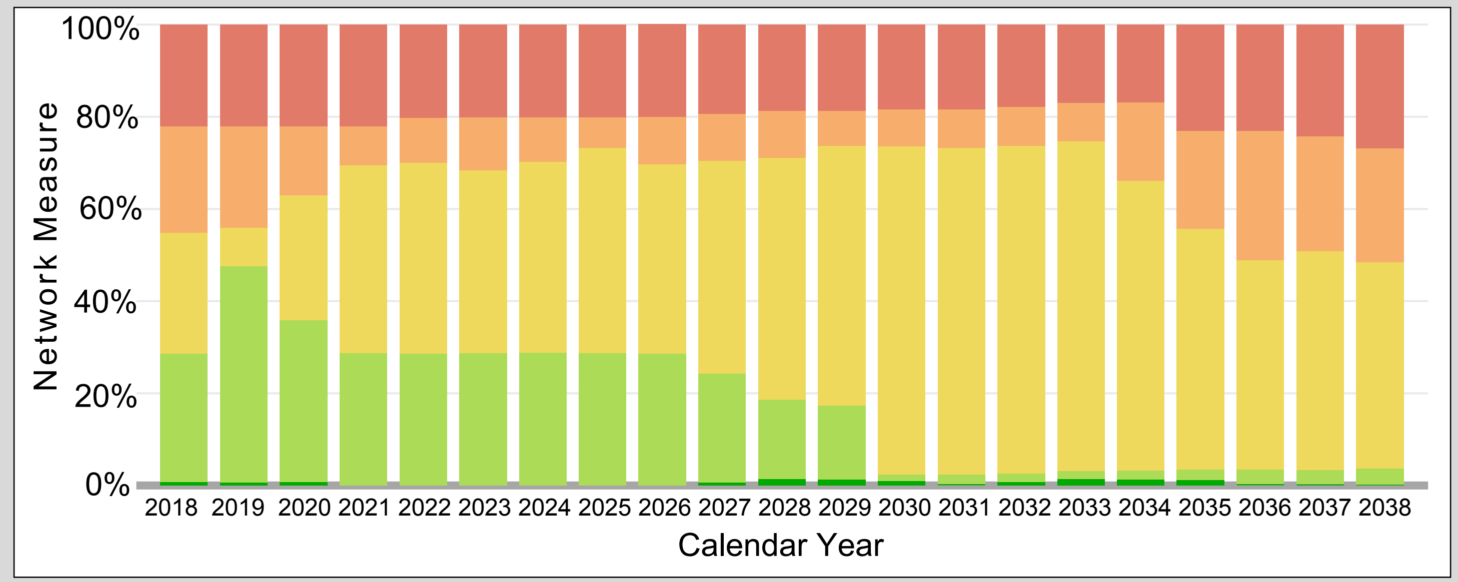

Figure 11.4 Projected 20-year Current Budget Condition Profile (Recreation Services)

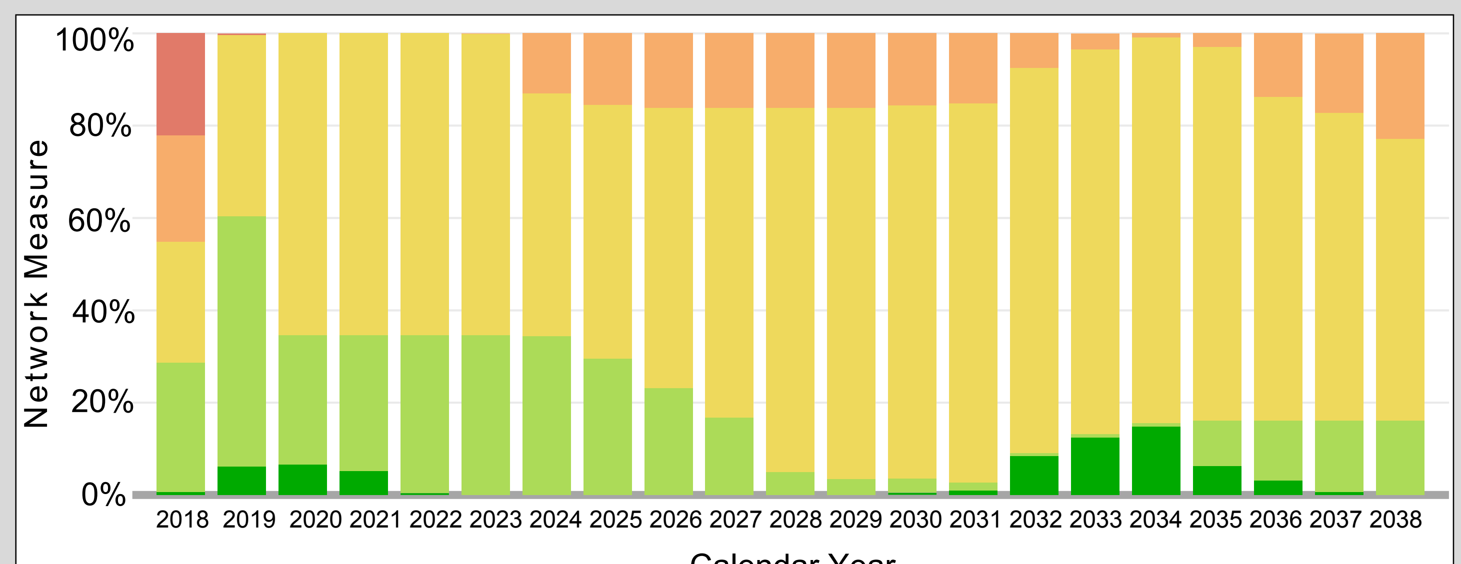

Figure 11.5 Projected 20-year Optimal Budget Condition Profile (Recreation Services)

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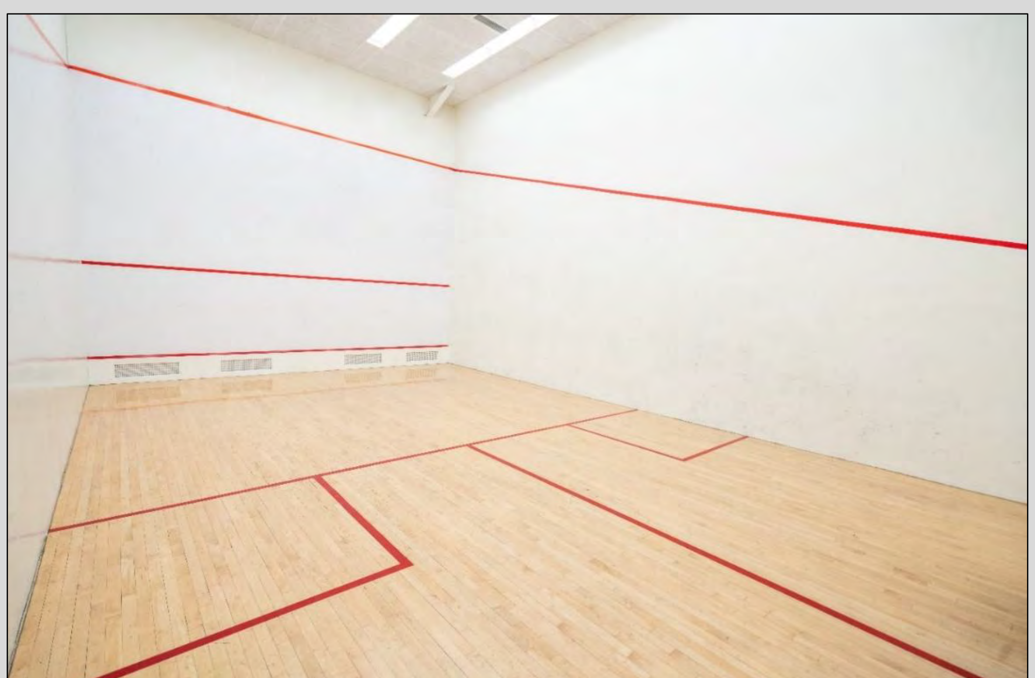
11.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 11.11 and illustrated in Figure 11.6. The analysis documented below is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as it is inherent with asset renewal/rehab/replacement activities.

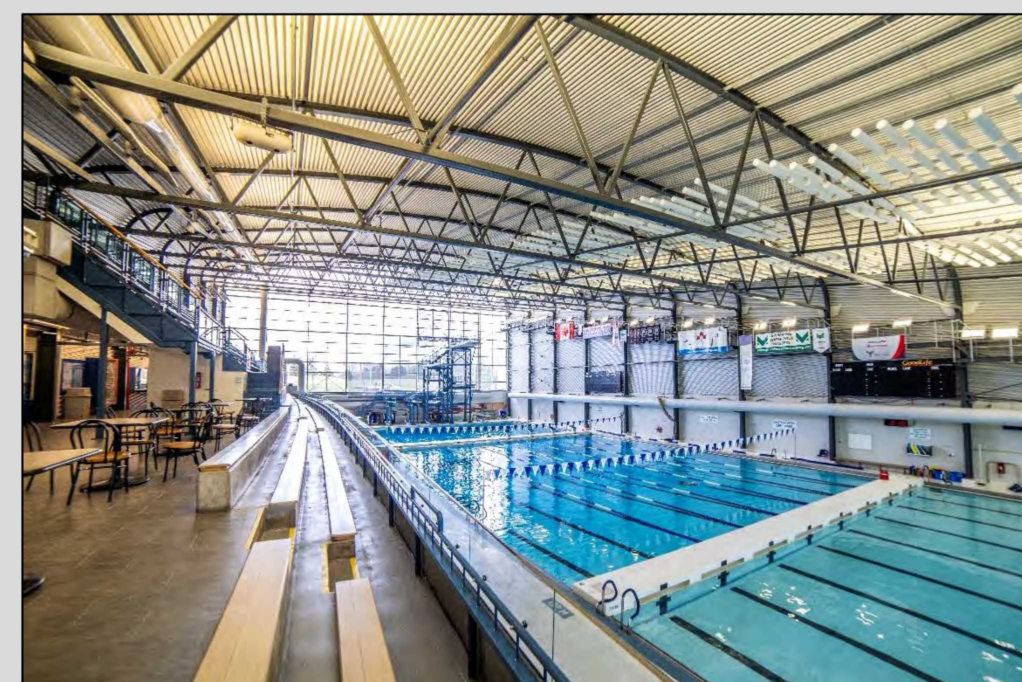
Current funding for capital budgets presented is the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Table 11.11 Current and Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Recreation Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's) (Average Annual)	Funding Gap (000's) (Average Annual)
Recreation Services Assets	Lifecycle Capital Budget	Recreation (other than Senior Centres and Golf)	$3,998	$14,201	$426	$9,777
		Senior Centres	$163	$430	$11	$256
		Golf	$200	$842	$27	$615
		Total	**$4,361**	**$15,473**	**$464**	**$10,648**



North London Optimist Community Centre Squash Court – Cheapside St



Canada Games Aquatic Centre – Wonderland Road North

Section 11: Recreation

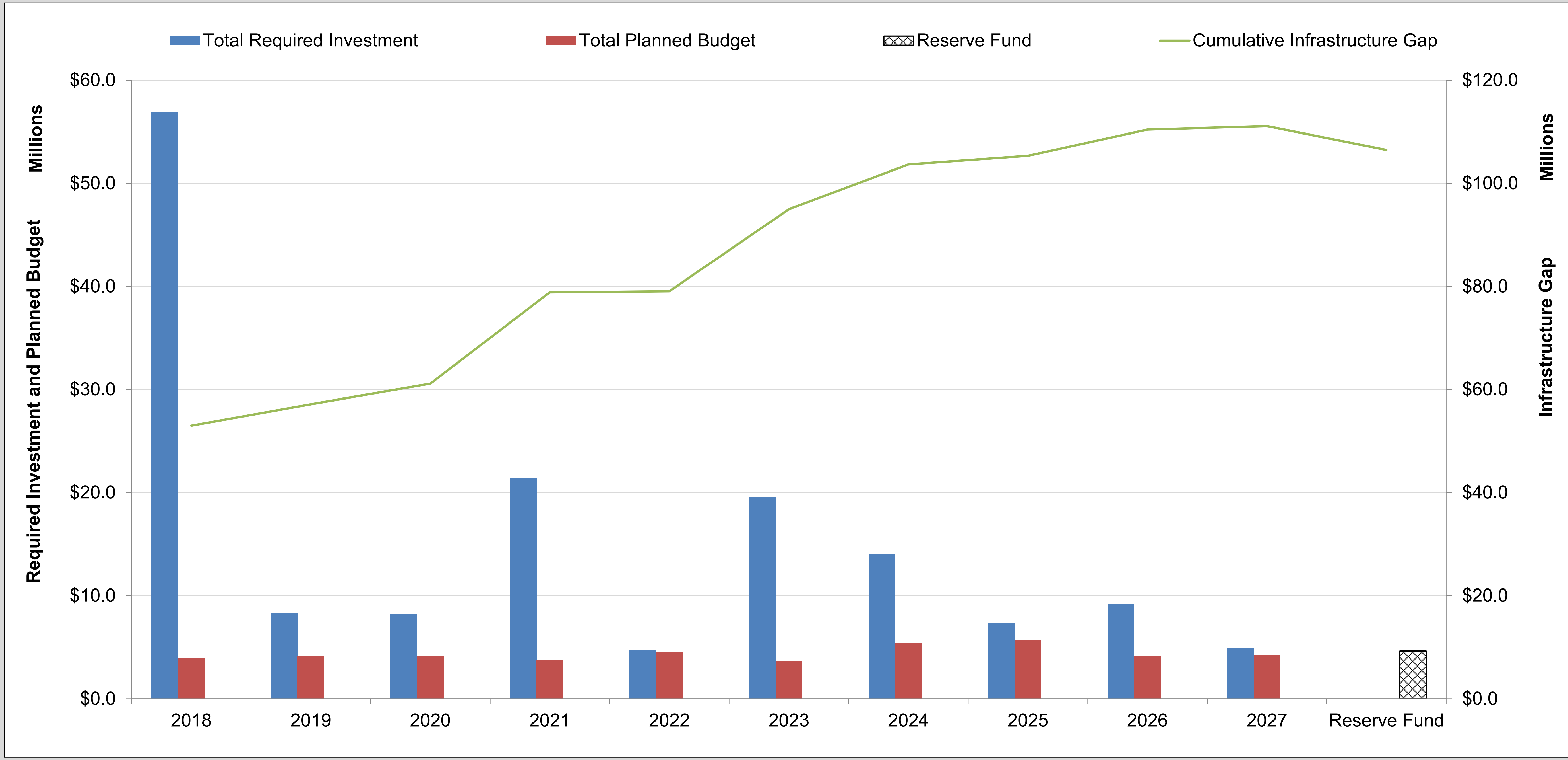


Figure 11.6 Forecasted Infrastructure Gap (Recreation Services)

The cumulative infrastructure gap for recreation assets (arenas, aquatics, community centres, senior centres, golf, etc.) would grow to more than $106.48 million over the next decade. Trends presented are primarily driven by the arenas aquatics, attractions, and community centre renewals, which accounts for roughly 90% of this deficit.

Base needs represent the costs to renew and maintain the serviceability of existing assets, and do not account for growth and the expansion of service to new areas.

Section 11: Recreation

11.5 DISCUSSION

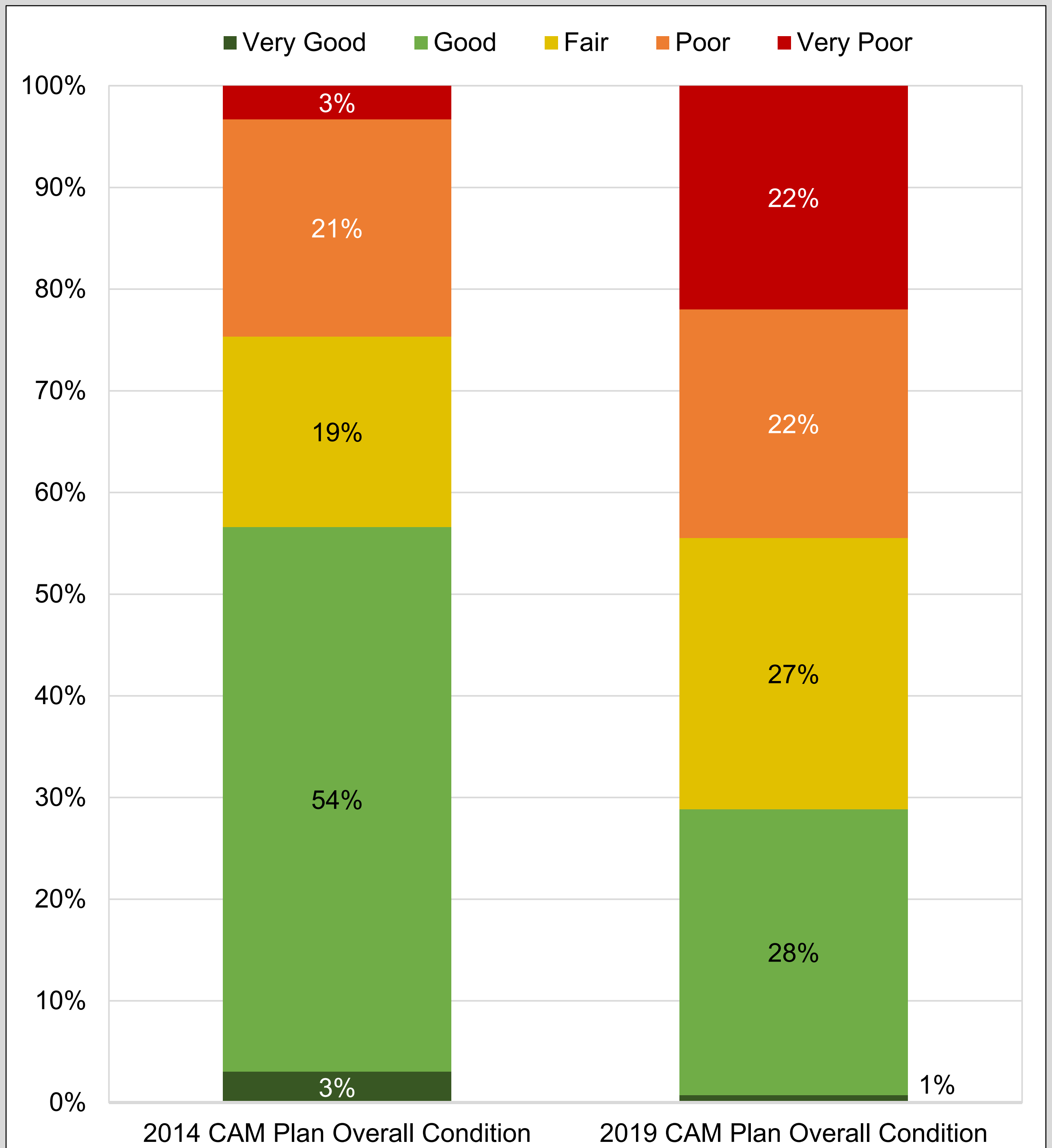


Figure 11.7 2014 CAM Plan to 2019 CAM Plan Condition Summary (Recreation Services)

CURRENT AND FUTURE CHALLENGES

The recreation assets replacement value indicated in the 2014 Asset Management Plan was $246.8 million, the replacement value increased to $372.2 million due to inflation and constructing new assets, in addition to the recent increase in the construction cost in the region. The 2014 - 2019 CAM Plan Recreation assets condition comparison is provided in Figure 11.7. In the 2014 CAM Plan, the assets were anticipated to deteriorate due to the limited funding; this can be seen in the 2019 CAM Plan condition profile. The cumulative 10 year forecasted infrastructure gap from the 2014 CAM Plan was $7.31 million. Following the 2014 CAM Plan, Facilities service conducted a detailed condition assessment program for all recreation buildings which defined a clear picture of the required needs for all recreations facilities. The current cumulative 10 year forecasted infrastructure gap is $106.48 million.

Thames Park Pool Facility – Ridout St S

11.6 CONCLUSIONS

Valued at nearly $372.28 Million, the City’s Recreation assets are overall in **Fair** condition, indicating that sufficient investments are necessary to maintain the assets at the required level of service. Maintaining current investment will result in a $106.48 million infrastructure gap. This could result in degradation of the service delivered to citizens. Further investment is needed to address the future lifecycle needs of the current Recreation assets. Figure 11.8 illustrates the infrastructure gap as a proportion of the required investment over the next decade, showing the distribution of the different types of assets contributing the gap. Table 11.12 presents the summary of the state of infrastructure, infrastructure gap, and reinvestment rates for recreation assets.

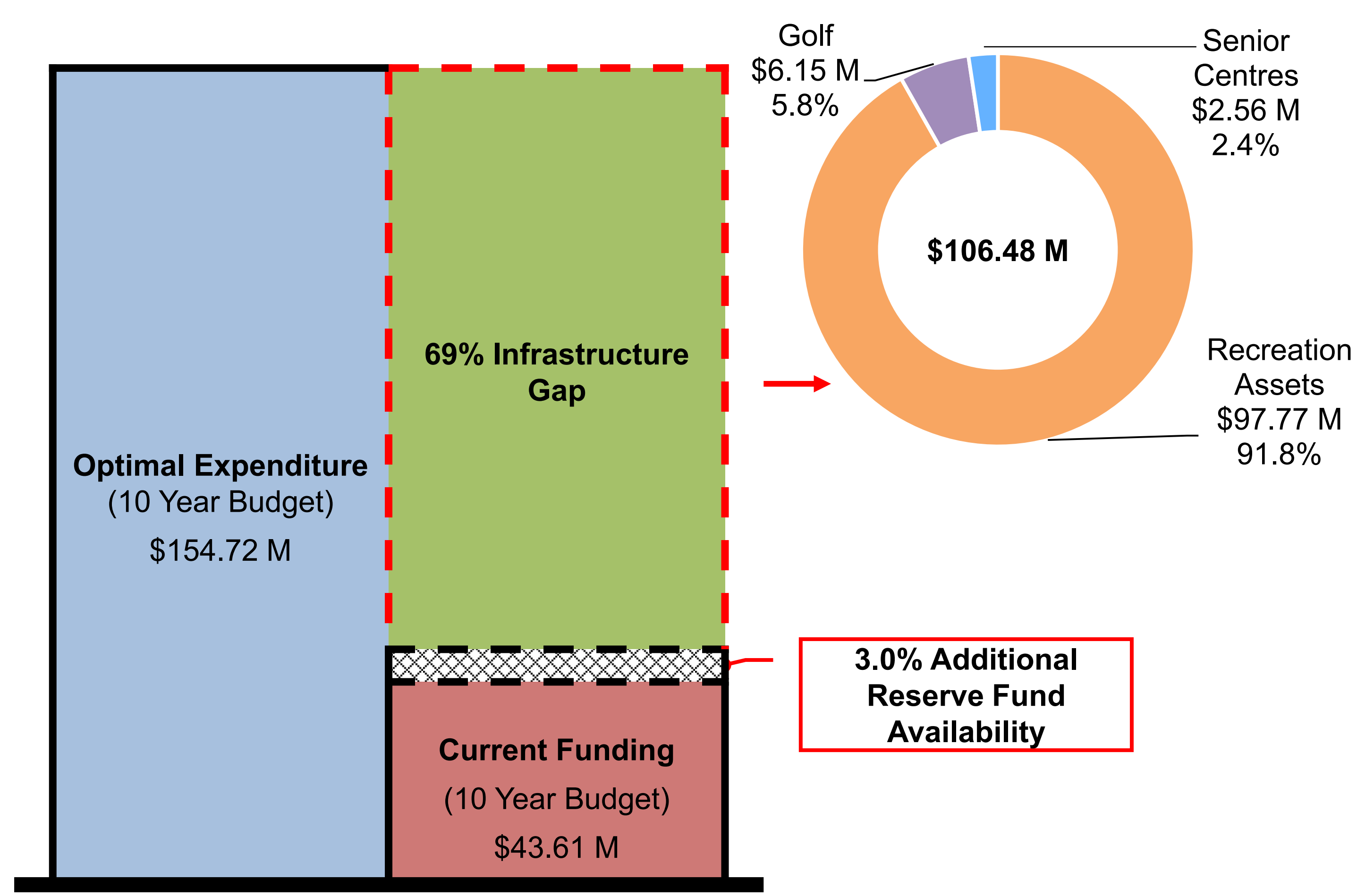


Figure 11.8 Cumulative 10 Year Infrastructure Gap Visual (Recreation Services)

*We note the infrastructure gap is proportionally allocated based on needs of each Asset Type.

Kiwanis Senior Centre - Riverside Drive

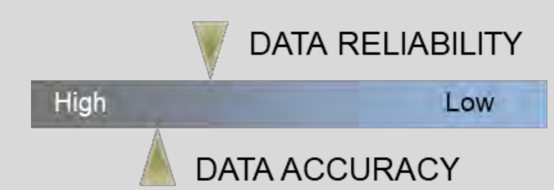
Section 11: Recreation

Table 11.12 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Recreation Services)

City of London - Recreation Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Recreation assets	$337.2		$49.13	$97.99	1.2%	1.7% to 2.5% *
Golf assets	$20.58		$2.81	$6.15	1.0%	1.7% to 2.5% *
Senior Centers	$14.51		$1.03	$2.56	1.1%	1.7% to 2.5% *
Overall Recreation	**$372.3**		**$52.98**	**$106.48****	**1.2%**	**1.7% to 2.5% ***

* Canadian Report Card Recommended Annual Reinvestment Rate.
** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Section 12: Urban Forestry

Quick Facts
Approximately 1.5 Million Woodland Trees
Approximately 172,000 Street Trees and Manicured Parks Trees

Replacement Value	$402.1 Million
Condition	Good
10 Year Gap	$22.92 Million
City-Wide Infrastructure Gap Contribution	4.0%

4.0% City-Wide Infrastructure Gap Contribution

Section 12: Urban Forestry

12.1 STATE OF LOCAL INFRASTRUCTURE

The City of London takes pride in being known as "The Forest City." Our urban forest is recognized both as an asset and a vital component of our green infrastructure, natural heritage system and our quality of life. Unlike our other assets, trees are living and increase in value with age for most of their lifecycle. The condition of a tree relates primarily to its health unlike other assets which focus on age and 'wear and tear.' Our urban forest is at risk from insect, disease, weather damage and development pressures. In the past, there has been a reactive approach to managing these issues. The development of proactive and timely asset management practices is critical to sustain a healthy urban forest.

Kiwanis Park – Central South (Large Woodland)

12.1.1 Asset Inventory and Valuation

The current value of the urban forest owned by the City is approximately $402 Million. The inventory does not include privately owned trees. It also does not include trees outside Urban Growth Boundary (UGB) as it is not tracked within City databases. Trees associated with other service areas (Long Term Care, Fire) and rural roads are also not being quantified by Forestry Operations. Management and operation of the City's urban forest is under the expert care and custody of the Urban Forestry section of the Planning Division with operational aspects of management shared with the Forestry Operations section of Environmental and Engineering Services.

The Urban Forestry inventory is divided into three categories of trees:

i. **Street trees**: include street trees within road allowance;

ii. **Manicured park trees**: include trees in manicured portions of parks;

iii. **Woodlands Trees:** include trees in woodlands or wooded portions of parks.

Table 12.1 Asset Inventory and Valuation (Urban Forestry Services)

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
Street trees	Street trees within road allowance	134,819	Ea.	$321,094
Manicured park trees	Trees in manicured portions of parks (1566 hectares)	37,055	Ea.	
Woodlands Trees	Trees in woodlands or wooded portions of parks (1203 hectares)	1,494,495	Ea.	$81,020
Total				**$402,114**

Trees in woodlands have estimated inventory based on 1,242 trees/hectare. This factor was adopted from a 2008 UFORE (Urban Forest Effects) analysis which studied total tree species across London whether private or public. Internal opinion assessed this metric is still representative for 2019 CAM Plan inventory amounts.

The woodlands replacement cost is approximately $67,300/hectare, which is a method that factors in costs for planning, preparation, modest soil restoration, plant propagation, and planting.

Section 12: Urban Forestry

12.1.1 Asset Inventory and Valuation (Continued)

An initial inventory of urban road allowance trees as well as those found in portions of manicured parks was completed in 2002. Updates to the early inventory with the updated data are reflected in this report. Further work is needed to improve the integrity of this continually changing inventory. Reporting capability for various inventory attributes are being improved. Inventory data will start collection late April 2019 and expected to be completed on streets by September 2019. A second phase will assess Parks tree inventory. It is expected to provide an accurate tree population and condition rating.

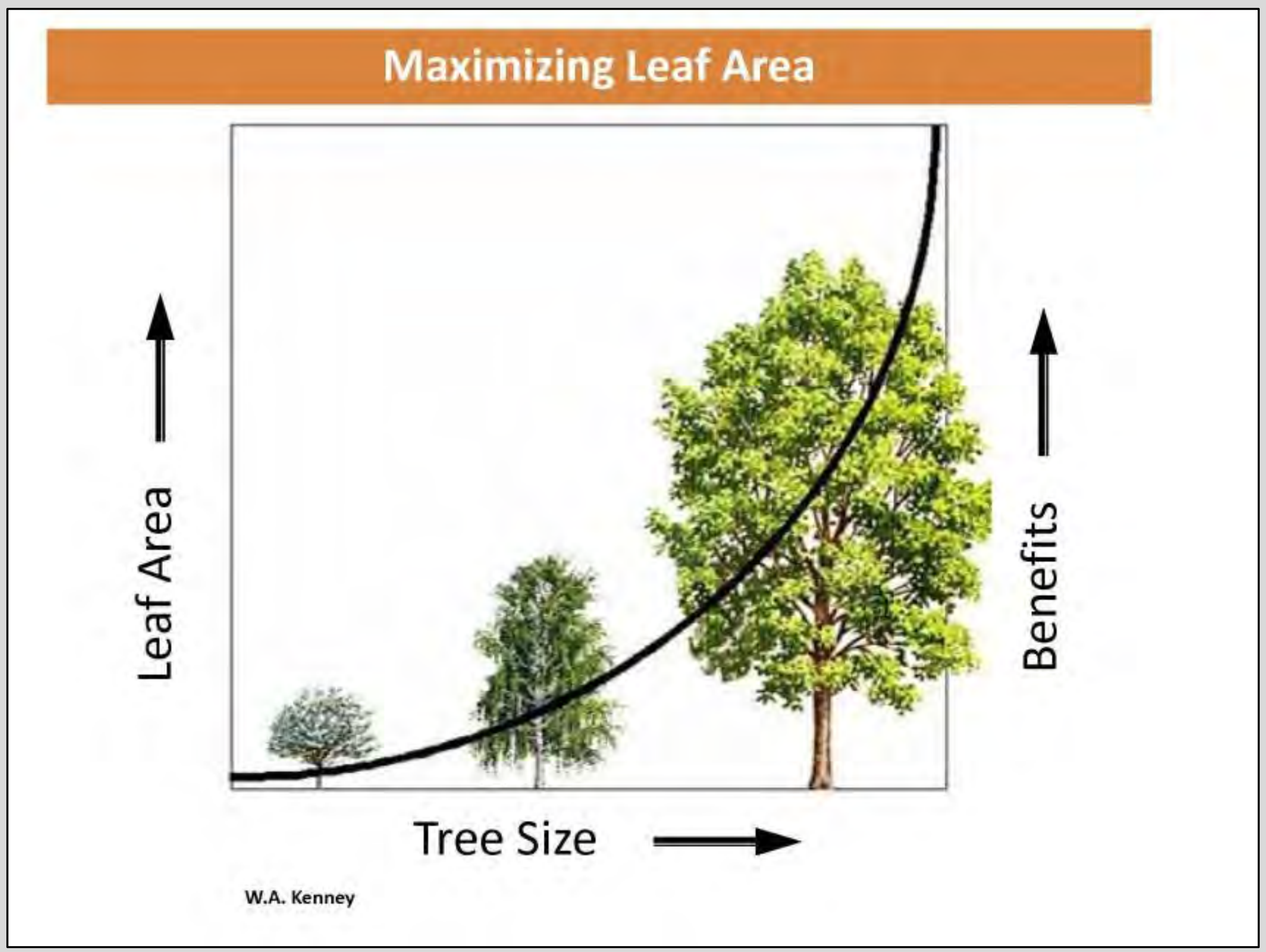


Figure 12.1 Incremental Benefit of Mature Trees

Replacement values for trees are treated differently than for typical City assets simply because trees grow. The environmental and other benefits of trees increase exponentially with size, age and health. This relationship is shown in the diagram below modified from the UFORE analysis. A tree that is 50 centimetres in diameter provides more than twice as many environmental benefits (such as amount of pollution removed from the air, amount of oxygen released into the air, etc.) than a tree 25 centimetres in diameter. Since it is not feasible to replace a tree 100 centimetres in diameter with another tree 100 centimetres in diameter the City recommendation for the replacement of trees is to plant an equivalent diameter of trunk compared to the tree that had to be removed. When the recommendation is followed, the net impact is more trees planted than removed which with time could increase the inventory provided the City complies with the recommendation. Current practices do not replace all tree losses. An Urban Forest Strategy and implementation plan has been developed which will set tree cover canopy targets and which will govern the management of trees and wooded areas for the next 20 years.

12.1.2 Age Summary

There are a variety of tree species that are planted and maintained each with differing lifespans. Pest damage, climate, weather condition, and infrastructure renewal of annual road replacement and resulting trees are contributing factors of the health of the tree canopy. Therefore, assigning expected lifespans for forestry assets is not easily achieved. It is assumed that trees and horticultural features will be replaced in coordination with associated road or park assets, although there are some assets which are independent of roads, parks, and open spaces.

Trees can attain ages greater than 100 years (e.g. silver maples in Old North, or in woodlands) if they are the right tree for the right place, if their condition is monitored regularly, if they are maintained proactively and protected from development or other activities. Many can attain sizes greater than a metre in diameter and reach heights greater than 20 metres. Over the course of their lives, individual trees can produce tens of thousands of dollars of benefits to the community. When it comes to environmental and social benefits, tree size does matter as the benefits and value increase with the age, size and health of the trees.

Woodlands/Parklands trees are expected to live to 100 years. Street tree life can vary depending on when road renewal work is completed, but a 25 lifecycle is the average expectation. Manicured park trees are expected to live for approximately 40 years.

Section 12: Urban Forestry

Age information can be implied from diameter at breast height (DBH) estimates. Trees over 100 cm DBH are considered mature. However, there are confounding factors of trees grown in an urban environment do not have ideal growing conditions. Reliance on the growth factors without adjusting for harsher environment could lead to tree age being considered younger than actual age. A growth factor adjustment is required to increase reliability of age calculations. Data is not readily available to quantify Street Trees and Manicured Park Trees age.

UFORE 2008 study indicates that 66% of Woodland trees were considered young, 25% were mid-age and less than 10% were considered older or mature in age. This suggests that Woodland trees age approximates 38 years.

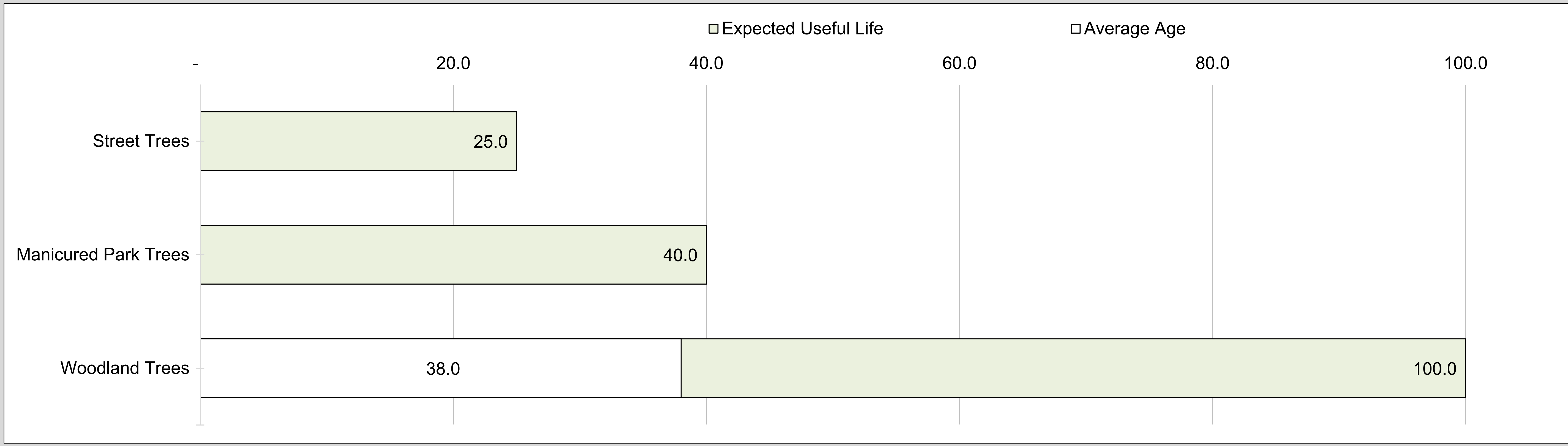


Figure 12.2 Average Assets Age as a Proportion of Average Useful Life (Urban Forestry Services)

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12.1.3 Asset Condition

The condition ratings for street trees and manicured portions of parks trees are derived from the 2002 tree inventory which is maintained in the City's geomatics (GIS) databases, in which some updates have occurred. The condition ratings for trees in woodlands and wooded portions of parks are derived from a quality rating system methodology that Urban Forestry prepared with assistance from Corporate Asset Management. In general the total number and condition of the trees is decreasing with respect to the older trees and some species such as ash which are being devastated by Emerald Ash Borer. Removal of larger trees from boulevards is often due to ongoing replacement of aging infrastructure, increased urban intensification and development pressure, poor historical maintenance practices and environmental factors such as storms and old age. Manicured park trees are often impacted by the level of use and management practices while woodland trees are impacted more by environmental factors such as invasive species, disease and adjacent development. Ash species make up 10% of all the trees in London and often represent the most numerous trees in woodlands. The full impact of Emerald Ash Borer has yet to be realized and may significantly impact the condition assessment and gap identified in this report section.

The Urban Forestry service area has approximately 87% of assets in **Fair**, to **Very Good** condition. The remainder is either deceased or nearing being deceased, indicating a need for investment in the short to medium term. The City's Urban Forestry assets are overall in fair to good condition, indicating that they are meeting current needs but there is increased likelihood of tree mortality.

Trees that die or are removed in woodlands are often not replanted allowing invasive species such as buckthorn to take up the space. The current failure to replant will result in a future forest with less tree canopy cover due to fewer and smaller trees. The number of trees in boulevards and on private property is also being reduced as development occurs. New lots typically have smaller dimensions with little topsoil to replace the historical number of trees and ultimate size at maturity.

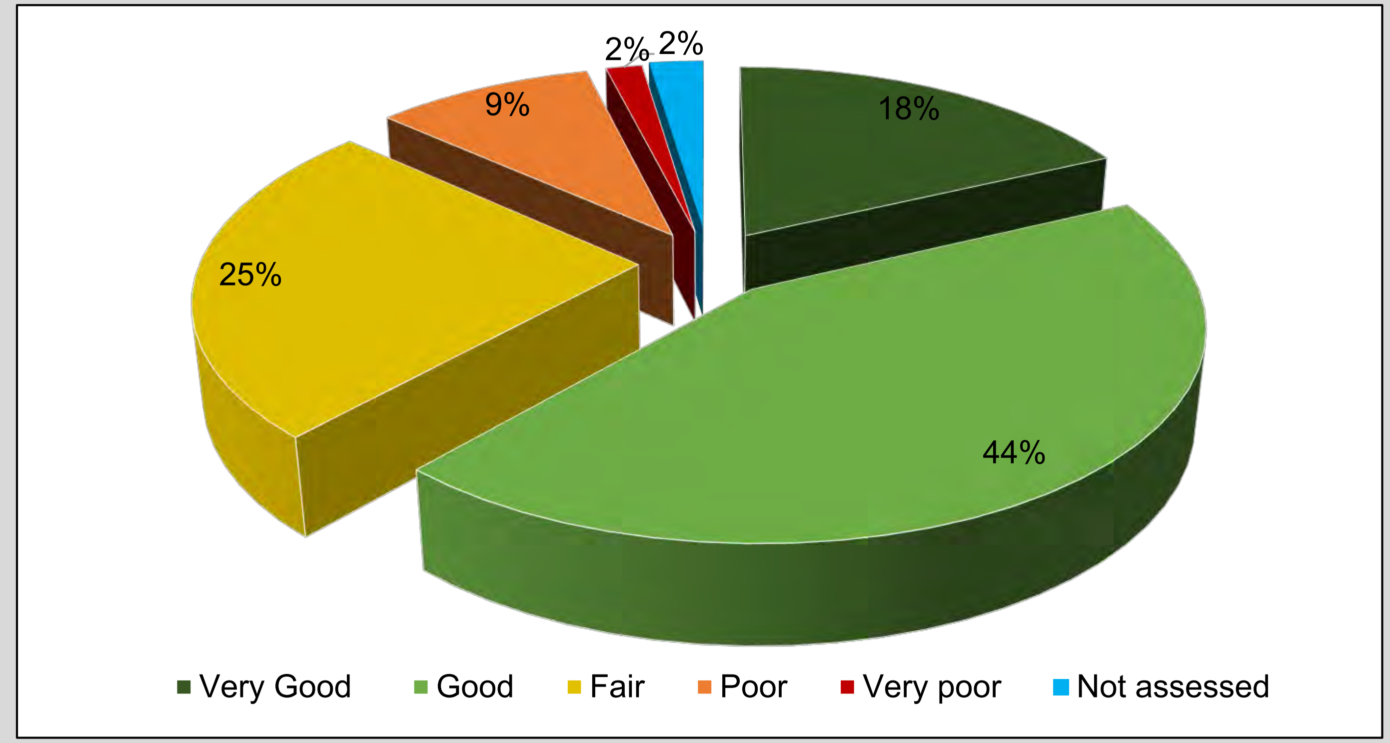

Figure 12.3 Asset Condition Summary (Urban Forestry Services)

Urban trees within the road allowance are watered in their first year and optimally trimmed on average every 10 years with younger and older trees trimmed more often. However, recent changes have resulted in trim cycles being mandated at 5 year trim cycles. Boulevard trees are currently on an average 12 year cycle. Management of Emerald Ash Borer has increased this cycle length. The remaining inventory of trees is not on a planned trimming cycle but is reactive to staff observations of potential hazards and comments or complaints from the public. There are currently no other routine programs for pests, insects, diseases or other maintenance activities, such as watering or fertilizing.

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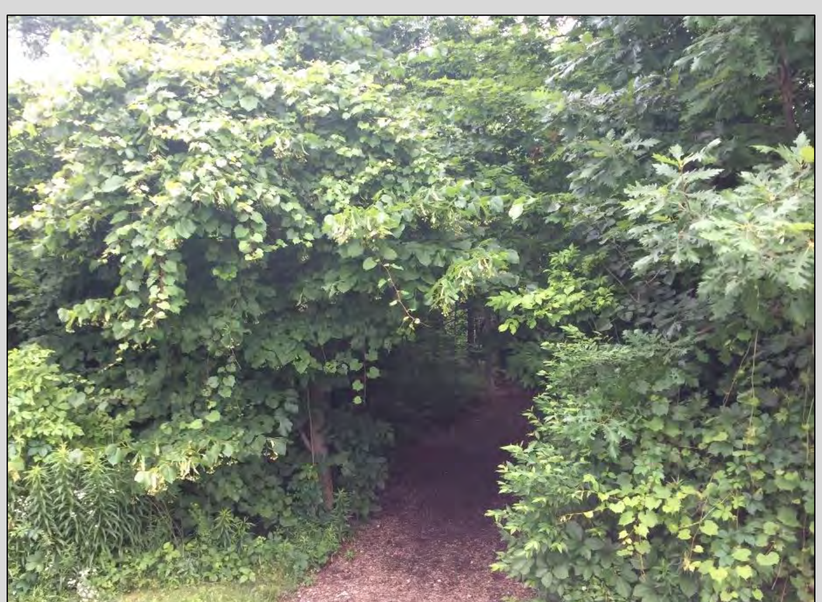
12.1.3 Asset Condition (Continued)

Street trees and manicured parks trees including roadways, trails and multi-use pathways, are in **Fair** to **Very Good** condition, based on expert opinion from staff and documentation from the GIS listing. Known issues are prioritized and addressed reactively through operations or capital projects.

Since the last Asset Management Plan, **Woodlands and wooded portions of parks** have created a formal asset management assessment methodology that has been performed once. They are evaluated regularly for safety, with urgent issues flagged and targeted for resolution by operations staff. Approximately 84% are assessed to be in or condition, indicating that they are functional, but subject to superficial to extensive deterioration. Approximately 12% of woodlands have not yet been assessed. Urban Forestry would benefit greatly from frequent condition assessments and monitoring system to help manage these key assets.

Urban Forestry does not currently have computerized asset management or maintenance management capability although work has been initiated to implement a computerized maintenance management system. The majority of data on the asset condition is formally collected and recorded, but is not frequent. All significant safety issues are addressed immediately. Maintenance issues, along with concerns identified by staff and the public are prioritized and addressed based on needs. Other assets are informally evaluated and needs addressed reactively. As noted, Urban Forestry is in process of updating data collections in 2019 which will inform decision making in future asset management and budgeting work.



Walnut Woods – Kyle Ct (Medium Woodland)

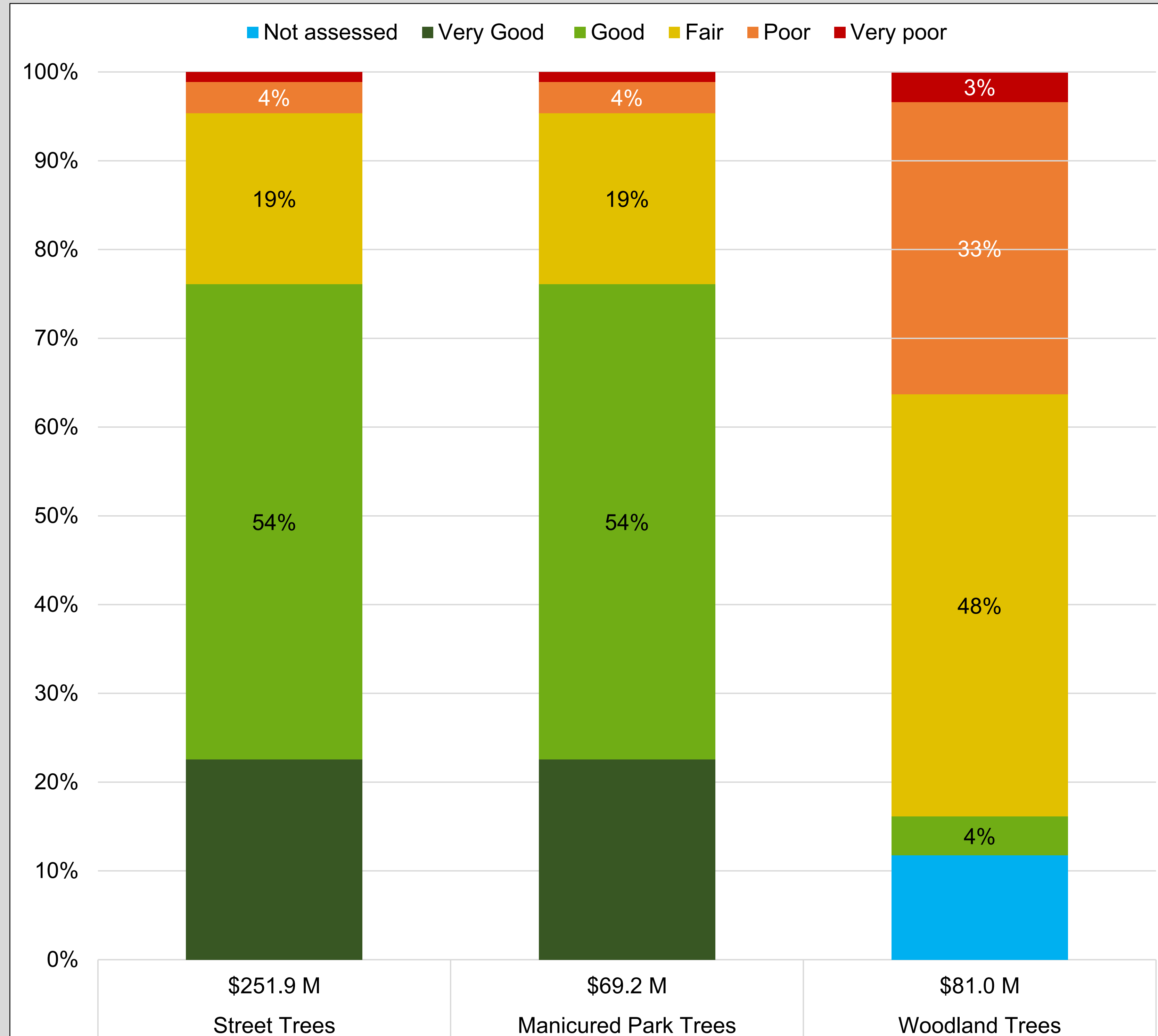


Figure 12.4 Asset Condition Detail (Urban Forestry Services)

12.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Customer Service, Cost Efficiency, Accessibility, Quality, Safety, and Environmental Stewardship/Sustainability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Table 12.2.

Euston Park – MacKay Avenue (Small Woodlands)

Burr Reed Woods – Riverside Dr (Medium Woodland)

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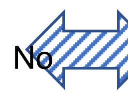
Table 12.2 Levels of Service Metrics – Foundational and Advanced (Urban Forestry Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Providing reliable urban forestry services	% of community satisfied with Urban Forestry services	81%	
Cost Efficient	Providing Urban Forestry service in a cost efficient manner	Cost to provide Urban Forestry services and Forestry - Operations services ($/serviced households)	$22.25	No  ge
		Average Woodland Tree renewal rate (# years)	Under Review	40 year trim cycle
		Average Street Trees and Manicured Park Trees renewal rate	10 years	5 year trim cycle
Accessibility	Providing adequate pedestrian accessibility to Urban Forestry	Accessibility to street trees/residential household	0.76 ROW Tree/residential household	
		Providing shade for pedestrians	22.0% of sidewalks/paths with tree cover	

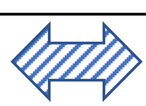
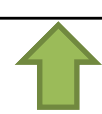
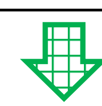
 **No Change**  **Positive Upward**  **Positive Downward**

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Table 12.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Urban Forestry Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Quality	Providing Street Trees in acceptable condition	% City-owned Street Trees and Trees in Manicured Park Tree in fair or above condition	96%	
	Providing Urban Forestry at the right design standard	% of Woodland Tree level of service quality rating in fair or above condition	52%	
		Average Woodland Tree level of service quality rating (Rating of 1 is 'Very Good', 2 is 'Good', 3 is 'Fair', 4 is 'Poor, 5 is 'Very Poor')	2.89	
Safety	Providing an Urban Forestry network that is safe for drivers, pedestrians and cyclists	Frequency or percent of trees inspected per year	10%	
Environmental Stewardship/Sustainability	Providing urban forestry services that have minimal impacts on the environment	Increase canopy cover	24% of City covered by tree canopy in Urban Growth Boundary	

No Change **Positive Upward** **Positive Downward**

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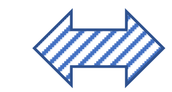
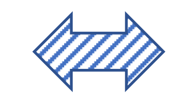
Table 12.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Urban Forestry Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Providing reliable urban forestry services	# of street trees planted per year	5,476	5,000
		# of street trees removed per year	1,506	
Cost Efficient	Providing Urban Forestry service in a cost efficient manner	Cost to provide Urban Forestry services and Forestry - Operations services ($/serviced households)	$3,934,484	
		Street Tree and Manicured Park Tree Reinvestment Rate	0.6%	
		Woodland Tree Reinvestment Rate	0.2%	
Accessibility	Providing adequate pedestrian accessibility to Urban Forestry	# of ROW trees per residential household	0.76	>1
		% of kilometers of sidewalks (and paths) with tree cover	22.0%	34% in 10 years

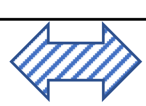
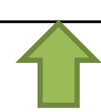
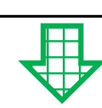
 **No Change**  **Positive Upward**  **Positive Downward**

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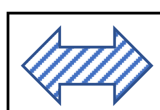
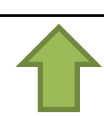
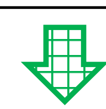
Table 12.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Urban Forestry Services)

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Quality	Providing Street Trees in acceptable condition	% City-owned Street Trees and Trees in Manicured Park Tree in poor or very poor condition	4.0%	<2%
	Providing Urban Forestry at the right design standard	Woodlands quality level poor to very poor	36%	
Safety	Providing Urban Forestry network that is safe for drivers, pedestrians and cyclists	Biologically optimal frequency of trimming trees or planned urban forest maintenance	10	5-7 years
Environmental Stewardship/ Sustainability	Providing urban forestry services that have minimal impacts on the environment	% of city covered by tree canopy in Urban Growth Boundary	24%	34%

 **No Change**  **Positive Upward**  **Positive Downward**

12.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

12.3.1 Lifecycle Activities

Table 12.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Urban Forestry assets:

Table 12.3 Current Asset Management Practices or Planned Actions (Urban Forestry Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	***Street Trees, Manicured Park Trees*** • Implementation of Urban Forestry Strategy approved by Council in 2014 • Encouragement of conservation of Urban Forestry, Parks, and associated infrastructures assets through policy, procedures, public outreach, etc. • Maintaining the existing urban forest for reduce loss of maturing forest and increase/redirect planting budget to support this. • Mitigate maintenance cost by reducing loss and therefore, decreasing need for planting as the 'easy fix'. • Adopting an increased awareness in London for tree injury/damage via construction management. • Altering perception to view at the urban forest as a valuable asset and not a renewable resource.	• Infrastructure renewal with annual road replacement damage and tree loss is a major contributing factor to tree health/condition. • Implementing the Urban Forestry Strategy can be impacted by cost pressures, resulting in undesirable outcomes. • Market pressure of many North American cities implementing Urban Forestry Strategies, thus limiting supply or increasing costs. • Provincial market may choose to focus on residential market. • Invasive species – new pests, diseases as well as invasive plants. • Climate change mitigation - excessive urban heat, alternative energy (e.g. solar) could impact how and where trees are planted, or not. Quicker non-tree alternatives may be chosen (e.g. sail cloth structures to provide immediate summer shade in Parks). • Changes in legislation – an example includes Migratory Bird Convention Act. Currently the official breeding season for birds starts April 1 but that is expected to be brought forward, which may impact service delivery

Table 12.3 (Continued) Current Asset Management Practices or Planned Actions (Urban Forestry Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	***Street Trees, Manicured Park Trees*** • The approach to asset management for the living assets is somewhat unique because it entails **living assets**, grass, trees, etc. The product can be qualitative and not easily measured. • City manages its trees through planning and maintenance activities including trimming, removals, plantings, treatment and watering based on available resources. • Monitored and problems addressed when triggered by staff observations and public feedback. ***Woodland Trees*** • The approach to asset management for the living assets is somewhat unique because it entails **living assets**, grass, trees, etc. The product can be qualitative and not easily measured. • City manages its trees through planning and maintenance activities including trimming, removals, plantings, treatment and watering based on available resources. • Monitored and problems addressed when triggered by staff observations and public feedback.	• Refer to Appendix B.

Table 12.3 (Continued) Current Asset Management Practices or Planned Actions (Urban Forestry Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	***Street Trees, Manicured Park Trees*** • Certain activities can be performed to extend lives of mature and veteran heritage trees that have suffered from compaction by footsteps: ○ Deep root fertigation. ○ Propping and cabling. ○ Mycorrhizal inoculation. ○ Root barriers/deflectors can be retroactively installed in certain instances. ***Woodland Trees*** • Rehabilitating a tree may not be a practical or relevant activity – typically a tree is either maintained or replaced.	• Refer to Appendix B.
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	***Street Trees, Manicured Park Trees*** • Planned plantings for non-Woodland trees. • Use of underground technologies to provide protected rooting zones in conjunction with utilities, sidewalks, and, in some technologies, roads. ***Woodland Trees*** • There are no planned plantings for Woodland trees.	• Homeowners declining to replace tree planting, which reduces tree canopy cover related to Urban Forestry Strategy.

Table 12.3 (Continued) Current Asset Management Practices or Planned Actions (Urban Forestry Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	***Street Trees, Manicured Park Trees*** • When tree removal is considered necessary, disposal activities include - tree brush and wood removal, stump removal, site restoration to prepare for replacement. ***Woodland Trees*** • Typically Woodland trees would be left in situ (original location) when they are deceased, however, exceptions could occur if deemed a hazard. These exceptions assess if the tree would strike a target such as a planned, managed and well-used path, trail, or a house, etc. In the future, policy may be revised to not always cutting down dead or damaged trees.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability	***Street Trees, Manicured Park Trees*** • Consultation with public and users of Urban Forestry and Parks, and in conjunction with Planning and/or Transportation would determine service improvement needs.	• Refer to Appendix B.

Table 12.3 (Continued) Current Asset Management Practices or Planned Actions (Urban Forestry Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	**<u>Overall Actions</u>** • Capital growth projects and analysis in conjunction with Development Charge service area (where applicable with regulatory and municipal policy), or as a part of Assessment Growth Policy (where applicable with municipal policy). ***Street Trees, Manicured Park Trees*** • Consultation with public and users of Urban Forestry and Parks would determine growth needs. • Street trees inventory could grow as a result of assumption of subdivisions, commercial and industrial extensions, local improvements, etc. • Collaboration could occur with Transportation for input into streets and road allowances. ***Woodland Trees*** • Growth would occur when Open Space Parkland would be reclassified into urban forestry and thus increase inventory.	• Incorrect growth assessments may result in overabundance of Urban Forestry assets in a particular area and insufficient assets in another

Table 12.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets[1]

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Urban Forestry (Street Trees, Manicured Park Trees, and Woodland Trees)	Operating Budget*	Total Urban Forestry	**$3,778**
	Lifecycle Capital Budget**	Street Trees and Manicured Park Trees	$2,397
		Woodland Trees	$2,025.5
		Total	**$4,422.5**
	Service Improvement Budget	**Total Urban Forestry**	**$400**

The cost of these identified Lifecycle activities is summarized in Table 12.4. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

[1] Incorporated into budget are Woodland Tree Urban Forestry Management service improvement budget – they are considered a lifecycle component within Street Trees.

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

Table 12.5 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Urban Forestry (Street Trees, Manicured Park Trees, and Woodland Trees)	Growth Capital Budget and Significant Operating Costs	Growth Capital –Total Urban Forestry	$50
		Significant Operating Costs – Urban Forestry	$nil
		Total	**$50**

The draft DC Background Study has identified $0.05 million total related to funding for Urban Forestry portion of Parks & Recreation Development Charges Studies. The asset management plan has been completed prior to the finalization of the draft DC Background Study. Thus, any growth needs as identified in the draft 2019 DC Background Study are assumed to be approved for purposes of the CAM Plan, but could be revised.

12.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not readily available for the Urban Forestry service area. These assets are living and expected to improve in condition over time, which is opposite from traditional infrastructure assets. In addition, these living assets aren't necessarily disposed at their expected useful life, but removed resulting from ongoing replacement of aging infrastructure, increased urban intensification and development pressure, poor historical maintenance practices and environmental factors such as storms. Manicured park trees are often impacted by the level of use and management practices while woodland trees are impacted more by environmental factors such as invasive species, disease and adjacent development. Incorporating these criteria into a representative condition profile is not possible at this time.

Section 12: Urban Forestry

12.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not readily available for the Urban Forestry service area. These assets are living and expected to improve in condition over time, which is opposite from traditional infrastructure assets. In addition, these living assets aren't necessarily disposed at their expected useful life, but removed resulting from ongoing replacement of aging infrastructure, increased urban intensification and development pressure, poor historical maintenance practices and environmental factors such as storms. Manicured park trees are often impacted by the level of use and management practices while woodland trees are impacted more by environmental factors such as invasive species, disease and adjacent development. Incorporating these criteria into a representative condition profile is not possible at this time.

Pottersburg Park – Gore Road (Large Woodland)

Kiwanis Park – Central South (Large Woodland)

12.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 12.6 and illustrated in Figure 12.5. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as they are inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Woodland Tree Urban Forestry Management service improvements are incorporated into the budget – they are considered a lifecycle component within Street Trees.

Table 12.6 Comparison of Current to Optimal Operating & Capital Budgets, and Funding Gap (Urban Forestry Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's) (Average Annual	Funding Gap (000's) (Average Annual)
Urban Forestry (Street Trees, Manicured Park Trees, and Woodland Trees)	Lifecycle Capital Budget	Street Trees and Manicured Park Trees	$1,980.5	$2,397	None Identified	$416.5
		Woodland Trees	$150	$2,025.5	None Identified	$1,875.5
		Total	**$2,130.5**	**$4,422.5**	**None Identified**	**$2,292**

Euston Park (Small Woodland)

Section 12: Urban Forestry

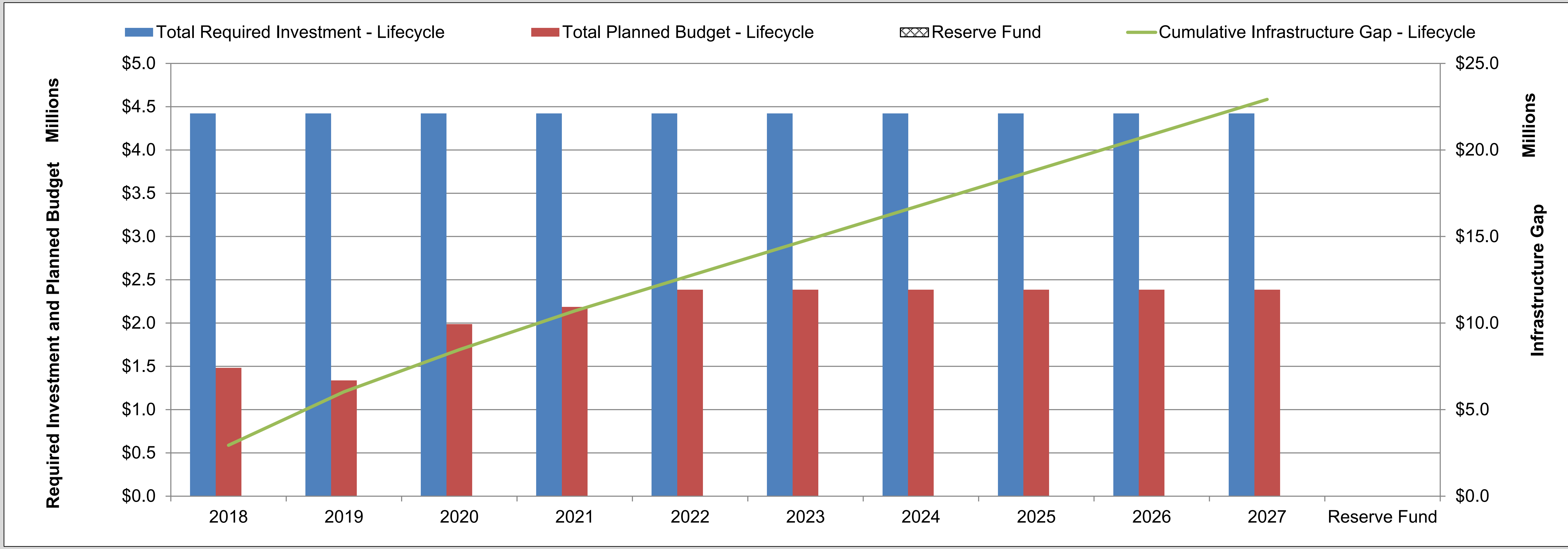


Figure 12.5 Forecasted Lifecycle Infrastructure Gap (Urban Forestry Services)

Urban Forestry has a $2.94 Million current infrastructure gap growing to $22.92 Million over the next decade. Historically trees were not considered as infrastructure assets and renewal plans were minimal. The area has a long history of underfunding and loss of inventory. Today renewal plans for woodlands and wooded portions of parks are continuing recognition in the budget process. The infrastructure gap is partially attributed to underfunding of street trees and trees in manicured portions of parks. However, the infrastructure gap primarily relates to Woodland Trees. Historically Woodland management has little infrastructure funding as it does not have a detailed inventory to assist in identifying infrastructure needs. The City relies on woodlands to regenerate, however that can be challenging when considering encroachment and factors like Emerald Ash Borer. The consideration of trees as infrastructure is a major step forward in preserving the health of this asset group.

Often the replacement of street trees occurs in conjunction with the replacement of other assets. The existence of a good tree does not prevent a new road or development from being built or a broken water pipe from being repaired. Efforts are made to replace the impacted tree as part of the project. More attention is also being paid to the tree as an important part of the infrastructure. This is evidenced by treed center islands. Although there is some positive news, independent tree removals and replacements will result from other environmental, age, health, insect and disease factors that are not associated with and paid for within a project. Non-project tree replacements may be funded through separate capital budgets but are currently not sufficient to cover all of the losses. In the end, the overall trend is a reduction in tree inventory in London as evidenced by the gap results.

Section 12: Urban Forestry

12.5 DISCUSSION

CURRENT AND FUTURE CHALLENGES

Current challenges primarily relate to continue the implementation of the Council-approved Urban Forestry Strategy in 2014. Other challenges include developing comprehensive woodlands and street tree asset management listings; performing regular condition assessments; assessing representative condition ratings; and, increasing street trees costs. This challenge is being addressed through data collections beginning April 2019, and survey methods for Woodlands (LiDAR) that can provide a value for woodlot reduction in canopy due to the Emerald Ash Borer.

Trim cycles for Street Trees are being reduced from 10 years to a mandated 5 years. This will place pressure on operating costs as the transition to halving the trim cycle occurs.

Other current challenges of coordinating and communicating with other City projects are being addressed through the recent reorganization of Forestry and Urban Forestry under one Division. One impact of the coordination is to have trees considered early and planned around in City road infrastructure renewals and replacement projects, the warranted sidewalk program, and other activities.

The intent is to minimize unneeded tree removal; however, there will may be cases where trees have to be removed as the costs of or lost opportunity in avoiding the tree may be deemed excessive. The refined data collections and service coordination will allow the tree asset value to be part of the possible removal decision. There then may be a better outcome, if a tree is worth more than the costs of changing the design, layout, etc. to avoid harming it.

Market forces are a current challenge as well. For the past 10 years, many tree nurseries chose to focus on the residential market (perennial plants, garden ornaments, statues, chiminea, etc.) which limited the supply of trees. An increase in demand is not expected to suddenly reverse the 10 year trend.

Compounding this challenge is that many North American cities are adopting strategies similar to London's Urban Forestry Strategy. Fulfilling bids to provide trees at current prices has been difficult.

Trees outside Urban Growth Boundary (UGB) are not tracked within City databases. Trees associated with other service areas (Dearness, Fire) and rural roads not being quantified by Forestry Operations. Updating information and quantifying any funding gaps to have a complete assessment of all City-owned forestry will be a difficult and long term project.

Other future challenges include altering perceptions and increasing awareness in London. The challenge is to view at the urban forest as a valuable asset and not a renewable resource, increasing awareness in London for tree injury/damage via construction management.

Maintaining the existing urban forest to reduce the loss of maturing forest and increase/redirect planting budget to support this initiative can result in maintenance cost mitigation and therefore, decreasing need for planting as the 'easy fix'.

The provincial tree seed facility in Angus, Ontario – from where almost all the nurseries and conservation groups receive their native trees – announced its closure and has begun the process of closing the facility. The impact of this closure is not quantified at this time, but the expectation is for prices to increase as more places compete for a dwindling supply. Shortfalls may continue because of supply problems.

COMPARING 2014 CAM PLAN TO 2019 CAM PLAN

The 2014 CAM Plan relied on internal expert opinion for Urban Forestry assets. Since that time, quality rating methodologies for Woodlands have been created, but are infrequent and still being implemented as part of regular operations. The Urban Forestry service replacement value decreased from approximated $513 million (in the 2014 CAM Plan) to $402 million in the 2019 CAM Plan. The decrease is attributed to available research corroborating woodlands replacement value. Historically replacement values for street trees were used as a proxy for woodlands, which overestimated replacement value; however, street trees cost have increased by 35% since the last CAM Plan. If these costs continue to increase, infrastructure funding shortfalls will increase.

Section 12: Urban Forestry

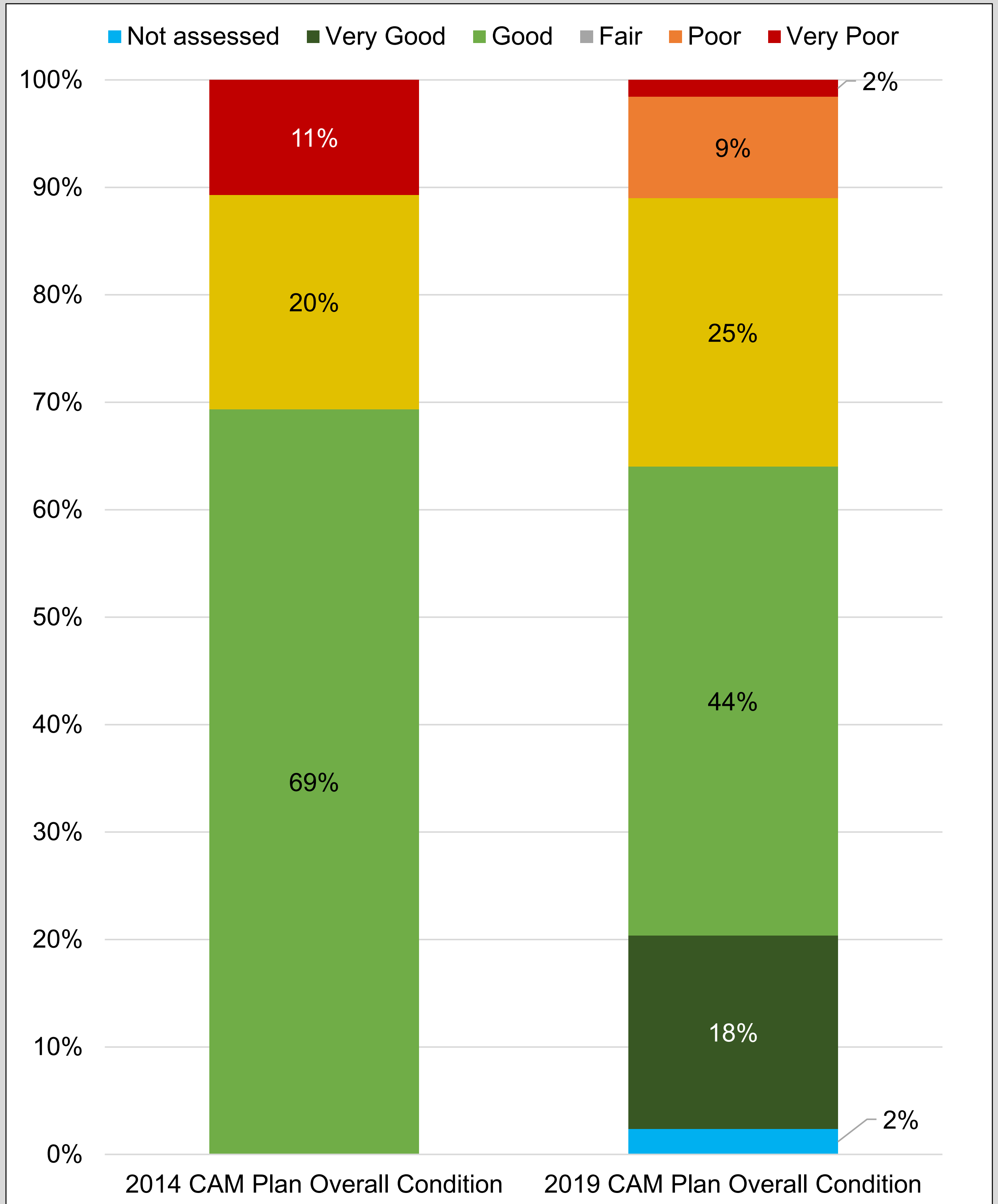


Figure 12.6 2014 CAM Plan to 2019 CAM Plan Condition Summary (Urban Forestry Services)

The Urban Forestry service area condition comparison is provided in Figure 12.6 on the left. The change in condition profile is attributed mainly to incorporating a detailed quality rating system for Woodland tree assets based on internal expert opinion and updates to the street tree inventory listing maintained in GIS. The cumulative 10 year infrastructure gap has grown from approximately $9.1 million in 2014 CAM Plan compared to $22.92 Million in the 2019 CAM Plan. The gap increase is attributed to increased Woodland tree needs.

Coves – Elmwood Gateway (Medium Woodland)

12.6 CONCLUSIONS

Valued at over $400 Million, the City's Urban Forestry assets are overall in Fair to Good condition. Data regarding the City's tree inventory and condition is limited but being addressed in 2019/20 initiatives. Reorganizing Urban Forestry to increase coordination with other City infrastructure projects will minimize unneeded tree removal. However, cost pressures will result from street tree trims cycles are being mandated to 5 years compared to previous target of 10 years. In addition, the full impact of Emerald Ash Borer has yet to be completely realized and quantified. It is anticipated that the condition of wooded areas will continue to be reduced as more consistent condition assessments become available. The current and future gap means that under current funding plans, the number of trees in London is expected to continue to reduce along with the benefits they provide for air and water quality, habitat, and recreational uses. The City continues to implement the 2014 Urban Forest Strategy and will continue identifying tree cover targets as well as policies, guidelines and practices that will govern the management of the urban forest for the next twenty years reversing current trends. It is critical that the City invest the necessary resources to implement the strategies if current trends are to be reversed.

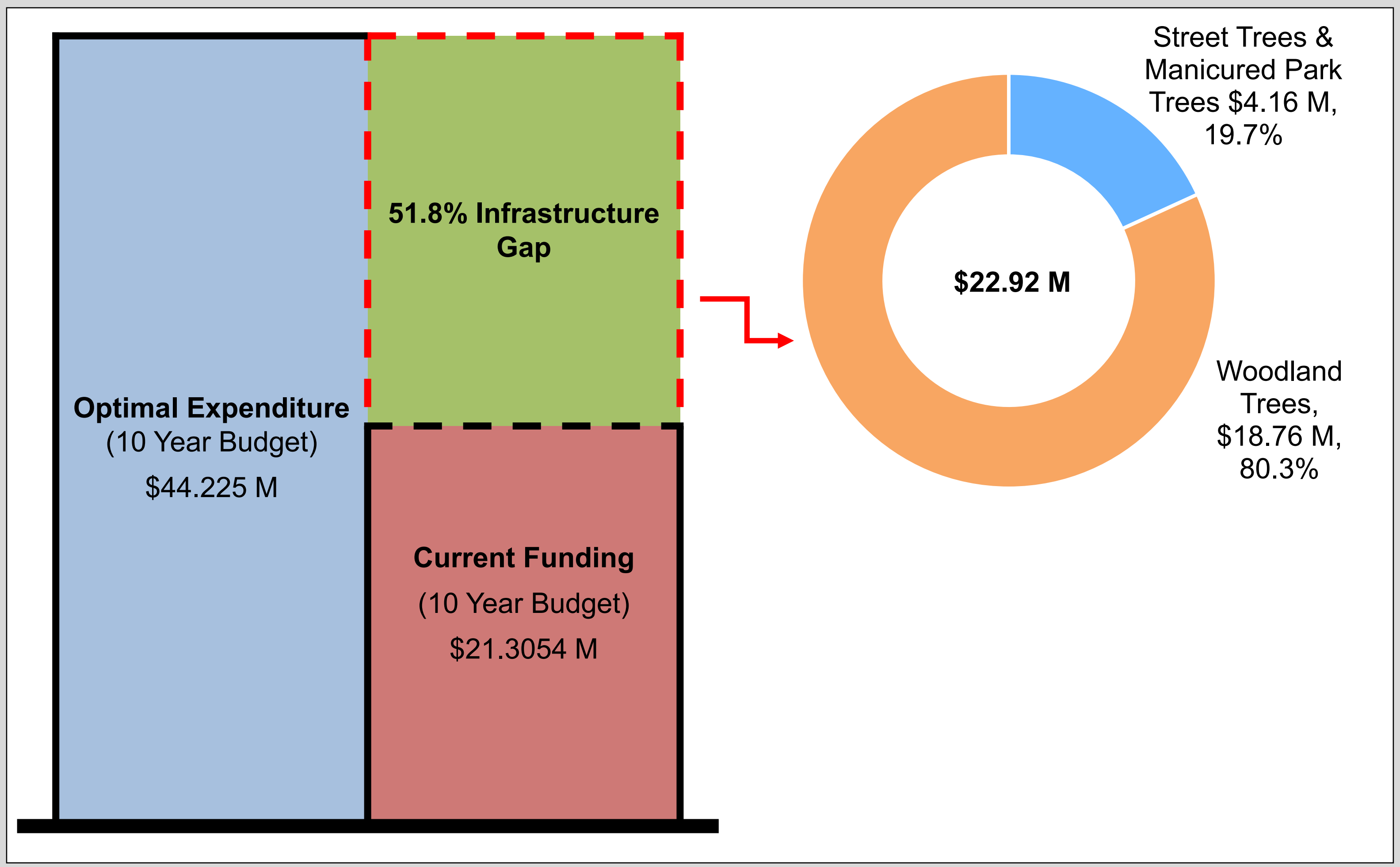
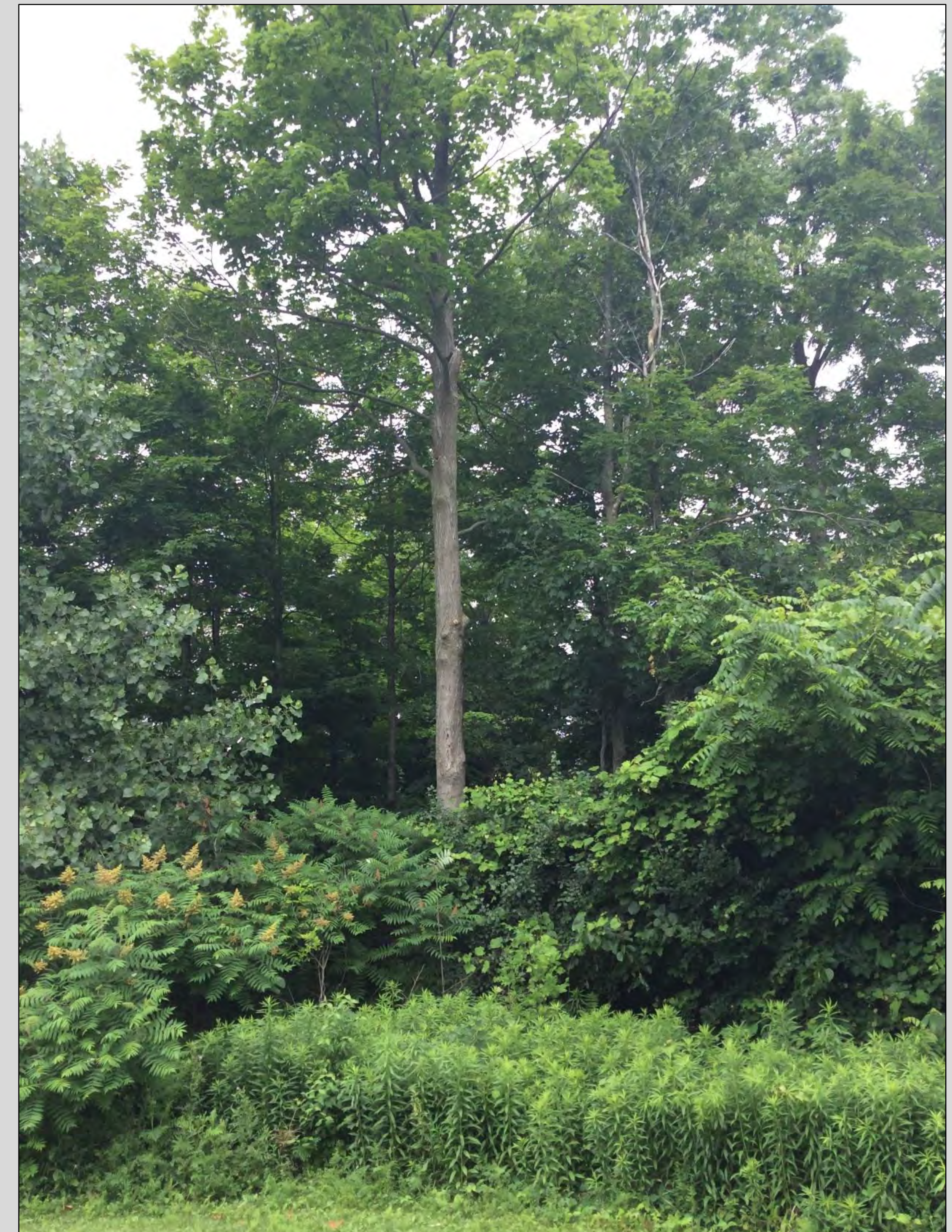


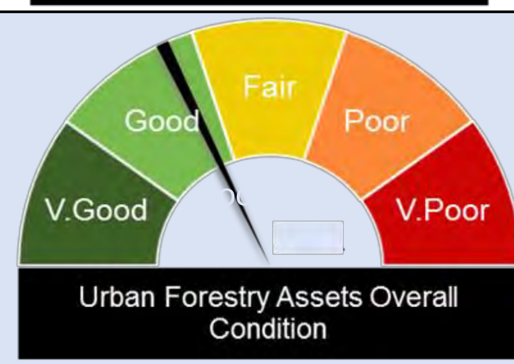
Figure 12.7 Cumulative 10 year Infrastructure Gap Visual (Urban Forestry)

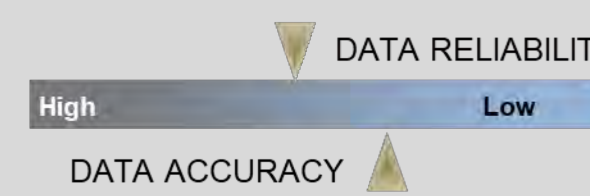


Walnut Woods (Medium Woodland)

Section 12: Urban Forestry

Table 12.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Urban Forestry)

City of London Urban Forestry Infrastructure						
Asset Type	**Replacement Value (millions)**	**Current Condition**	**Current Infrastructure Gap (millions)**	**10 Year Infrastructure Gap (millions)**	**Current Annual Reinvestment Rate**	**Recommended Annual Reinvestment Rate**
Street Trees Manicured Park Trees	$321.1		$1.07	$4.16	0.6%	3.5%
Woodland Trees	$81.0		$1.88	$18.76	0.2%	1.0%
Overall Urban Forestry	**$402.1**		**$2.9415**	**$22.92**	**0.5%**	**2.3%**



Section 13: Fire

Quick Facts
14 Fire Stations
31 Emergency Vehicles
2 Training Buildings

Fire Department Overall Condition

Replacement Value	$105.28 Million
Condition	Fair
10 Year Gap	$28.49 Million
City-Wide Infrastructure Gap Contribution	5.0%

5.0% City-Wide Infrastructure Gap Contribution

Section 13: Fire

13.1 STATE OF LOCAL INFRASTRUCTURE

As a principled approach to delivering effective and efficient fire protection services, the London Fire Department (LFD) executes the Office of the Fire Marshal's Three Lines of Defence to prevent and mitigate fire loss, injury, and death, and to promote firefighter safety within the community. The Three Lines of Defence or the 'Three Es' are:

- Education - The best way to stop fires is to teach people about fire safety.
- Enforcement - Enforcement of the Fire Protection and Prevention Act, 1997, to ensure that London is a fire safe community.
- Emergency Response - When the first two lines of defense fail the London Fire Department will respond to calls for service for emergency responses to mitigate hazards.

LFD services primarily focus on Council's Strategic area of focus "Strengthening Our Community". In 2018, LFD responded to approximately 10,000 calls ranging from fire, motor vehicle collision and auto extrication to hazardous materials, technical rescue and water and ice rescues, as well as medical emergencies. Furthermore, LFD also has mutual and automatic aid agreements with some neighbouring municipalities. To support these services the City maintains an array of facilities, vehicles and equipment, valued at over $105 Million. These assets range from specialized stations and training facilities, a myriad of fire and rescue vehicles, specialized equipment, and emergency apparel, to more common assets such as passenger vehicles (cars, vans, pickup trucks and trailers). Because of the specialized nature of its emergency response vehicles, Fire is responsible for maintaining their own fleet and equipment.

Fire Station # 4 – Colborne street

13.1.1 Asset Inventory and Valuation

LFD inventory includes two Asset Types: Fire Stations & Facilities and Vehicles & Equipment. Each asset type has a number of assets in which they are grouped according to their characteristics. Table 13.1 summarizes the LFD owned assets inventory and their replacement value. LFD owns 14 fire stations, a number of other facilities that are used for services or training, in addition to a large fleet of fire trucks and other vehicles, trailers and specialized firefighter equipment needed by the department for emergency response. The assets replacement values have been identified using different City databases including JD Edwards and VFA Capital Planning software.

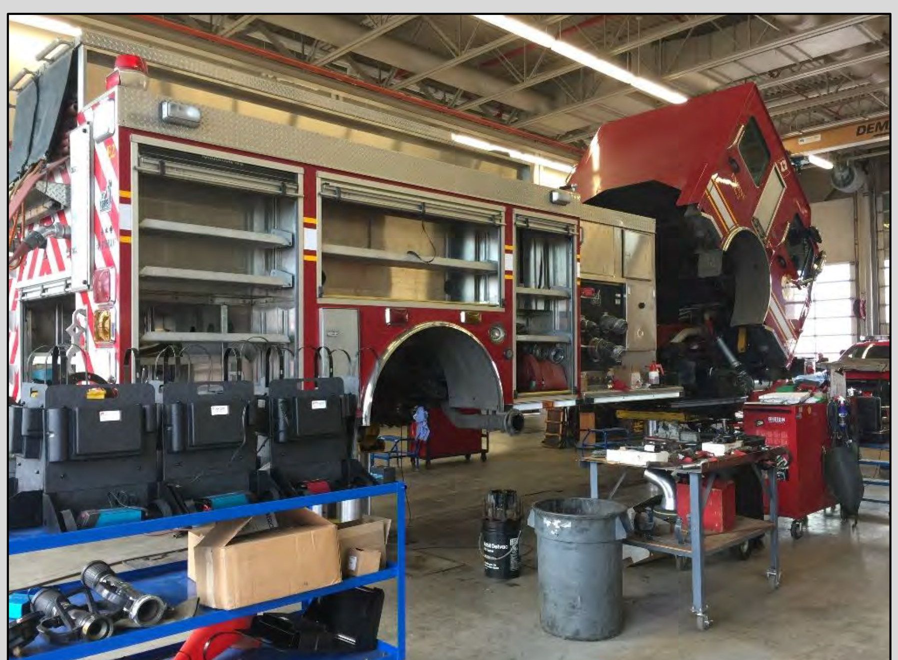
Fire Station # 1 and Head Quarter – Horton St E

Section 13: Fire

13.1.1 Asset Inventory & Valuation (Continued)

Table 13.1 Asset Inventory & Valuation (Fire Services)

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
Stations & Facilities	Fire Station	14	Ea.	$53,907
	Training Tower	1	Ea.	$942
	Training Building	2	Ea.	$4,407
	Storage Garage	1	Ea.	$74
	Fueling Station	1	Ea.	$5.8
	Fire Station sites	15	Ea.	$4,424
Vehicles & Equipment	Emergency Vehicles	31	Ea.	$17,887
	Non-Emergency Vehicles and Equipment	48	Ea.	$5,654
	Fire Fighting Apparel and Light Equipment	A mix	Ea.	$12,977
	Communication Equipment and Software	A mix	Ea.	$5,000
TOTAL				**$ 105,277.8**

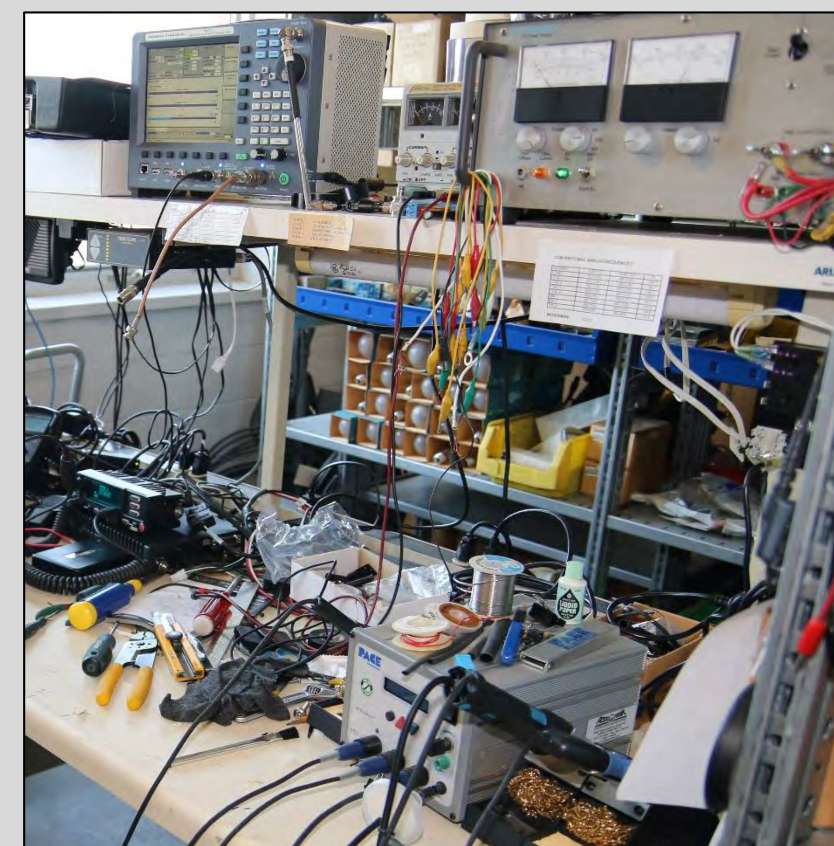


Fire Emergency Vehicle – Engine during maintenance

Fire Station # 2 – Florence Street

STATIONS AND FACILITIES

LFD is comprised of 14 fire stations located strategically throughout the city. Administrative headquarters, Fire Prevention & Public Education and Communications & Dispatch is located at Central Fire in conjunction with Fire Station 1. A training centre with a classroom, a driver simulator and a training tower is located at Station 9; a fueling station and a storage garage. Station 2 has the Apparatus Division adjacent to it. The triple bay, double deep garage facility is used to repair and maintain the large fleet of fire trucks and other vehicles, trailers and specialized firefighter equipment needed by the department for emergency response. Table 13.1 summarizes the Fire department owned assets inventory and their replacement value.



Fire related communication equipment

Section 13: Fire

13.1.1 Asset Inventory & Valuation (Continued)

Fire Vehicles & Heavy Equipment are comprised of a variety of Primary Response Vehicles such as Engines, Pumper Rescues, Quints, Aerial Ladders, an Aerial Platform, Tankers and a Rescue Truck. Also included are specialized Technical Rescue, Hazardous Material and Water/Ice Rescue units. Secondary Response Vehicles include pickup trucks, for Command Vehicles and deployment of specialized equipment, as well as Spare Apparatus. These Spare Apparatus are used for training and are brought into primary use when the main apparatus is undergoing maintenance. Non-emergency utility vehicles consist of standard cars, trucks and vans for administrative, service, inspection and public education use.

Fire Fighting Apparel & Light Equipment is made up of uniforms and a vast array of specialized personal protective, firefighting, rescue, and communication equipment.

Communication Equipment and Software is made up of a vast array of specialized emergency communication infrastructure, tools, software and equipment.

Training Tower – Fire Station # 9

13.1.2 Age Summary

Figure 13.1 shows the London Fire Department average asset age as a proportion of the average useful life by asset type. In most cases, the average age for all facilities and equipment was calculated using the recorded construction date in VFA (Facilities Management) software. City GIS and/or other databases such as Tangible Capital Assets (TCA) database were also used as a source of information. As shown in Figure 13.1, in general all asset types are within their average industry standard useful life.

It is important to note that 40 years was selected as the expected useful life based on the non-structural components of buildings which have the longest expected service life. In practice the many components that comprise a building are slated for renewal based upon a combination of factors including age, condition, consequence of failure, likelihood of failure etc. and the practical expected life is largely indefinite while the building continues to serve its intended/required purpose in its given geographic location.

Emergency Vehicle – Engine # 13

Section 13: Fire

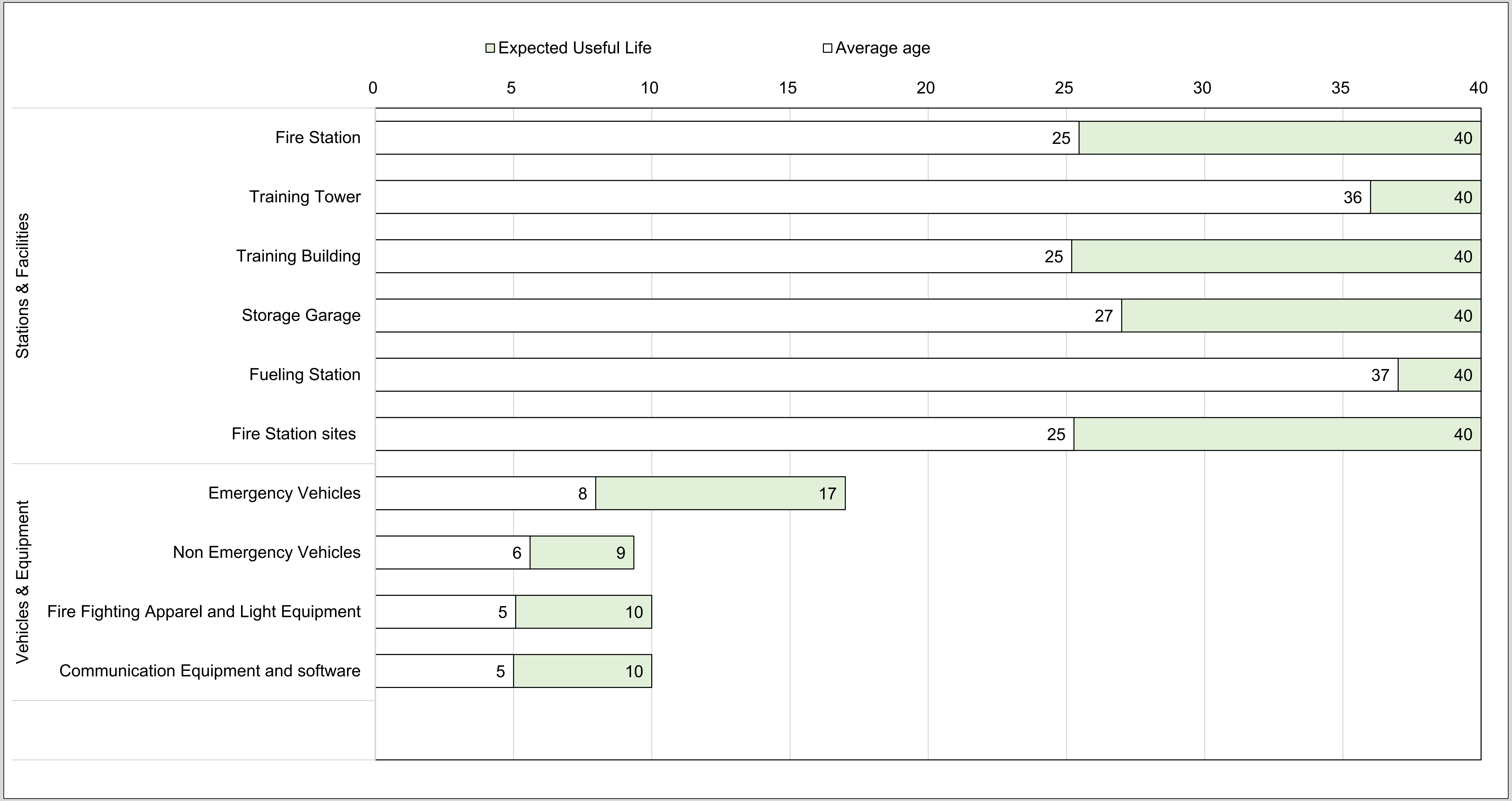


Figure 13.1 Average Assets age as a Proportion of Average Useful Life (Fire Services)

Section 13: Fire

13.1.3 Asset Condition

Buildings are maintained by Corporate Facilities. Condition is evaluated on a rotating basis using a standard approach and rating system. Deficiencies are identified and scheduled for resolution through capital and operating investments. Care is taken to maintain mission critical assets impacting the delivery of front line service.

Equipment and vehicle assets are managed centrally by the Apparatus Division of the London Fire Department. Under its current preventative maintenance program, every front line fire and rescue vehicle is inspected and maintained monthly, thereby ensuring that any issues are addressed before they occur. Further to these quick inspections, every vehicle undergoes a more comprehensive inspection every six (6) months, as well as annually. The latter is a requirement by the Ministry of Transportation. The condition of these assets is solely tied to age and expected useful life and not an assessment of the actual condition of the assets.

Replacement dates and maintenance regimes are set when equipment and vehicle assets are brought into inventory. Assets are maintained in serviceable condition, with replacement occurring on a planned basis as assets reach the end of their useful life. Where practical, retired vehicles are sold off and the associated proceeds used to offset the purchase of new vehicles.

Equipment may be traded during replacement to achieve cost efficiencies and accomplish convenient disposal at the same time. Where retired assets are older such as the 15 year lifecycle for Front Line vehicle set by Council, the proceeds from recent sales have been minimal.

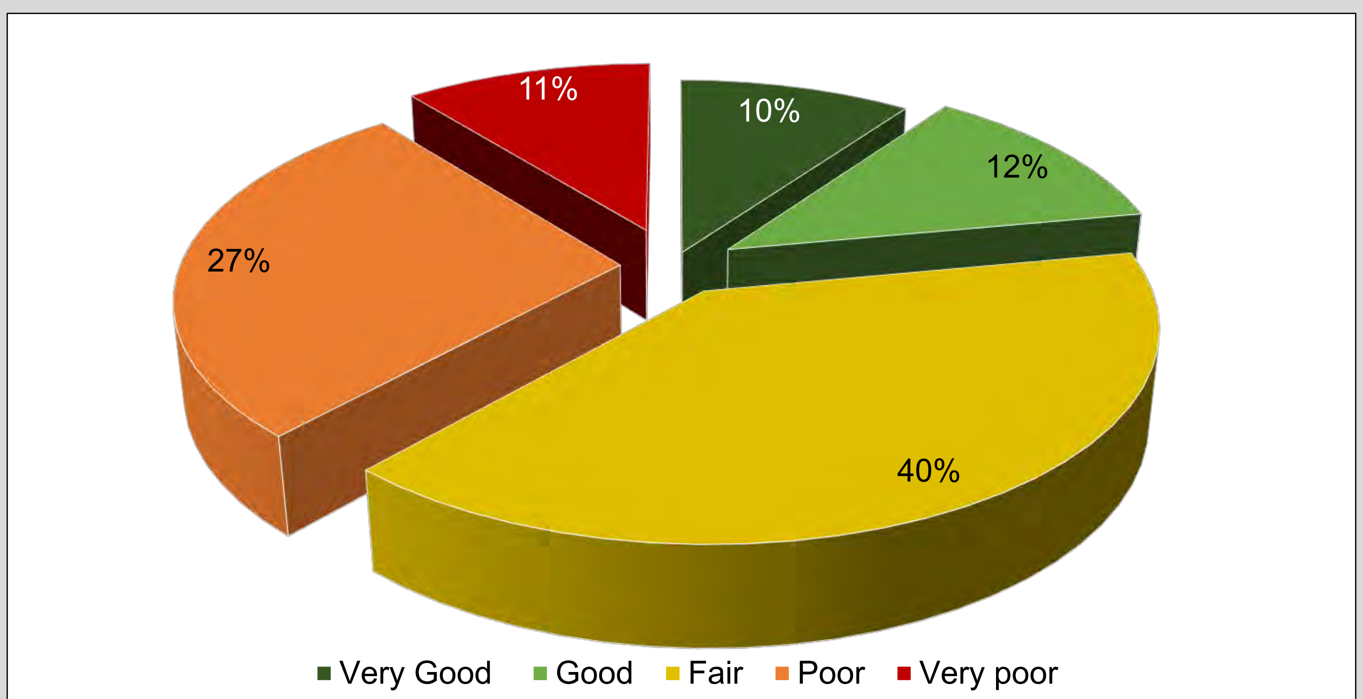


Figure 13.2 Average Asset Condition by Replacement Value (Fire Services)

In some cases, retired vehicles and equipment are not decommissioned but rather used by the Training Division or held by the Apparatus Division as back up or for parts. Figure 13.2 presents the condition distribution of all LFD assets. As shown, 62% of the assets are in **Fair** to **Very Good** condition.

Stations and Facilities (Buildings) are in **Fair** to **Good** condition as seen in Figure 13.3. Investment needs are identified and prioritized based on service impact, and addressed operationally and through capital renewal. The ratings presented represent the physical condition of the building and not a representation of the functionality required to satisfy Fire Department's requirements (i.e. size, location, ability to accommodate certain types of crews or equipment). An industry standard Facility Condition Index (FCI) was used to calculate the condition of the stations and facilities in which it considers the capital needs for repairs and renewals in proportion to the replacement value of the building.

Emergency Vehicles and Equipment condition is distributed through all condition ranges. Figure 13.3 presents the condition of the Front Line Vehicles based on age and expected useful life estimates for each unit, and not on formal condition assessment or maintenance review records. Given their critical nature, these assets are rigorously maintained to support the reliable delivery of front line service. They receive daily, monthly and more rigorous biannual and annual inspections. Typically, Fire departments replace their Front Line vehicles every 12 – 15 years, whereas LFD has followed the 20 year lifespan for heavy vehicles. Crews are observing that fire trucks require more and more repairs, particularly after the 15 year mark. The department is currently researching the costs and benefits to replace them every 15 years followed by 3 years in reserve. This is anticipated to enhance the overall condition of the assets, reduce staff and repair costs in the long run and allow Apparatus mechanics to focus better on preventative maintenance.

The term reserve is a bit of a misnomer as reserve vehicles are often used to replace vehicles being serviced. It is possible that reserve vehicles could see as much if not more use than vehicles assigned to stations with a lower number of alarms. This situation is anticipated to be eliminated or minimized by the potential reduction in useful life.

Non-Emergency Vehicles condition is distributed through all condition ranges as seen in Figure 13.3. The Fire Department applies a longer estimated useful life to these assets than other City service areas, because of the nature of their use (short trips for inspections or investigations within the city), diligent maintenance by the Apparatus Division and constant assessment, these vehicles last longer than similar vehicles within other London services. This inventory approach potentially reduces the amount of funding recovered through the sale of the vehicles at the end of their useful life but can be argued as warranted given the extended life of the vehicles.

Section 13: Fire

Fire Fighting Apparel & Light Equipment condition is distributed on all condition ranges based solely on age and expected useful life. As with Front Line Vehicles & Equipment, these assets are rigorously tested and maintained to support the reliable delivery of front line service. Assets no longer capable of meeting these requirements are flagged for replacement. Assets due for replacement per regulation are removed from service and replaced. The department has a capital plan for replacement of this equipment on a cyclical basis.

Communication Equipment and Software condition is distributed on all condition ranges based solely on expert opinion as detailed inventory is not currently available. LFD is currently working on developing a detailed inventory for the emergency communication equipment.

This assessment of Fire's assets relies heavily on age and estimated useful life. It is not a standardized formal conditional assessment. Further investigation is needed to determine the condition of Fire's asset base with greater accuracy.

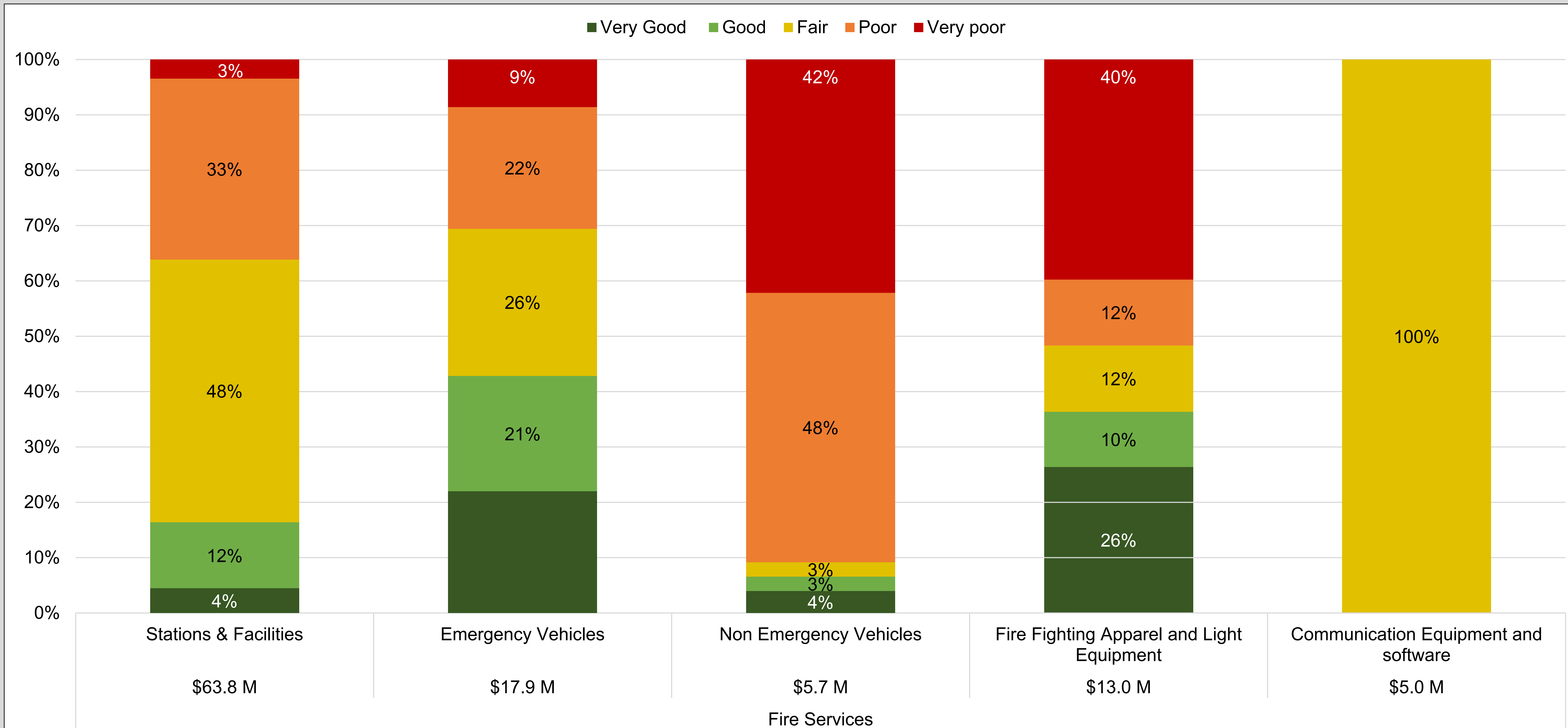


Figure 13.3 Asset Condition Detail (Fire Services)

13.2 LEVELS OF SERVICE

LEVELS OF SERVICE PERFORMANCE METRICS

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Safety, Quality, Reliability, Prevention and Public Education, and Environmental Stewardship/Sustainability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be maintained at the same level in future years.

Foundational and advanced metrics are listed in Table 13.2. They are listed as overall Fire assets LOS metrics (including Stations and Facilities, Front line vehicles and equipment, non-emergency vehicles and other equipment).

Fire Station # 11 – Savoy street

Section 13: Fire

Table 13.2 Levels of Service Metrics – Foundational and Advanced (Fire Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

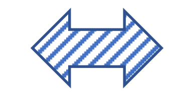
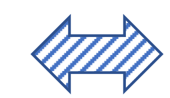
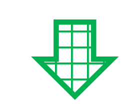
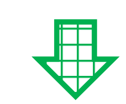
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Effective	Delivering effective and efficient fire rescue and prevention education services	Annual operating cost to provide service ($/household)	$338	↔
Safety	Providing effective fire & rescue services to the community	Number of incidents	9,588	↔
Quality	Providing effective fire & rescue services to the community	Providing effective fire & rescue services to the community	92%	~90%
Reliable	Providing the appropriate amount of rescue services and ensuring firefighters are well prepared	% of Fire assets in fair or better condition	62%	↑
		Readiness to respond to all types of emergencies	100%	100%
Environmental Stewardship	Provide fire services that protect the environment	% of environmentally friendly foam used	100%	↔

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 13: Fire

Table 13.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Fire Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Delivering effective and efficient fire rescue and prevention education services	Operating dollars budget for Fire Services (Fire & Rescue and Fire Prevention)	$59,804,282	
		Fire stations and Facilities reinvestment rate	1.36%	
		Emergency Vehicles reinvestment rate	6.89%	
		Non-emergency Vehicles and Equipment reinvestment rate	3.44%	
Safety	Providing effective fire & rescue services to the community	Ratio of apparatus/vehicles in service versus required	100.0%	
		Percent of Emergency Responses that meet NFPA 1710 standards for Total Response Times	82.6%	
Quality	Providing effective fire & rescue services to the community	90th percentile City-wide response time to assemble 15 Firefighters on scene within the Urban Growth Boundary (Code 4)	7:43	
		90th percentile City-wide response time for 1st Engine to arrive on scene within the Urban Growth Boundary (Code 4)	4:38	

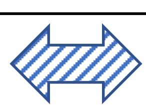
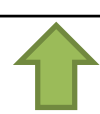
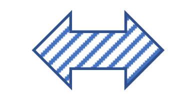
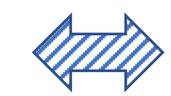
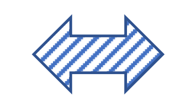
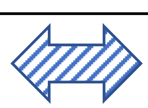
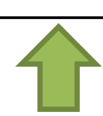
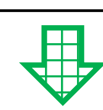
 **No Change**  **Positive Upward**  **Positive Downward**

Table 13.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Fire Services)

Performance Measure | Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing fire services with minimal impact to the community	% of fire assets in poor or very poor condition	38%	
		Average age of frontline fleet	8.00	
		# of fire apparatus/vehicles (frontline fleet)	31	
		% of time when equipment is available and operating properly	100%	100%
Environmental Stewardship	Providing fire services that protect the environment	% of environmentally friendly foam used	100%	
	Providing facilities that are energy efficient	Annual electric energy consumption per square foot	9,775 KWH/sf	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	1,392 m^3/sf	10% reduction by 2020 from 2014 baseline
	Providing facilities that are environmentally conscious	Annual water consumption per square foot	0.054 m^3/sf	10% reduction by 2020 from 2014 baseline

 **No Change**  **Positive Upward**  **Positive Downward**

13.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

13.3.1 Lifecycle Activities

Table 13.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Fire Department assets:

Table 13.3 Current Asset Management Practices or Planned Actions (Fire Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Fire assets are rigorously maintained to support the reliable delivery of front line service. They receive monthly and more rigorous biannual and annual inspections. • Fire facilities are maintained and renewed through the Facilities group and their use of VFA software (supplied through VFA), which combined with comprehensive condition assessments and Facilities experience, determines the lifecycle management needs of a facility. • The lifecycle management needs includes the direct care of the building envelope, mechanical and electrical systems, etc. • Fire manages their assets based on a ten year capital budget plan that defines the investments needed to support ongoing facility improvements. Single purpose Fire Engines and dedicated Rescue Units are being replaced over the long term with multi-purpose vehicles capable of providing more operational flexibility, resiliency and depth of coverage; resulting in a change of the configuration of the Fire fleet. • Fire leadership networks with peers through conferences and committees to learn from their experience.	• Lack of a realization of the benefit from the activity (i.e. the life is not extended or the cost of managing an asset increases rather than decreases). • Improper usage or illegal buildings may result in higher risk of fire or loss in the event of fire for citizens and the Fire department.

Table 13.3 (Continued) Current Asset Management Practices or Planned Actions (Fire Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• Fire Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), the cost and timing of replacement requirements. • A work order system and online interface exists for Fire admin to generate requests of Facilities. • Fire vehicles and equipment are monitored and problems addressed when triggered by staff/fleet observations. • Tender specifications are modified based on experience from usage of vehicles and equipment, to minimize recurrence of the issues, where possible.	• Refer to Appendix B.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• Fire Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), the cost and timing of replacement requirements. • Equipment is generally not considered a rehabilitation option. The lifecycle activity is regular maintenance and the decision to replace the asset. • Fire vehicles are rehabilitated/replaced by their own fleet.	• Refer to Appendix B.

Section 13: Fire

Table 13.3 (Continued) Current Asset Management Practices or Planned Actions (Fire Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• Fire Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), the cost and timing of replacement requirements. • Vehicle and equipment assets ideally are used to end of useful life. When unexpected events occurs then the asset would have to be immediately replaced.	• Refer to Appendix B.

Emergency Vehicle – Engine # 9

Table 13.3 (Continued) Current Asset Management Practices or Planned Actions (Fire Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• Fire would coordinate to ensure buildings are disposed or transitioned to other uses such as training sites.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• Refer to Appendix B.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Capital growth projects are identified by Development Charges (subject to *Development Charges Act, 1997* requirements and City of London policy), or as a part of Assessment Growth Policy (where applicable with municipal policy).	• Incorrect growth assessments may result in overabundance or under abundance of Fire Stations and Facilities assets.

Section 13: Fire

13.3.1 Lifecycle Activities (Continued)

Table 13.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average annual Activity Currently Practiced)
Fire Department	Operating Budget*	**Total**	**$57,994**
	Lifecycle Capital Budget**	Fire Stations and Facilities	$866
		Emergency Vehicles	$1,232
		Non-emergency vehicles, Equipment, and software	$812
		Total	**$2,910**
	Service Improvement Budget	**Total**	**$1,195**

The cost of these identified Lifecycle activities is summarized in Table 13.4. Current funding for operating budgets presented are the average of the budgeted 2016 and 2017 fiscal years. Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

Table 13.5 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Fire Department	Growth (Capital Budget and Significant Operating Costs)	Capital	$630
		Significant Operating Costs	$1,510
		Total	**$2,140**

Growth activities are analyzed using the draft 2019 DC Background Study. The Fire Department Capital and Operating growth expected funding is summarized in Table 13.5. Needs relate to building and outfitting Fire Station 15.

Fire Station # 5 – Deveron Crescent

13.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CONDITION PROFILE BASED ON CURRENT BUDGET

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is insufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 13.4 presents the expected condition profile for the next 20 years based on the current budgets for the Fire Department.

OPTIMUM CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the LOS metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. Figure 13.5 presents the expected condition profile for the next 20 years based on the optimum budget for the Fire Department.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

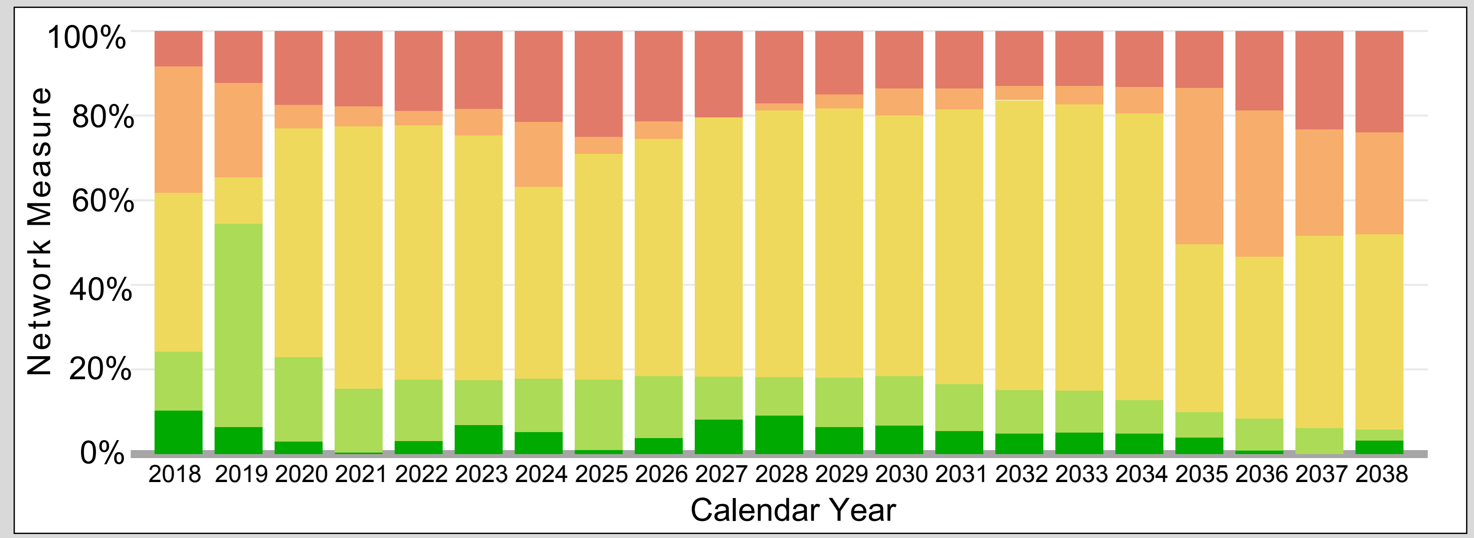


Figure 13.4 Condition Profile Expected from Current Budget over 20-year span (Fire Services)

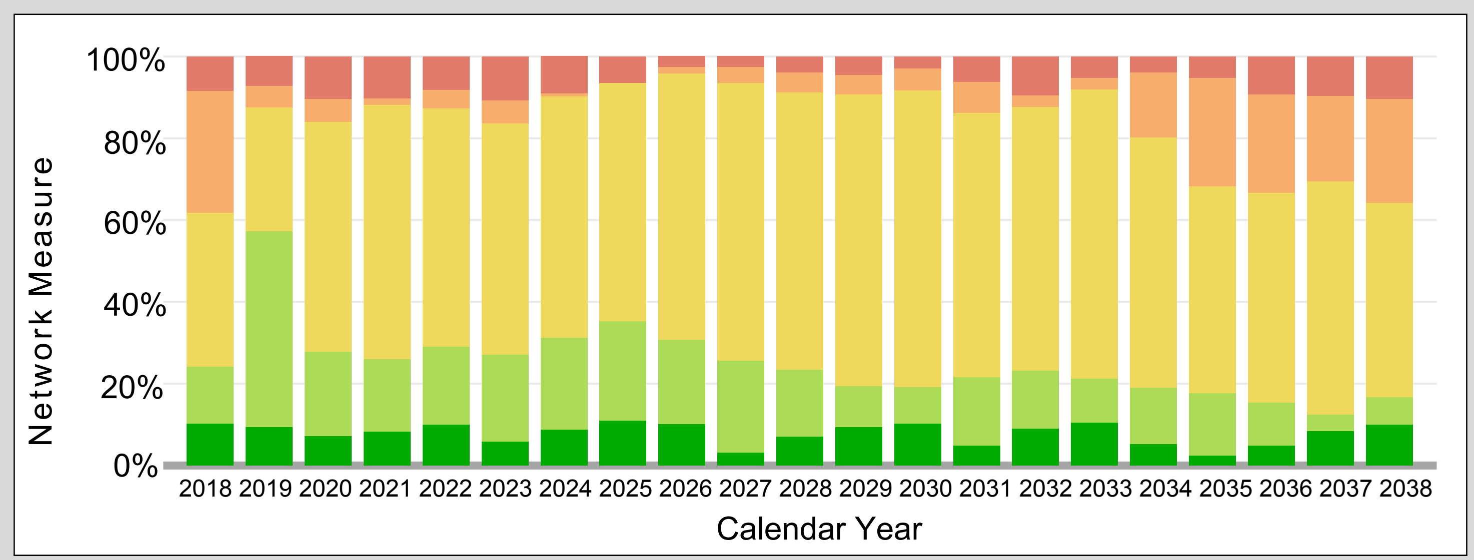


Figure 13.5 Condition Profile Expected from Optimal Budget over 20-year span (Fire Services)

13.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 13.6 and illustrated in Figure 13.6. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as it is inherent in asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

The Cumulative Infrastructure Gap for the Fire Department assets would grow to about $28.5 M over the next decade. Trends presented are primarily driven by the Fire Stations and Facilities, which accounts for roughly 58% of this deficit.

Base needs represent the costs to renew and maintain the serviceability of existing assets, and do not account for growth and the expansion of service to new areas.

Table 13.6 Current and Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Fire Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's) (Average Annual)	Funding Gap (000's) (Average Annual)
Fire Services Assets	Lifecycle Capital Budget	Fire Stations and Facilities	$866	$2,338	$nil	$1,472
		Emergency Vehicles	$1,232	$1,672	$51	$389
		Non-emergency vehicles, Equipment, and software	$812	$1,930	$130	$988
		Total	**$2,910**	**$5,940**	**$181**	**$2,849**

Non-Emergency Vehicles – Fire Prevention and Inspection

Section 13: Fire

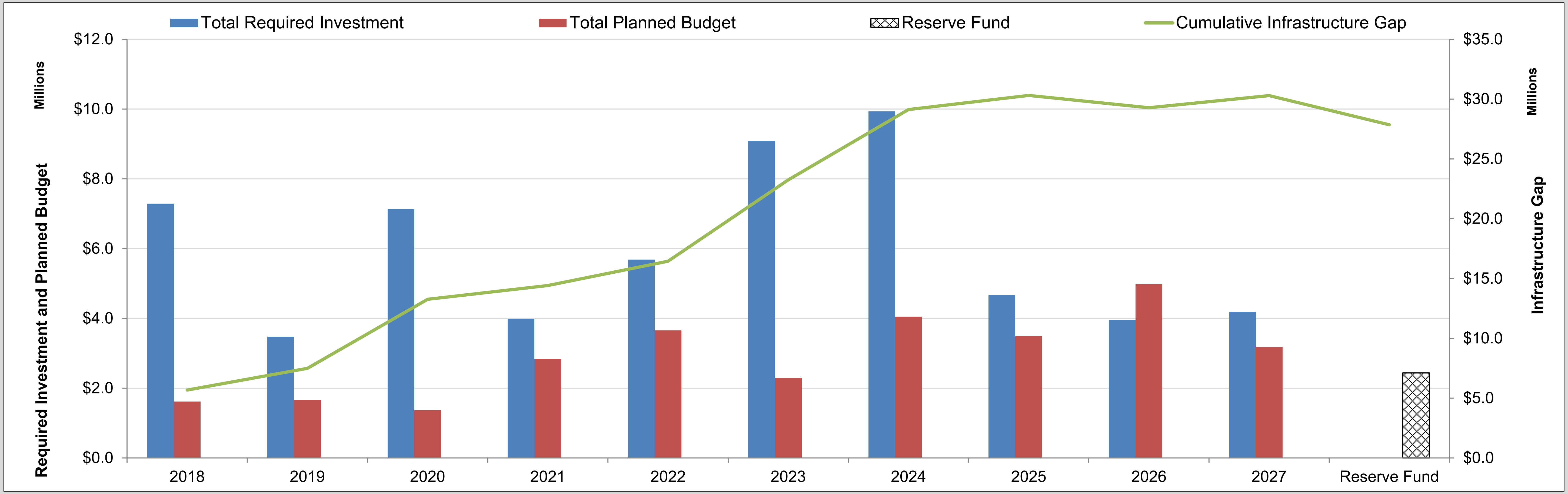


Figure 13.6 Forecasted Infrastructure Gap (Fire Services)

Non-Emergency Vehicle – Fire Investigation Unit

Fire Station # 7 – Webster street

13.5 DISCUSSION

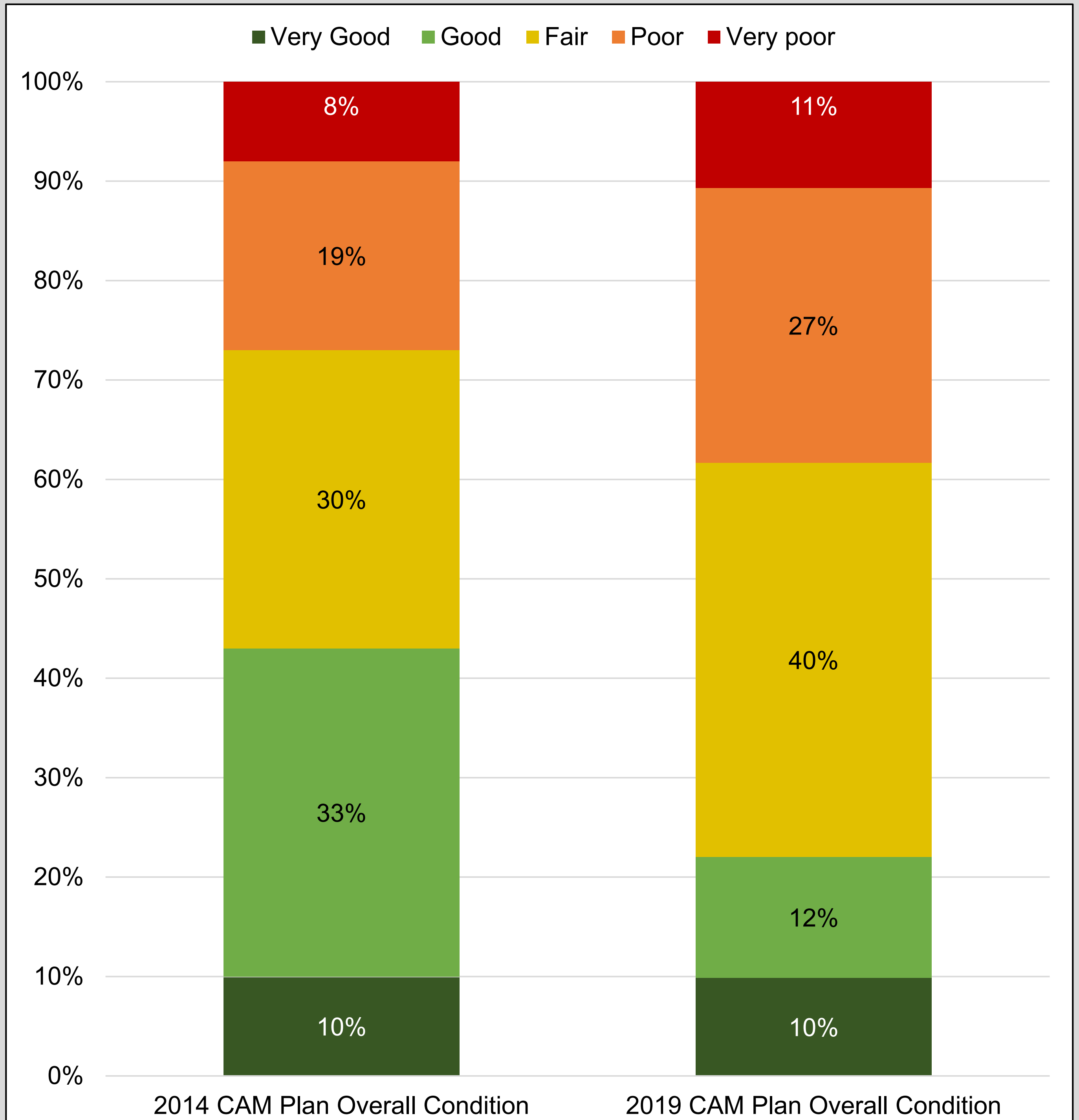


Figure 13.7 2014 CAM Plan to 2019 CAM Plan Condition Summary (Fire Services)

CURRENT AND FUTURE CHALLENGES

The Fire Department assets replacement value indicated in the 2014 Asset Management Plan was $66 million, the replacement value increased to around $105 million due to inflation and constructing new assets in addition to the recent increase in the construction cost in the region. The 2014 CAM Plan to 2019 CAM Plan Fire Department assets condition comparison is provided in Figure 13.7. The condition profile has changed to have more assets in poor and very poor condition. The main reason for this change is attributed to the better and more accurate facility condition data based on the detailed condition assessment conducted in the past few years in addition to the imminent replacement of equipment that is in poor/very poor condition. There was no cumulative forecasted infrastructure gap in the 2014 CAM Plan; however, the current cumulative 10 year forecasted infrastructure gap is $28.49 million, assuming that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities.

Fire Station # 11 – Savoy street

Section 13: Fire

13.6 CONCLUSIONS

Valued at over $105 Million, the City's Fire Services assets are overall in Poor to Fair condition, indicating that sufficient investments are required to maintain the assets at the required level of service. Maintaining current investment will result in a $28.50 Million infrastructure gap. This could result in degradation of the service delivered to citizens. Further investment is needed to address the future lifecycle needs of the current Fire Services assets. Figure 13.8 illustrates the infrastructure gap as a proportion to the required investment over the next decade showing the distribution of the different types of assets contributing to the gap, while Table 13.7 presents the summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment rates for Fire Services assets.

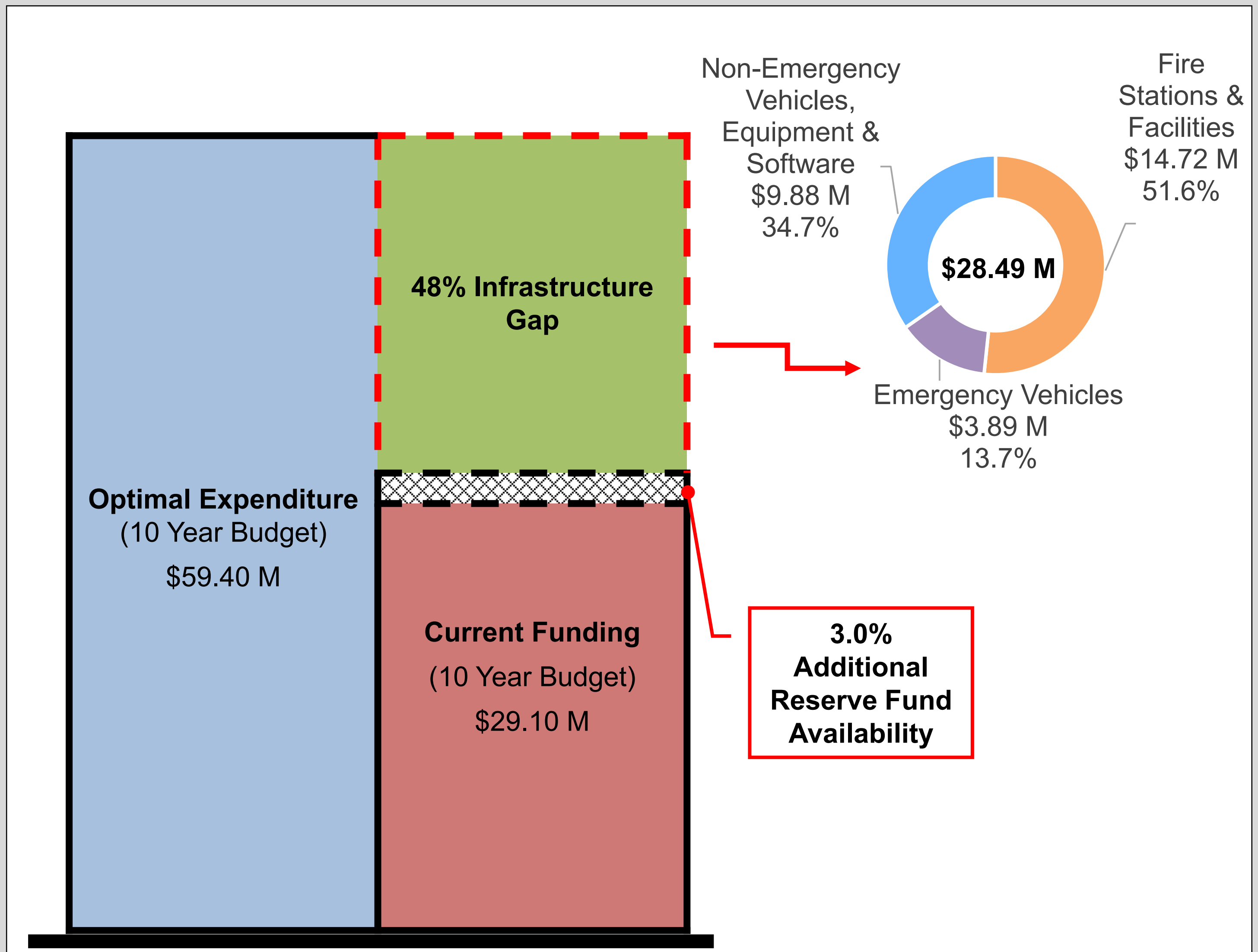


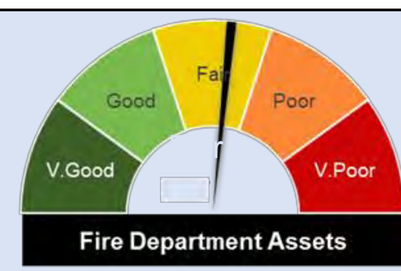
Figure 13.8 Cumulative 10 year Infrastructure Gap (Fire)

London Fire Department Mandate

Section 13: Fire

Table 13.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Fire Services)

City of London – Fire Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Stations and Facilities	$63.76		$3.63	$14.72	1.36%	1.7% to 2.5% *
Emergency Vehicles	$17.89		$0.48	$3.89**	6.89%	6.66%
Non Emergency Vehicles and Equipment	$23.63		$1.56	$9.88**	3.44%	10.0%
All Fire Assets	**$105.28**		**$5.67**	**$28.49****	**2.76%**	**2.5% to 3.4%**

* Canadian Report Card Recommended Annual Reinvestment Rate.

** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.

DATA RELIABILITY

High Low

DATA ACCURACY

Section 14: Long Term Care

Quick Facts
1 Retirement Home

Replacement Value	$64.63 Million
Condition	Good
10 Year Gap	$11.62 Million
City-Wide Infrastructure Gap Contribution	2.0%

2.0% City-Wide
Infrastructure Gap Contribution

Section 14: Long Term Care

14.1 STATE OF LOCAL INFRASTRUCTURE

Dearness Home is a long-term care home, owned and operated by the City of London. Dearness Home provides long term care services to 243 residents from the London-Middlesex area by providing respite, medical, nursing, personal, therapeutic and social work services. Dearness Home promotes the well-being of individuals and families by providing a safe, secure, comfortable and caring community in which to live.

The assortment of services offered by Dearness is second to none. The needs of residents for short or long term care in private or standard rooms are met in one of the 9 Resident Home Areas. Dedicated staff and volunteers make residents' physical, emotional, social and spiritual needs their first concern. In fact, with about 350 volunteers, the ratio of volunteer time per resident is one of the highest in the area.

Dearness Home – Southdale Rd E

14.1.1 Asset Inventory & Valuation

The City of London owns and operates the Dearness Home facilities and equipment that have a current replacement value of about $64.6 million. The services provided at the facility involves primary care and personal support, including provision of nutritious meals and snacks; therapeutic, recreational, social and spiritual services; medical services; nursing services; and supportive therapies. Table 14.1 summarizes the Long Term Care assets inventory and current replacement value.

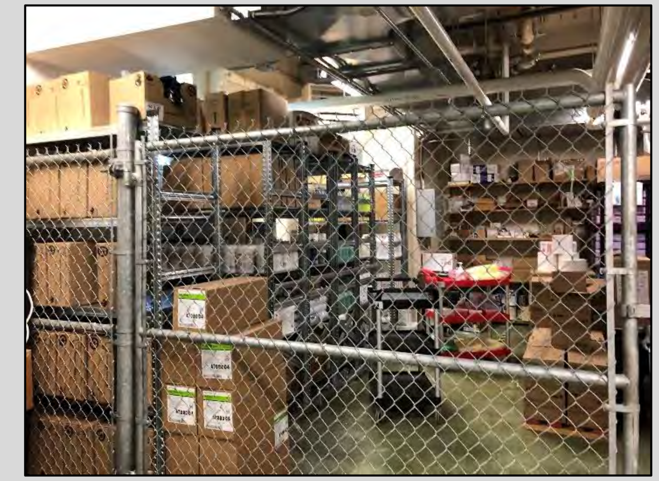
Dearness Home – Exterior

Section 14: Long Term Care

14.1.1 Asset Inventory & Valuation (Continued)

Table 14.1 Asset Inventory & Valuation (Long Term Care Services)

Asset Type	Asset	Description	Inventory	Unit	Replacement Value (000's)
Long Term Care Facilities and Equipment	Dearness Retirement Home	Building and Site work	1	Ea.	$61,120
	Equipment	Food Services, Nursing Equipment, Recreation Services, and other Building Equipment	Mix	Ea.	$3,517
TOTAL					**$64,637**



Dearness Home – Equipment Storage

Dearness Home – Shower and Tub Room

14.1.2 Age Summary

Figure 14.1 shows the Long Term Care assets' (Facilities and Equipment) average asset age as a proportion of the average useful life by asset type. The average ages for the Facility and associated Site Work were calculated using the construction date, while all equipment ages were calculated using available information of recorded acquisition date or were based on expert opinion. As shown in Figure 14.1, in general all asset types are within their average industry standard useful life. It is important to note that 40 years was selected as the expected useful life based on the non-structural components of buildings which have the longest expected service life. In practice, the building is composed of many components that are slated for renewal based upon a combination of factors including age, condition, consequence of failure, likelihood of failure etc. The practical expected life is largely indefinite while the building continues to serve its intended purpose in its geographic location.

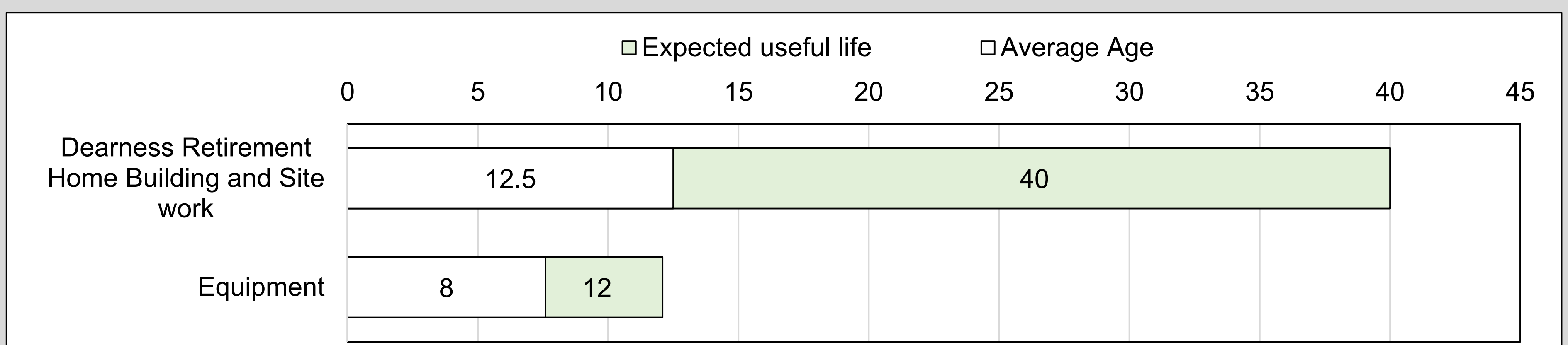


Figure 14.1 Average Age as a Proportion of Average Useful Life in Years(Long Term Care Services)

Section 14: Long Term Care

14.1.3 Asset Condition

Generally, the City's Facilities Division provides maintenance, repair and rehabilitation services on behalf of Long Term Care service area, while the Long Term Care service area is responsible for use of the facility and delivery of the service. However, Long Term Care services has greater involvement in maintaining the facility compared to a typical other service areas as immediate action is required in order to comply with the Long-Term Care Homes Act 2007, provincial regulations and safety standards.

The condition of the buildings are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (split into building envelope, mechanical and electrical systems, etc.).

Long Term Care has a database of all types of equipment and assets such as beds, lifts, nursing and recreation related assets, etc. The database contains an inventory of units and replacement values in addition to other information such as estimated condition and expected useful life for each unit.

As seen in Figure 14.2, 91% of Long Term Care owned assets are in **Good** condition. The condition is mainly driven by the condition of the facility itself as it comprises the greatest replacement value of about $61 million. Reflecting on the fact that the facility was built in 2005, the original structure and major components of the building are still in good condition. Figure 14.3 shows the condition distribution by asset type. As seen in the figure, 68% of equipment is rated **Fair** to **Very Good** condition.

Dearness Home – Laundry Equipment

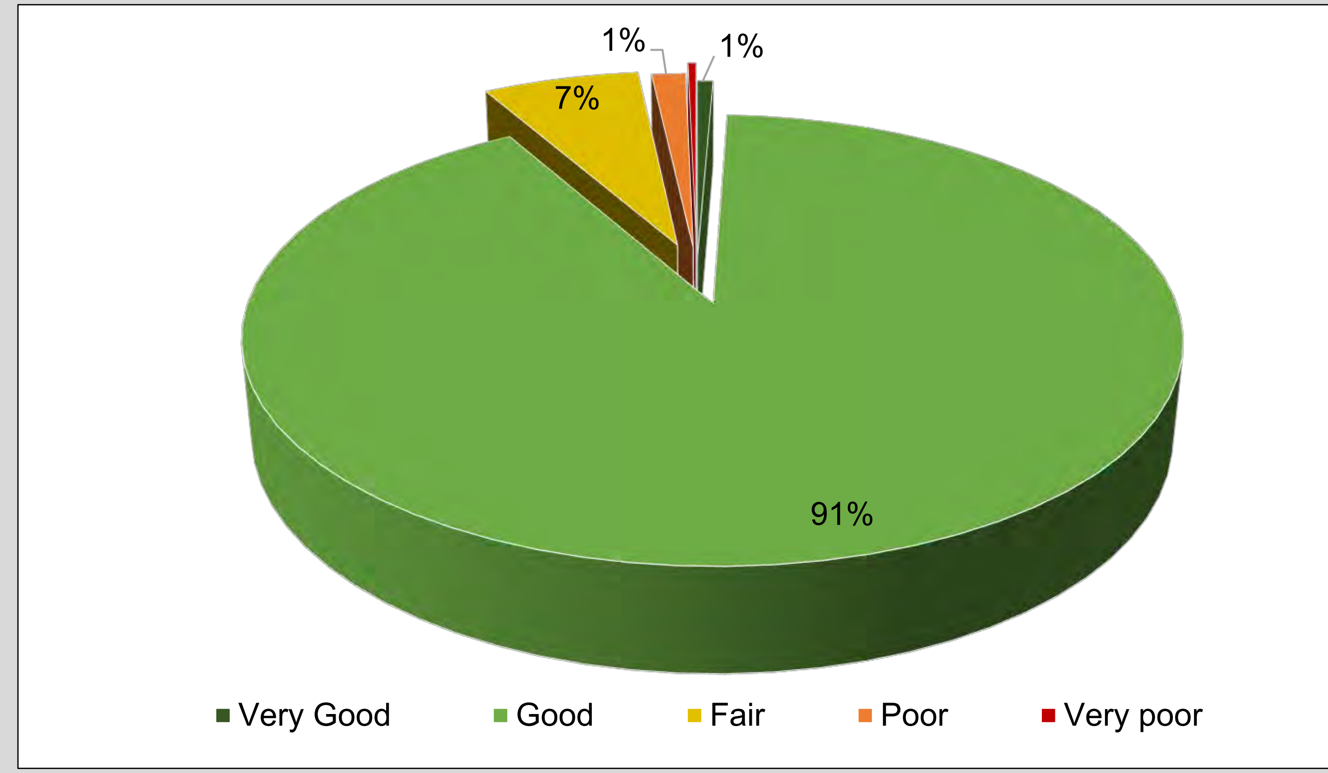


Figure 14.2 Long Term Care Services Asset Condition (Long Term Care Services)

Dearness Home – Dining Area

14.1.3 Asset Condition (Continued)

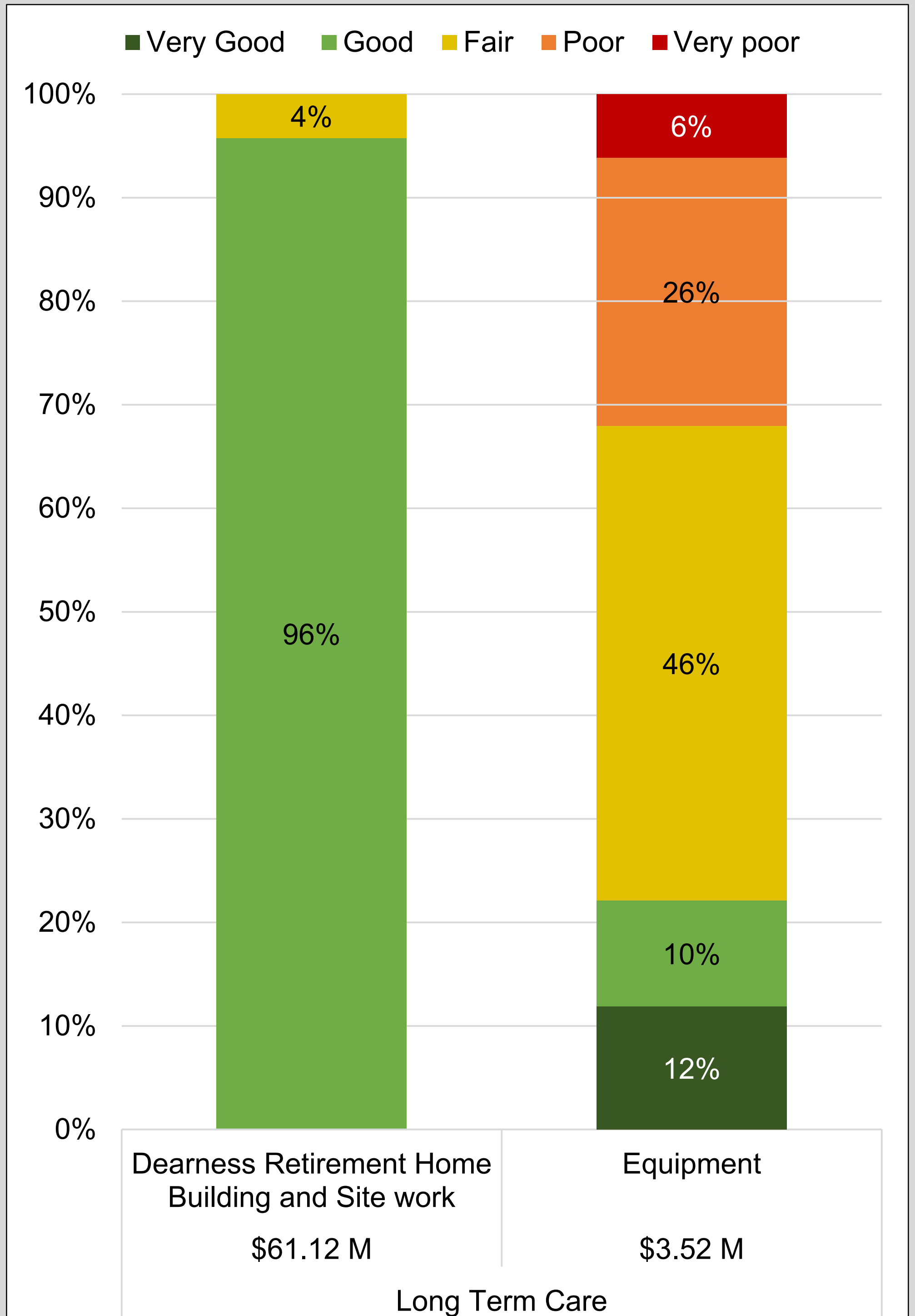


Figure 14.3 Asset Condition Detail (Long Term Care Services)

14.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Safety, Accessibility, Quality, Environmental Stewardship/Sustainability, and Legislative. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

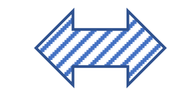
Foundational and advanced metrics are listed in Table 14.2. They are listed as Overall Long Term Care Assets LOS metrics for the facility and equipment.

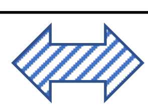
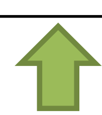
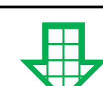
Dearness Home – Main Floor and Entrance

Section 14: Long Term Care

Table 14.2 Levels of Service Metrics – Foundational and Advanced (Long Term Care Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing long term care services in an efficient manner	Cost to provide service ($/resident)	$90,472	
Safe	Providing safe long term care facilities	Percentage of facility components annually inspected	100%	100%
Accessible	Providing long term care services in facilities that are FADS compliant Providing enough space for community and staff to comfortably use facilities	Percentage of facility components that are FADS compliant	Under Review	Under Review
Quality	Providing long term care facilities in acceptable condition	Percentage of Long Term care assets in fair to very good condition	98%	
	Provide community services outside the facility	Homemakers Program - Hours of Service	7,185	>6,000
	Providing long term care facilities at the right design standard	Long Term Care: Percentage of long term care residents who rate the home as a good or excellent place to live	96.90%	>90%
		Adult Day Program: Percentage of clients who are satisfied with the program.	92%	>90%

 No Change  Positive Upward  Positive Downward

Section 14: Long Term Care

Table 14.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Long Term Care Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Environmental Stewardship	Providing long term care facilities that are energy efficient	Annual electric energy consumption per square foot	20.2 KWH/SF	
		Annual natural gas consumption per square foot	3.206 m^3/sf	
	Providing long term care facilities that are environmentally conscious	Annual water consumption per resident client day	143.3 m^3/resident	
Legislative	Providing long term care facilities that meet legislative requirements	Number of issues with Ministry observations relating to Assets	0	0

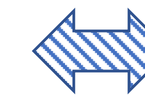
Dearness Home – Recreation Room

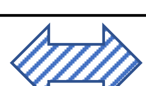
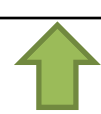
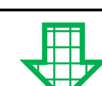
No Change | **Positive Upward** | **Positive Downward**

Section 14: Long Term Care

Table 14.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Long Term Care Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing long term care services in an efficient manner	Operating budget	$21,984,811	
		Facilities related Reinvestment Rate	0.76%	
		Equipment Reinvestment Rate	0.0%	
Safe	Providing safe long term care facilities	# of outstanding safety improvements required at facility/100 sqft	0	0
		% of facility components annually inspected	100%	100%
Accessible	Providing long term care services in facilities that are FADS compliant	% of washrooms that are FADS compliant	100%	100%
		% of entrances that are FADS compliant	100%	100%

 **No Change**  **Positive Upward**  **Positive Downward**

Section 14: Long Term Care

Table 14.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Long Term Care Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Quality	Providing long term care facilities in acceptable condition	% of Long Term care assets in poor or very poor condition	2%	
	Provide community services outside the facility	Hours of Service	7,185	>6,000
	Providing long term care facilities at the right design standard	Occupancy rate	98.30%	>97%
		Number of person days of service per year.	7,432	6,750
Environmental Stewardship	Providing long term care facilities that are energy efficient	Annual electric energy consumption per square foot	20.292 KWH	10% reduction by 2020 from 2014 baseline
		Annual natural gas consumption per square foot	3.206 m^3/sf	10% reduction by 2020 from 2014 baseline
	Providing long term care facilities that are environmentally conscious	Annual water consumption per square foot	0.187 m^3/sf	10% reduction by 2020 from 2014 baseline
Legislative	Providing long term care facilities that meet legislative requirements	Number of issues with Ministry observations relating to Assets	0	0

No Change | Positive Upward | Positive Downward

14.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

14.3.1 Lifecycle Activities

Table 14.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Long-Term Care assets:

Table 14.3 Current Asset Management Practices or Planned Actions (Long Term Care Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Refer to Appendix B.	• Refer to Appendix B.
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• **Facility** – Dearness Home has greater involvement in maintaining the facility compared to other service areas as immediate action is required in order to comply with the Long-Term Care Homes Act 2007, Provincial regulations and safety standards. • **Equipment** – Scheduled preventative maintenance programs for the majority of assets.	• Refer to Appendix B.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• **Facilities** – Dearness Home is regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (split into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of the Facilities service area, and computer software programs used by Facilities (VFA) determine the cost and timing of renewal requirements. • **Equipment** – Some assets are evaluated and rehabilitation is considered prior to purchasing new (i.e. janitorial equipment). But many do have a lifecycle that does not allow for rehabilitation (i.e. Mattresses).	• Refer to Appendix B.

Table 14.3 (Continued) Current Asset Management Practices or Planned Actions (Long Term Care Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• **Facilities** - The condition of the Dearness buildings are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (split into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA), determine the cost and timing of replacement requirements. • **Equipment** - Dearness has developed inventory listings documenting replacement value, condition and expected useful life.	• Refer to Appendix B.
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• **Equipment** – Dearness disposes of assets in compliance with required safety standards and regulations. • **Facilities** – Disposal Activities are inherent in replacing assets, and are administered by contractors or Facilities personnel.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• Dearness identifies service improvements through customer feedback surveys and develops business cases outlining the need for the service improvement.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Capital growth projects are identified by Development Charges (subject to *Development Charges Act, 1997* requirements and City of London policy), or as a part of Assessment Growth Policy (where applicable with municipal policy).	• Refer to Appendix B.

Section 14: Long Term Care

14.3.2 Funding the Lifecycle Activities

The cost of these identified lifecycle activities is summarized in Table 14.4. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years. Service Improvement activities are analyzed using planned expenditures identified a review of the capital budget.
No growth budgets have been identified for Long Term Care for the 2018-2027 period.

Table 14.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Long Term Care	Operating Budget*	Total	$21,896
	Lifecycle Capital Budget**	Total	$465
	Service Improvement Budget	Total	Nil

Dearness Home – Patient Room (Short Stay)

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

14.3.3 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not available for the Long Term Care service area. Data exists for these assets but not easily integrated into condition profile assessments. Shorter-lived assets common with Long Term Care do not lend to traditional linear assessment profiles. In the absence of condition profile predictions, Long Term Care mitigates this by having detailed analysis for assessing expected capital needs.

Dearness Home – Dining and Patio Area

14.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 14.5 and illustrated in Figure 14.4. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as it are inherent in asset renewal/rehab/replacement activities.

The Cumulative Infrastructure Gap for the Long Term Care assets would grow to more than $11.62 million over the next decade. Trends presented are primarily driven by the Dearness Building and Site Work, which accounts for roughly 71% of this infrastructure gap. Base needs represent the costs to renew and maintain the serviceability of existing assets, and do not account for growth and the expansion of service to new areas.

Table 14.5 Current and Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Long Term Care Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Long Term care	Lifecycle Capital Budget	**Total**	**$465**	**$1,663**	**$36**	**$1,162**

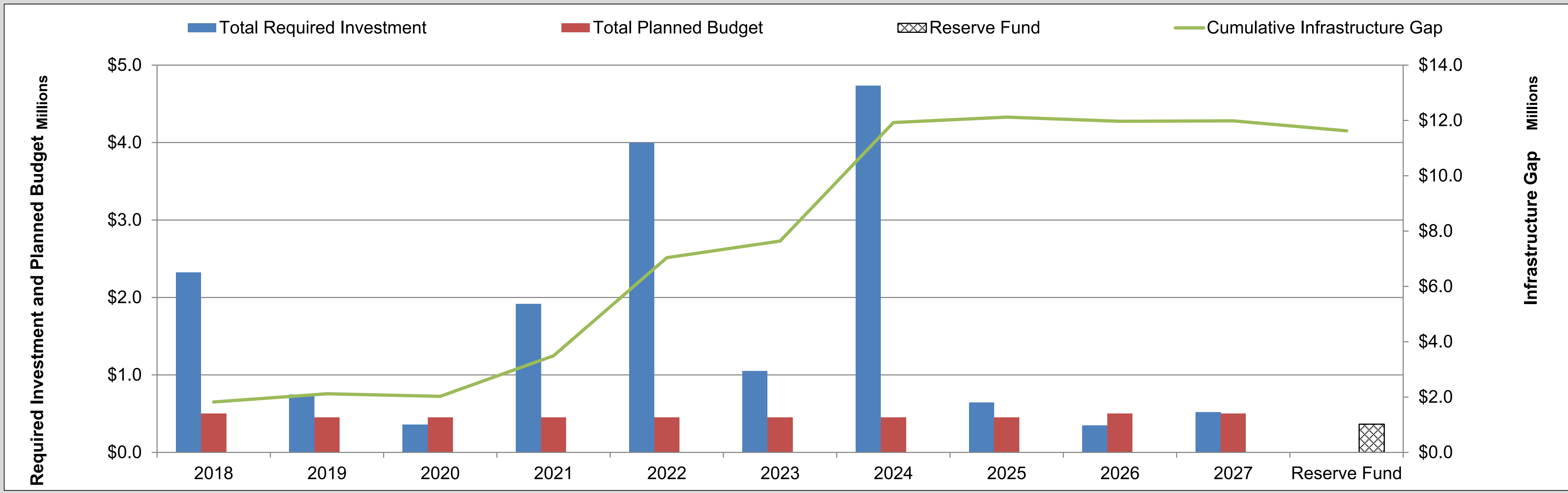


Figure 14.4 Forecasted Lifecycle Infrastructure Gap (Long Term Care Services)

14.5 DISCUSSION

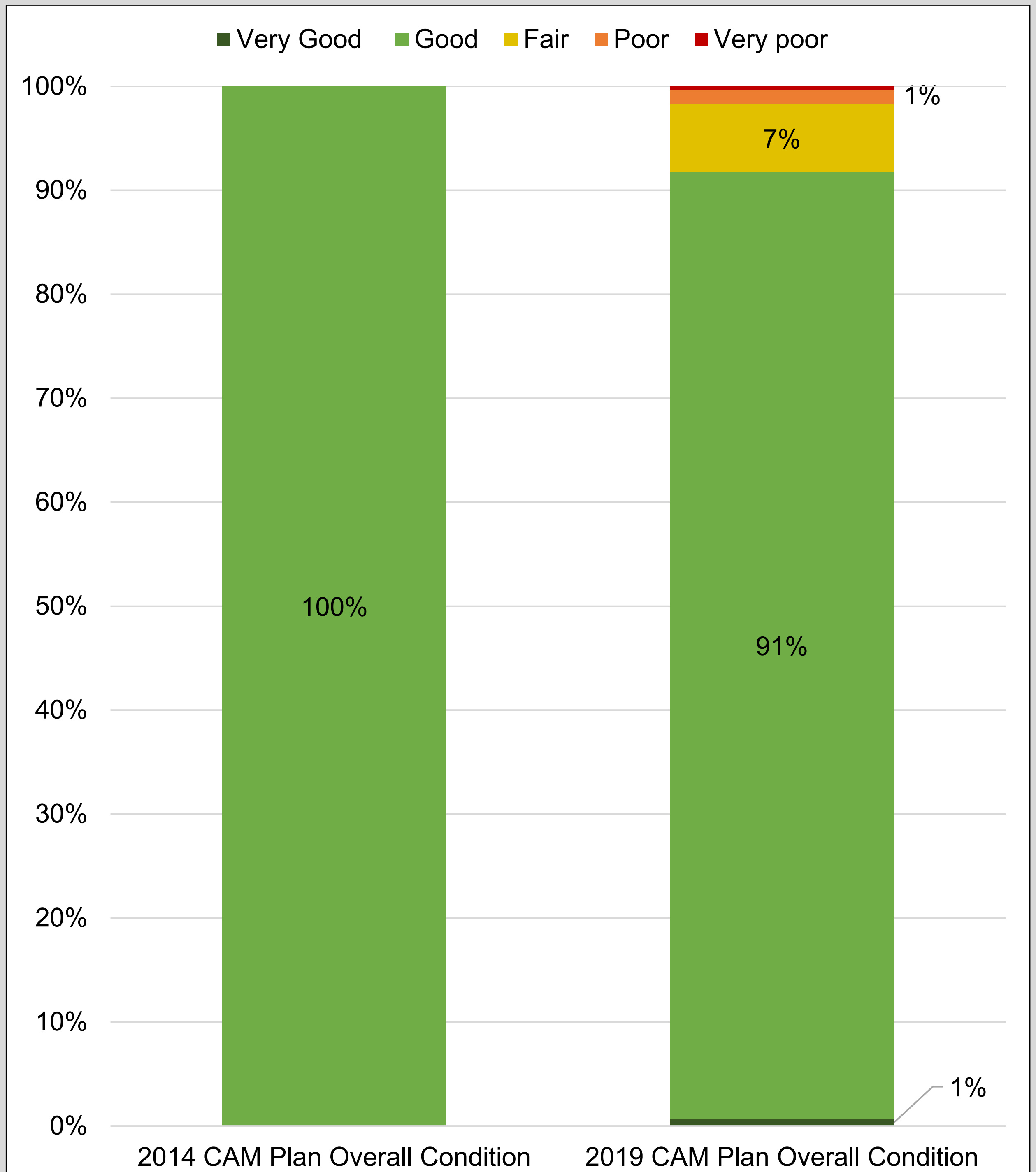


Figure 14.5 2014 CAM Plan to 2019 CAM Plan Condition Summary (Long Term Care Services)

CURRENT AND FUTURE CHALLENGES

The Long Term Care assets' replacement value indicated in the 2014 CAM Plan was $45 million. The replacement value has since increased to $64.63 million due to inflation and an increase in construction cost. An important caveat was the updated equipment database that was not available in the 2014 CAM Plan. The Long Term Care assets 2014 CAM Plan to 2019 CAM Plan condition comparison is provided in Figure 14.5. Evaluating required investment versus planned budget shows that the Long Term Care will have an accumulated infrastructure gap of $11.62 million over the next decade, resulting in an expected degradation of the service delivered to the residents.

Long Term Care service area needs for equipment have increased the gap as the operating budget has partially financed these purchases for 2016/2017. One time operational surpluses are used to purchase any new or emerging equipment that would help with improving efficiencies within the building. This new equipment is not noted on the lifecycle renewal until tracked as new equipment. Those surpluses are also used for older equipment that have passed their useful life or the repairs needed exceed or are not sensible when compared to the purchase of something new. The use of one time surplus from operating budget is unreliable as it will not sustain the delivery of service in the future. It is recommended to establish a dedicated lifecycle renewal budget for long term care equipment.

Dearness Home – Lounge

14.6 CONCLUSIONS

Valued at nearly $64.6 Million, the City's Long Term Care assets are overall in **Good** condition, indicating that the current funding from Capital and Operating budget has been sufficient to maintain the Long Term Care assets in a serviceable condition. However, the trend shows that maintaining current investment will result in an accumulated infrastructure gap of $11.62 million in the next decade. The trend presented is driven by the shortage in the capital budget and continuously funding the capital requirements from the Operating budget. Figure 14.6 illustrates the infrastructure gap as a proportion to the required investment over the next decade. Table 14.6 presents the summary of the State of the Infrastructure, Infrastructure Gap/Surplus, and Reinvestment rates for Long Term Care assets.

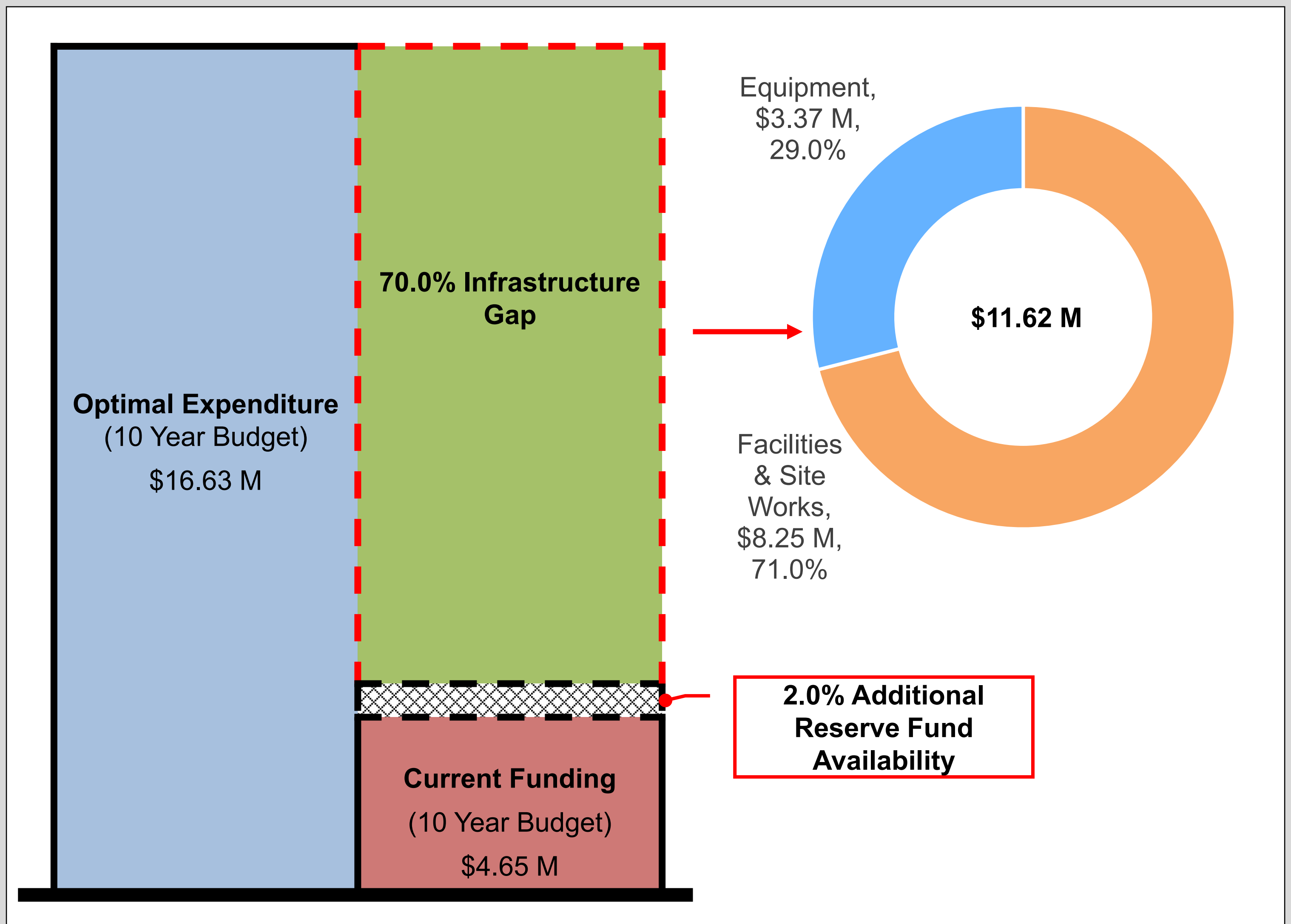


Figure 14.6 Cumulative 10 year Infrastructure Gap (Long Term Care Services)

Dearness Home – Exterior

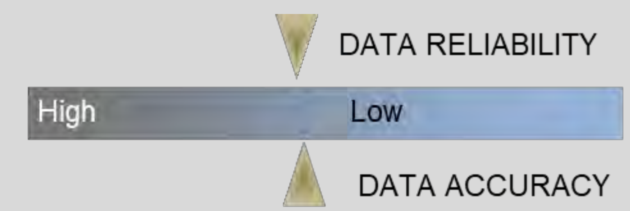
Section 14: Long Term Care

Table 14.6 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Long Term Care Services)

City of London – Long Term Care Services Infrastructure

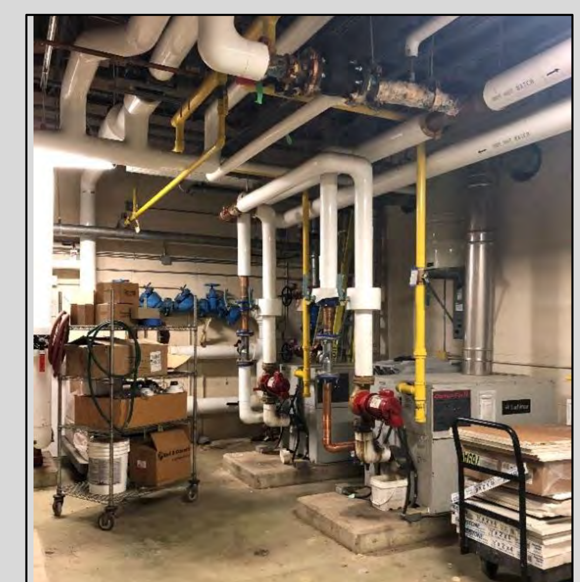
Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Overall Long Term Care	$64.63		$1.82	$11.62*	0.72%	2.6%

* This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Dearness Home – Boiler and Pump Room

Dearness Home – Boiler and Pump Room



Dearness Home – Boiler and Pump Room

Section 15: Corporate and Cultural Facilities

Cultural Facilities Overall Condition

Corporate Facilities Overall Condition

Quick Facts
15 Heritage Facilities
46 Public Art and Monuments
4 Administration Buildings

	Corporate Facilities	Cultural Facilities
Replacement Value	$244.6 Million	$91.03 Million
Condition	Poor	Fair
10 Year Gap	$32.03 Million	$19.53 Million
City-Wide Infrastructure Gap Contribution	9.1%	

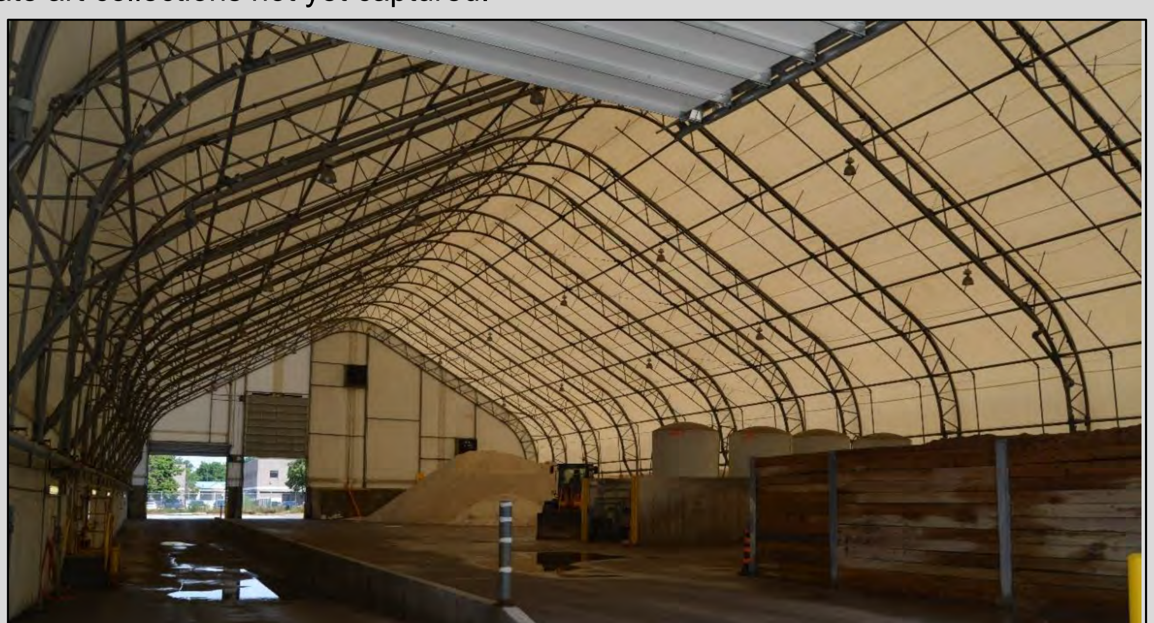
9.1% City-Wide
Infrastructure Gap Contribution

Section 15: Corporate & Cultural Facilities

15.1 STATE OF LOCAL INFRASTRUCTURE

The City of London owns and operates hundreds of facilities as part of its built environment. These facilities are used to provide the wide range of services offered by London. They support service delivery by providing safe and efficient work and meeting places for use by City of London staff, Council, Boards and Commissions, and members of the public. The Facilities Division manages and maintains these assets, allowing them to meet the City's functional requirements, and building and safety codes, while operating in a safe and efficient manner. The majority of facilities inventory include buildings which are individually used for the service they provide like recreational arenas and are budgeted within their service area. For the purpose of this report, their inventory has been included in their specific service area section while this section deals with the remainder and provides a brief summary of Facilities Division.

This section of the facilities inventory is divided into two areas; Corporate Facilities and Cultural Facilities. Corporate Facilities include general service facilities such as administrative buildings (e.g. City Hall, Admin building etc.) and operations centers (e.g. A. J. Tyler, Exeter Road etc.) that are used by several different service areas. Cultural Facilities are very different in that each facility may have a different management approach. The City Culture and City Planning offices manage these facilities in consultation with the Facilities Division, contracts with third parties and addresses any major maintenance and other issues. Public Art and Monuments are identified as part of Business Improvement Area (BIA) planning documents and community improvement plans in neighbourhoods across the City of London; they are identified as part of larger City Capital Projects such as Community Centres; and are identified in development agreements. Civic Art collections are maintained by Clerks through Past Perfect Software, however, some corporate art collections not yet captured.



Sand/Salt Dome – Exeter Operation Centre

15.1.1 Asset Inventory and Valuation

The City of London owns and operates a collection of office, administrative, storage and cultural facilities valued at approximately $335 Million located throughout the City of London. Table 1 summarizes the Corporate and Cultural Facilities assets inventory and replacement values. The administrative buildings provide space for staff work stations, equipment, and material; provide modern and effective meeting places; and, support the City in delivering front-line and administrative services. Operations Centres focus on maintenance and provide garages, workshops, storage and operations administration. Cultural Facilities includes several cultural sites, contributing to local tourism, learning, and public enjoyment. Some administrative buildings also have heritage status like the J. Allyn Taylor building but are grouped with administrative buildings for the purpose of this inventory.

Table 15.1 Asset Inventory and Valuation (Corporate and Cultural Facilities Services)

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
Corporate Facilities	Administration Buildings	4	Ea.	$133,611
	Main Centres	25	Ea.	$110,993
	Other	14	Ea.	
Cultural Facilities	Heritage	15	Ea.	$61,048
	Arts and Entertainment	1	Ea.	$20,738
	Public Art and Monuments	46	Ea.	$8,215
	Site Work	8	Ea.	$1,028
TOTAL				**$ 335,633**

The estimated replacement value for Corporate Facilities assets resides in the four administrative buildings, which add up to $133.6M. This includes City Hall, the City Hall Parking Building, the J. Allyn Taylor Building, and the POA Court House. The larger operations centers estimated replacement value is $110M which include A.J. Tyler, Oxford, Adelaide, and Exeter Road. Other Corporate Facilities include assets such as salt domes and storage buildings.

Section 15: Corporate & Cultural Facilities

15.1.1 Asset Inventory and Valuation (Continued)

Cultural Facilities include heritage buildings such as Eldon House; Elsie Perrin Williams Estate; Flint Cottage; one arts and entertainment venue (Centennial Hall); and, public art and monuments. The City's Facilities Division provides maintenance services on behalf of the responsible Service Area for the majority of these facilities in compliance with provincial regulations and safety standards. The City's Planning office is responsible for conserving the majority of these facilities in compliance with provincial regulations, such as the Ontario Heritage Act, and safety standards while tenants are responsible for use of the facility and delivery of the service they provide. For some Facilities like Eldon House, Grosvenor Lodge, etc., the City Planning office and Facilities Division deals with major conservation projects like window restoration while is the tenant is responsible for the use, operation and minor maintenance. Generally, the terms are specified in agreements or contracts. This report excludes buildings fully under the control of Boards and Agencies like Museum London or the Convention Center. Note that while Eldon House is considered a Board, the Eldon House structure is owned by the City of London.

Boer War Memorial – Victoria Park

15.1.2 Age Summary

Figure 15.1 shows the Corporate and Cultural facilities average asset age as a proportion of the average useful life by asset type. In most of the cases, the average ages for all facilities were calculated using the recorded construction date in the VFA (Facilities Management software), otherwise the City GIS and/or other databases were also used as a source of information in case information was not available. As shown in Figure 15.1, there are several assets that exceeded their average industry standard useful life such as the administration buildings and main centres. This leads to an increase in the operation and maintenance cost of these facilities. It is important to note that 40 years was selected as the expected useful life based on the non-structural components of buildings which have the longest expected service life. In practice the many components that comprise a building are slated for renewal based upon a combination of factors including age, condition, consequence of failure, likelihood of failure etc. and the practical expected life is largely indefinite while the building continues to serve its intended/required purpose in its given geographic location. In addition, the City of London's cultural heritage resources distinguish London from other cities, and make London a more attractive place for people to visit, live or invest in. The 'average useful life' does not apply to municipally owned heritage properties as the City is the steward for these heritage resources and must conserve these properties for current and future generations.

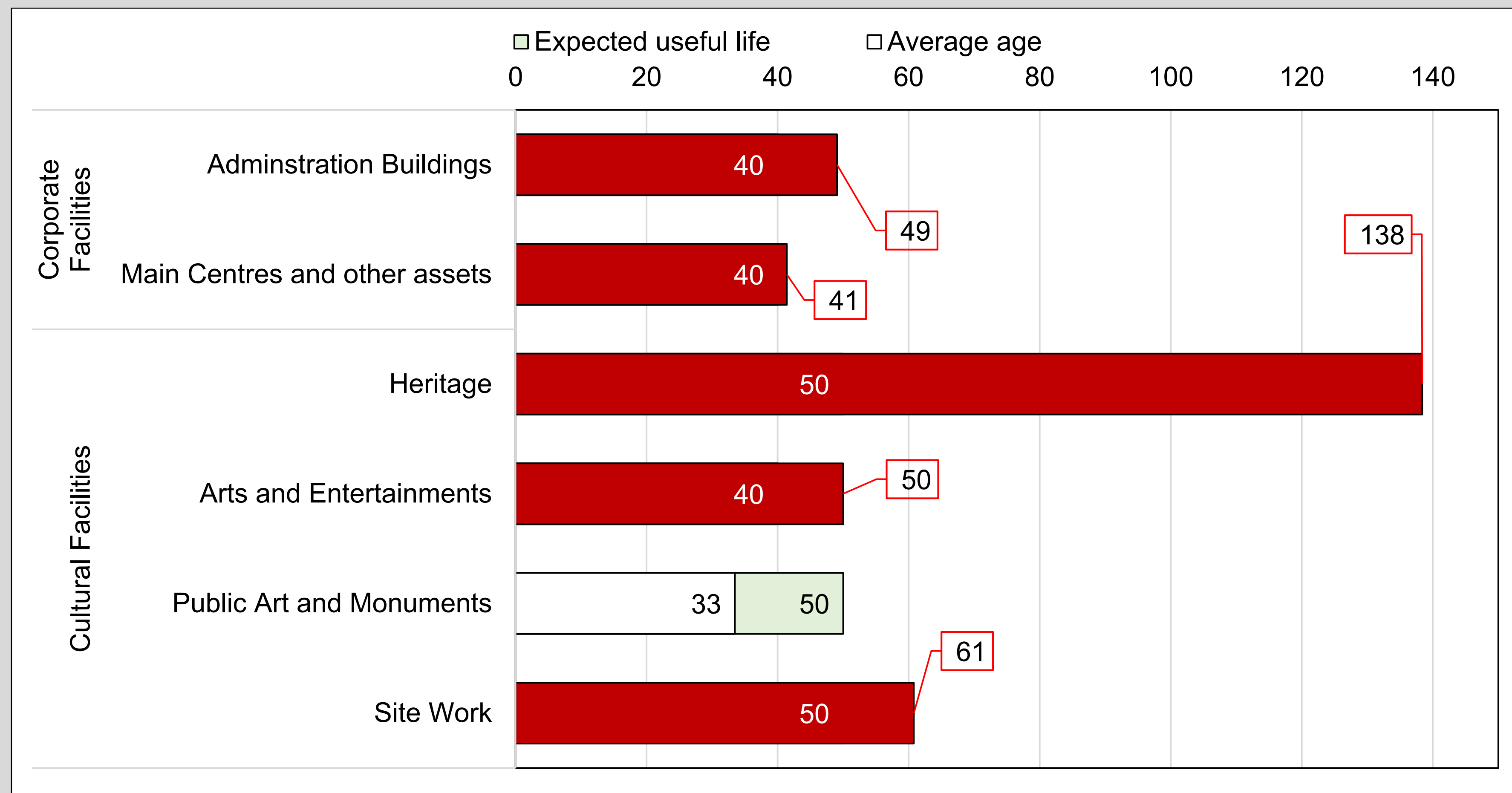


Figure 15.1 Average Assets Age as a Proportion of Average Useful Life (Corporate and Cultural Facilities Services)

15.1.3 Asset Condition

The condition of Corporate and Cultural facility assets is regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) that reflects the overall condition of the facilities and their sub-components (building envelope, mechanical and electrical systems, etc.). FCI was also used to assess the condition of the Public art and monuments; and, heritage properties in order to come up with an overall condition for each asset; however, in many cases a conservation assessment report by professionally accredited conservator/consultant in order to come up with a detailed condition assessment. These reports are used to identify the repair and rehabilitations strategies for these types of elements.

As seen in Figure 15.2, approximately 34% of the City's Corporate and Cultural assets are in **Fair** to **Very Good** condition, with the remainder assessed as in poor or very poor condition, indicating a need for investment in the short to medium term.

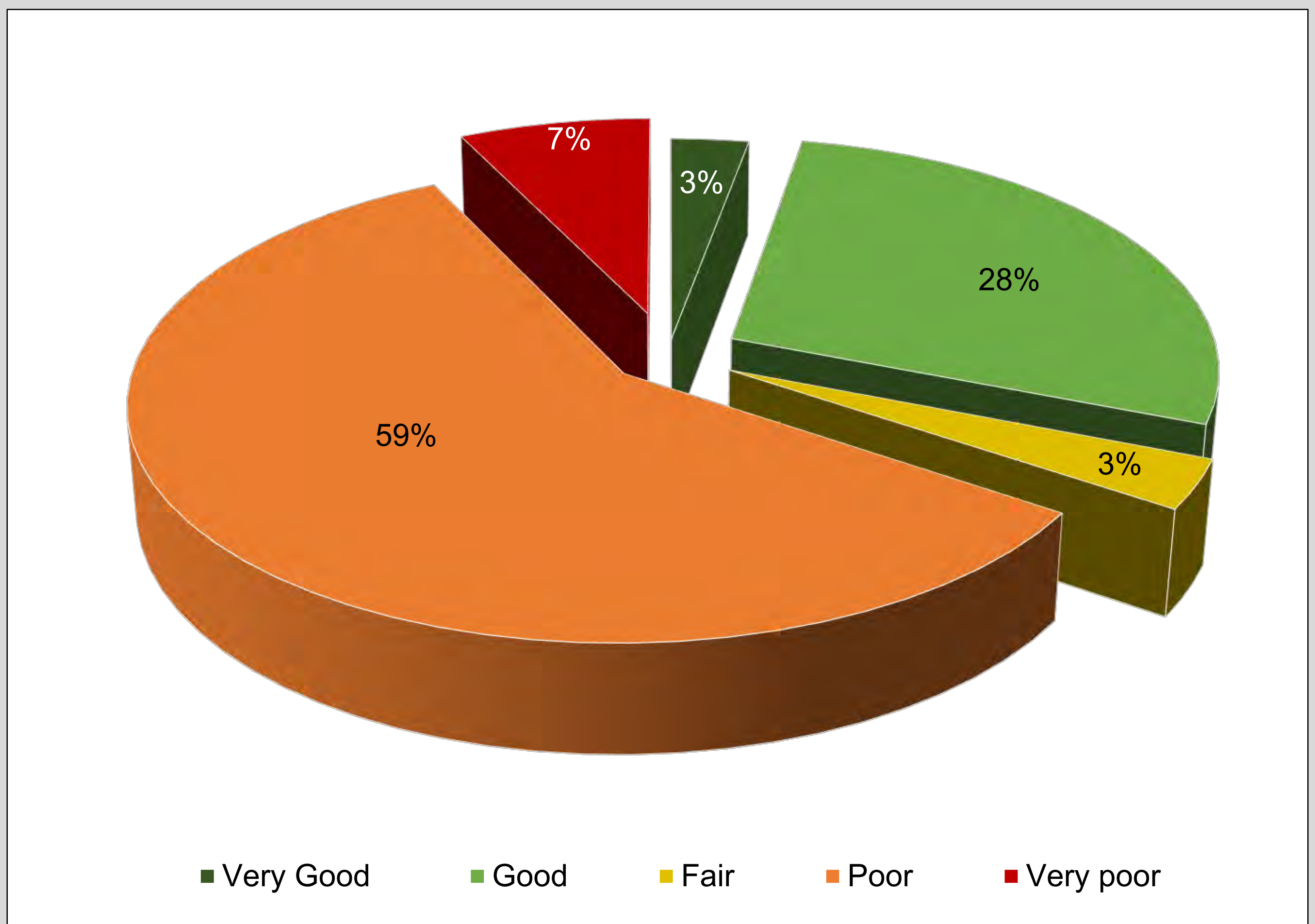


Figure 15.2 Asset Condition Summary (Corporate and Cultural Facilities Services)

Administration Centres are shown to be in **Poor** condition, which is largely driven by significant short-term investments required at City Hall and within its adjacent Parking Facility. Similarly, nearly 51% of Operation Centres are listed in **Fair** to **Poor** condition, indicating significant investment will be required to maintain the safety and functionality of these facilities over the next decade.

Cultural Facilities are shown to be distributed condition with 53% of the assets are in **Fair** to **Very Good** condition indicating that they are meeting current requirements, but many are starting to show signs of deterioration with 47% of them in **Poor** to **Very Poor** condition indicating significant investment will be required to maintain these valuable assets in good condition. The focus of the Facilities condition rating system can be heavily influenced by the cost of a given renewal requirement, for example, back-of-house type equipment (mechanical and electrical) which is not visible to the average user. As a result, while the interior finishes in occupied spaces and many other things that can affect the perceived overall condition may be in Fair, Good or even Very Good condition, a given facility may have a lower than expected FCI value due to back-of-house type of equipment that is reaching the end of its expected service life. Barring investment recommended through the condition assessment program and Conservation Master Plans, these facilities will continue to deteriorate, and could experience intermittent closures for maintenance and repair. Centennial Hall in particular has been the subject of much discussion concerning the need for a replacement. Figure 15.3 presents the current condition profile for the administration, operation and cultural facilities.

Baty House – Pond Mills Road

Section 15: Corporate & Cultural Facilities

15.1.3 Asset Condition (Continued)

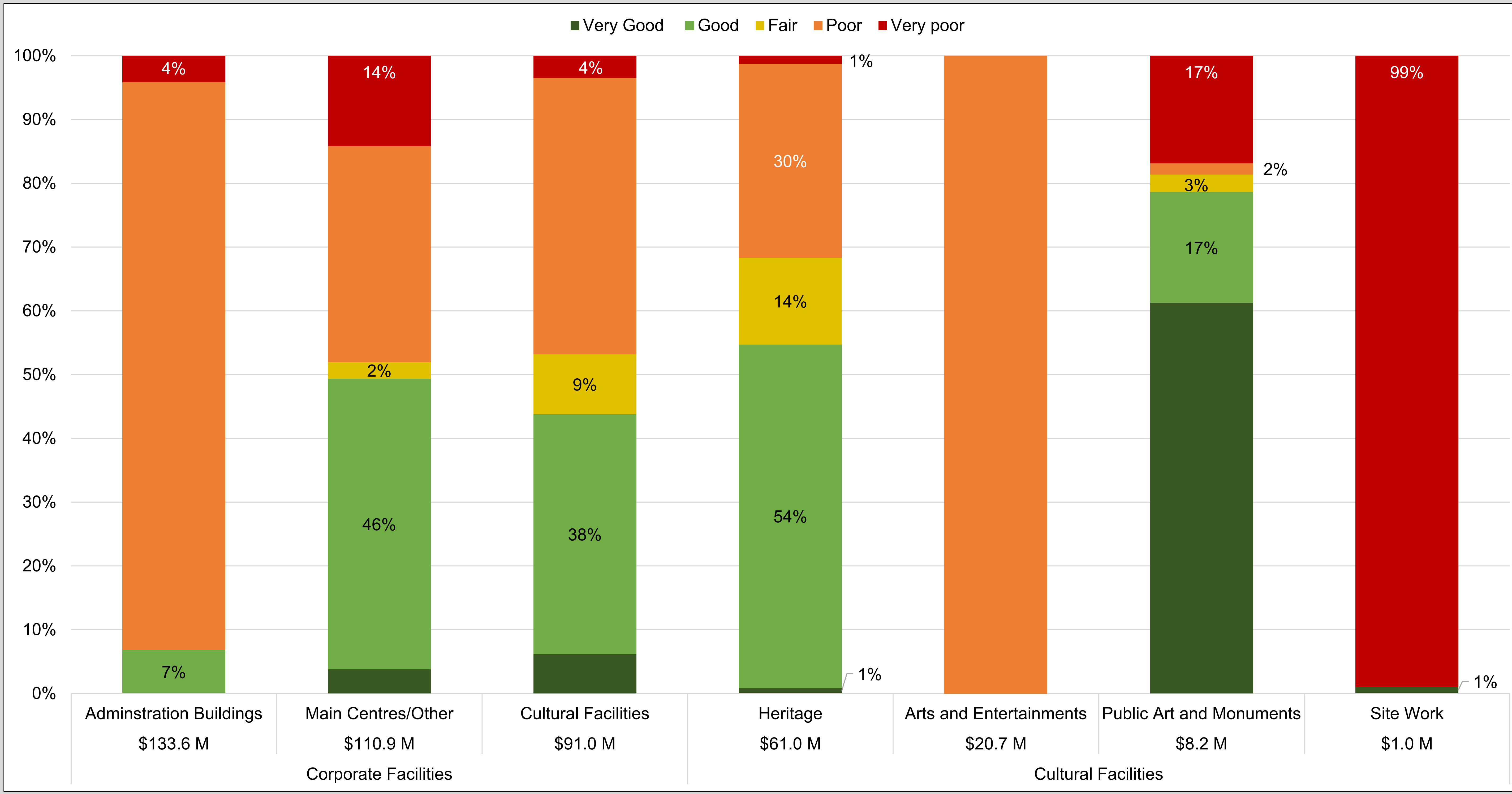


Figure 15.3 Asset Condition Detail (Corporate and Cultural Facilities Services)

15.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Safety, Accessibility/Legislative, Comfort, Quality, and Environmental Stewardship/Sustainability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Table 15.2. They are listed as Overall Corporate Facilities LOS metrics – for Corporate Facilities (including Administrative, Operational, and other Facilities).

London Fallen Firefighters Monument – Horton Street

A.J. Tyler Operations Centre – Bathurst Street

Table 15.2 Levels of Service Metrics – Foundational and Advanced (Corporate and Cultural Facilities Services)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing facilities management services in an efficient manner	Operating cost to provide service ($/household)	$81.28	⇔
Safe	Providing facilities management services to ensure that facilities are safe	Number of incidents in facilities/10,000 sqft	Under Review	⇩
Quality	Providing facilities in acceptable condition	Percentage of Corporate Facility assets (Defined as Cultural, Administration, and Operation facilities) in fair or better condition	34%	⇧
Environmental Stewardship	Providing facilities that are energy efficient	Annual electric energy consumption per square foot	8,423 KWH/sf	⇩
		Annual natural gas consumption per square foot	0.719 m^3/sf	⇩
	Providing facilities that are environmentally conscious	Annual water consumption per square foot	0.081 m^3/sf	⇩

⇔ **No Change** ⇧ **Positive Upward** ⇩ **Positive Downward**

Table 15.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Corporate and Cultural Facilities Services)

Performance Measure: Customer / Council Focused | Technical Focused

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing facilities management services in an efficient manner	Corporate Facilities Operating Budget	$14,374,794	↔
		Corporate Facilities Reinvestment Rate	0.9%	↑
Safe	Providing facilities management services to ensure that facilities are safe	Percentage of facilities inspected per planned schedule	69%	100%
		Percentage of planned maintenance activities as a proportion of total maintenance activities (80% planned vs. 20% reactive)	25%	80%
Quality	Providing facilities in acceptable condition	Percentage of Corporate Facilities in very poor condition	9%	↓
		Percentage of Cultural Facilities in very poor condition	3%	↓
Environmental Stewardship	Providing facilities that are energy efficient	Annual electric energy consumption per square foot	8,423 KWH/sf	↓
		Annual natural gas consumption per square foot	0.719 m^3/sf	↓
	Providing facilities that are environmentally conscious	Annual water consumption per square foot	0.081 m^3/sf	↓

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

15.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

15.3.1 Lifecycle Activities

Table 15.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Corporate and Cultural Facilities assets:

Table 15.3 Current Asset Management Practices or Planned Actions (Corporate and Cultural Facilities Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	***Corporate Facilities*** • Corporate buildings are maintained and renewed through the Facilities group and their use of VFA, which combined with comprehensive condition assessments and Facilities experience, determines the lifecycle management needs of a facility. • The lifecycle management needs include the direct care of the building envelope, mechanical and electrical systems, etc. • Contents - Office facilities have limited asset management information on contents although IT deals with systems equipment. Remaining information gaps will be dealt with as part of the CAM program. ***Public Art and Monuments and Heritage Assets*** • Conservation Master Plans for municipally owned heritage properties are to continue being prepared in order to identify the ongoing maintenance and repair requirements to conserve the heritage values, attributes and the integrity of each property. The Conservation Master Plans should examine the long-term conservation of a cultural resource and should determine how to retain its significance for future generations by recommending a conservation strategy and annual lifecycle renewal projects. • Public Art is the responsibility of Parks and Recreation and the City is ultimately the owner but the artists typically have the following rights under an Agreement that is signed when the Artwork is created and can include limitations, for example: • **Restoration and Repair** – The City must consult with the artists about restoration and repair, respect the design and materials of the artwork.	• Refer to Appendix B.

Table 15.3 (Continued) Current Asset Management Practices or Planned Actions (Corporate and Cultural Facilities Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Continued Actions or policies that can lower costs or extend useful lives	***Public Art and Monuments and Heritage Assets*** • **Copyright and City's Right to Reproduce** – City may move Artwork to a different location for "maintenance and safety reasons" provided that the new location would have similar visibility and stature in the City of London to that where the Artwork is currently installed. • **License to Modify** - The Artists are entitled to reasonably modify the Artwork providing that general appearance and theme of the Artwork is preserved. • **Facilities Division** assists Parks and Recreation with the lifecycle renewal of the public artwork. Assessments of the Artwork pieces are completed by consultants and the assessment results inform the renewal plan on and ongoing basis. Facilities secures the restoration specialists and contractors to complete the renewal scope on behalf of Parks and Recreation. • **Facilities Division** assists City Planning with the lifecycle renewal of Heritage assets. Assessments of the Heritage assets are completed by specialist consultants and the assessment results inform the renewal plan on and ongoing basis. Facilities secures the restoration specialists and contractors to complete the renewal scope on behalf of City Planning.	• Refer to Appendix B.

Table 15.3 (Continued) Current Asset Management Practices or Planned Actions (Corporate and Cultural Facilities Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	***Corporate Facilities*** • A work order system and online interface exists for City employees to generate requests of Facilities. ***Public Art and Monuments and Heritage assets*** • Regularly scheduled inspections, maintenance and/or repairs for Public Art and Monuments and Heritage assets follow the same intake process as Corporate Facilities work – via the Ask Facilities customer relationship management software and recorded in the work order system. There is an exception for low value maintenance work in some of the Heritage assets where the occupants are responsible for the work. • Public Art and Monuments are part of the City's Capital 10 year Lifecycle Maintenance Program. • The lifecycle renewal projects outlined in the Conservation Master Plans for the municipally owned heritage properties is to be reviewed and implemented annually.	• Completing planned maintenance activities while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure. • Enough resources available to complete a series of unplanned, urgent work requests that are submitted in close succession. • Unexpected weathering of public art/monuments.

Table 15.3 (Continued) Current Asset Management Practices or Planned Actions (Corporate and Cultural Facilities Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	***Corporate Facilities*** • Corporate Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA) determine the cost and timing of renewal requirements. ***Public Art and Monuments and Heritage assets*** • Public Art and Monument assets are evaluated by conservation and restoration specialists in a similar way to the process for Corporate Facilities. The results of these assessments inform the renewal actions that form the lifecycle renewal plan for these assets. • Heritage assets are evaluated by heritage specialists in a similar way to the process for Corporate Facilities. The results of these assessments inform the Heritage compliant renewal actions that form the lifecycle renewal plan for Heritage assets. • The Conservation Master Plans for the municipally owned heritage properties are to be reviewed and implemented annually.	• Refer to Appendix B.

Table 15.3 (Continued) Current Asset Management Practices or Planned Actions (Corporate and Cultural Facilities Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	***Corporate Facilities*** • Corporate Facilities are regularly evaluated through comprehensive condition assessments, which establish and update an industry-standard Facility Condition Index (FCI) score that accurately reflects the overall condition of the facilities (splits into components of building envelope, mechanical and electrical systems, etc.). These condition assessments, the expertise of Facilities, and computer software programs used by Facilities (VFA) determine the cost and timing of replacement requirements. ***Public Art and Monuments and Heritage assets*** • Public Art and Monument assets are evaluated by conservation and restoration specialists in a similar way to the process for Corporate Facilities. The results of these assessments inform the renewal actions that form the lifecycle renewal plan for these assets. • Temporary public art such as murals have a lifespan and removal is required. • Heritage assets are evaluated by heritage specialists in a similar way to the process for Corporate Facilities. The results of these assessments inform the Heritage compliant renewal actions that form the lifecycle renewal plan for Heritage assets. • Municipally owned heritage buildings are to be conserved for the next generation. The City should actively encourage and support appropriate forms of adaptive reuse when necessary to conserve heritage properties.	• Cost over-runs during large, complex design and construction projects. • Identifying locations for new or relocated Public Art pieces in the downtown area. • Long-term funding sources and locations for new Public Art pieces that commissioned as part of new developments.

Table 15.3 (Continued) Current Asset Management Practices or Planned Actions (Corporate and Cultural Facilities Services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	***Corporate Facilities*** • Appropriate and proper disposal occur when assets are replaced or renewed. ***Public Art and Monuments and Heritage assets*** • Generally Public Art and Monuments and Heritage assets are rarely disposed of. Any disposal would be completed appropriately and properly in compliance with the various corresponding regulations. • The Culture Office has worked with Legal Services to create Collection Guidelines which include de-accessioning of Public Art and Monuments processes • Municipally owned heritage properties are not intended to be disposed. The City is the steward for these cultural heritage resources and must conserve these properties for current and future generations.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	***Corporate Facilities*** • Consultation with public and users of Corporate Facilities would determine service improvement needs. ***Public Art and Monuments and Heritage assets*** • New Public Artwork is commissioned as part of new developments. • New Monuments are commissioned from time-to-time to commemorate historically significant events and people. • Public Art and Monuments may require improvements to ensure their lifespan is extended. • Assets typically become Heritage assets by virtue of a combination of their age, historical, contextual and local significance. • Tenants and uses for vacant municipally owned heritage buildings should be actively pursued.	• Long-term funding sources and location for new Public Art pieces and Monuments that are commissioned.

Section 15: Corporate & Cultural Facilities

The cost of these identified Lifecycle activities is summarized in Table 15.4. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years.

Service Improvement activities are analyzed using planned expenditures identified through a review of the capital budget.

Table 15.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average annual Activity Currently Practiced)
Corporate and Cultural Facilities	Operating Budget*	Corporate Facilities	$14,375
		Cultural Facilities	$3,281
		Total	**$17,656**
	Lifecycle Capital Budget**	Corporate Facilities	$2,453
		Cultural Facilities	$907.8
		Total	**$3,360.8**
	Service Improvement Budget	**Total**	**$Nil**

*Non-Infrastructure , Maintenance and Operating Activities

**Rehabilitation, Renewal, Replacement, and Disposal Activities

Growth activities are analyzed using the draft 2019 DC Background Study. The Cultural Facilities service area does not have growth operating and capital budgets, and the draft 2019 DC Background Study has not identified any growth projects with Cultural Facilities. The Corporate Facilities Capital and Operating growth expected funding is summarized in Table 15.5. Growth projects primarily relate to Administrative and Garage Building, salt storage building, vehicle wash and fueling station, coverall equipment building, Traffic Management Centre, and associated land purchase.

Table 15.5 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average annual Activity Expected over 10 year period)
Corporate and Cultural Facilities	Growth (Capital Budget and Significant Operating Costs)	Corporate Facilities (Operating)	$270
		Corporate Facilities (Capital)	$2,262
		Cultural Facilities	$Nil
		Total	**$2,532**

Elsie Perrin Williams Estate – Windermere Road

15.3.2 Lifecycle Management Approach

CORPRATE FACILITIES

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is insufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 15.4 presents the expected condition profile for the next 20 years based in the current budgets for Corporate Facilities assets.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the LOS metrics. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. Figure 15.5 presents the expected condition profile for the next 20 years based in the optimum budget for Corporate Facilities assets.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

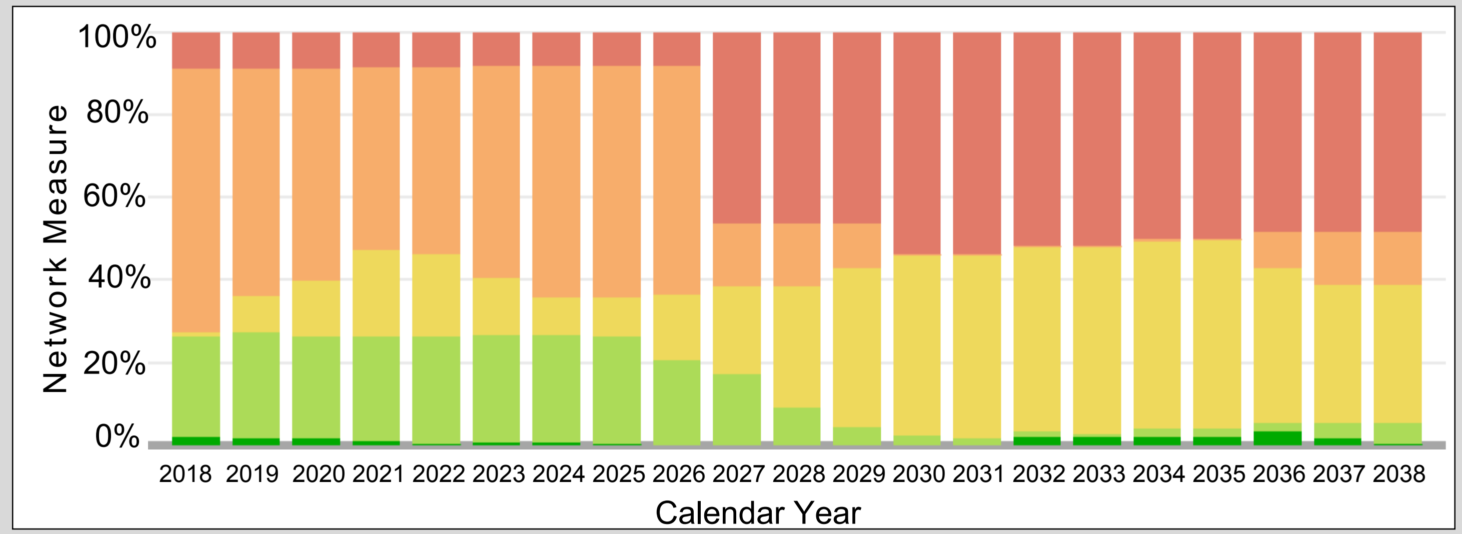


Figure 15.4 Projected 20-year Current Budget Condition Profile (Corporate Facilities Services)

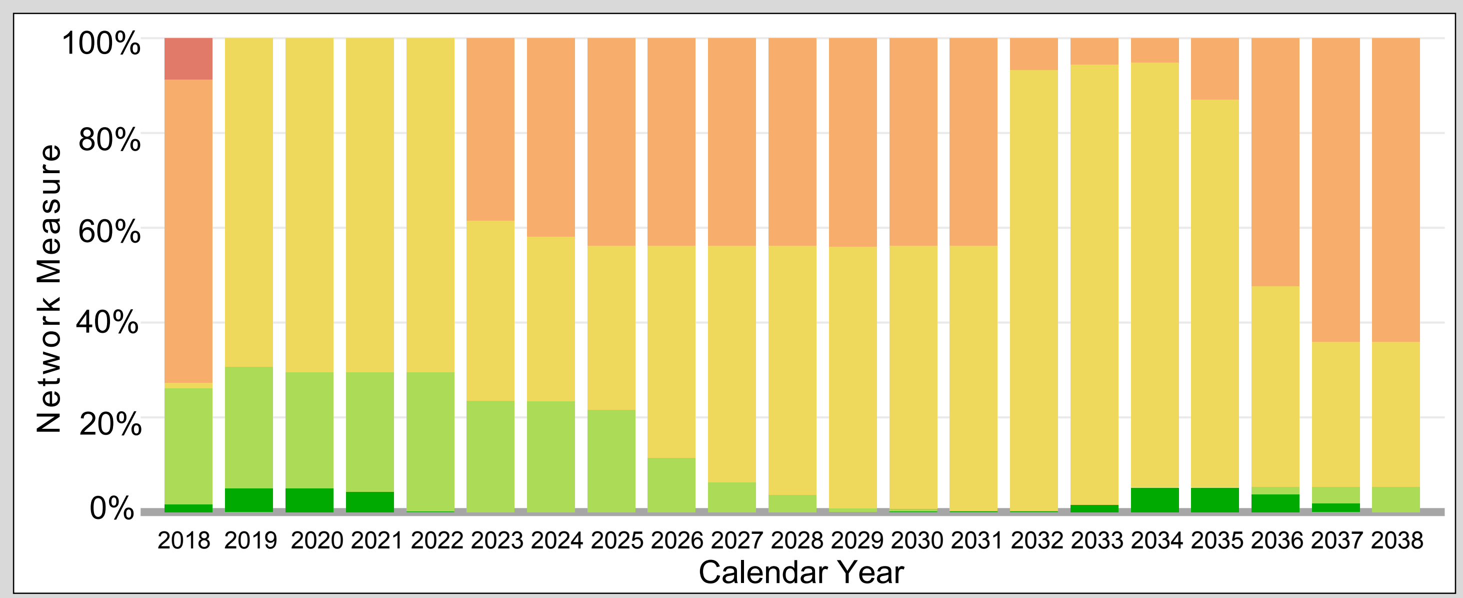


Figure 15.5 Projected 20-year Optimal Budget Condition Profile (Corporate Facilities Services)

15.3.2 Lifecycle Management Approach (Continued)

CULTURAL FACILITIES

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is insufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 15.6 presents the expected condition profile for the next 20 years based in the current budgets for Cultural Facilities assets.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the LOS metrics. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. Figure 15.7 presents the expected condition profile for the next 20 years based in the optimum budget for Cultural Facilities assets.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

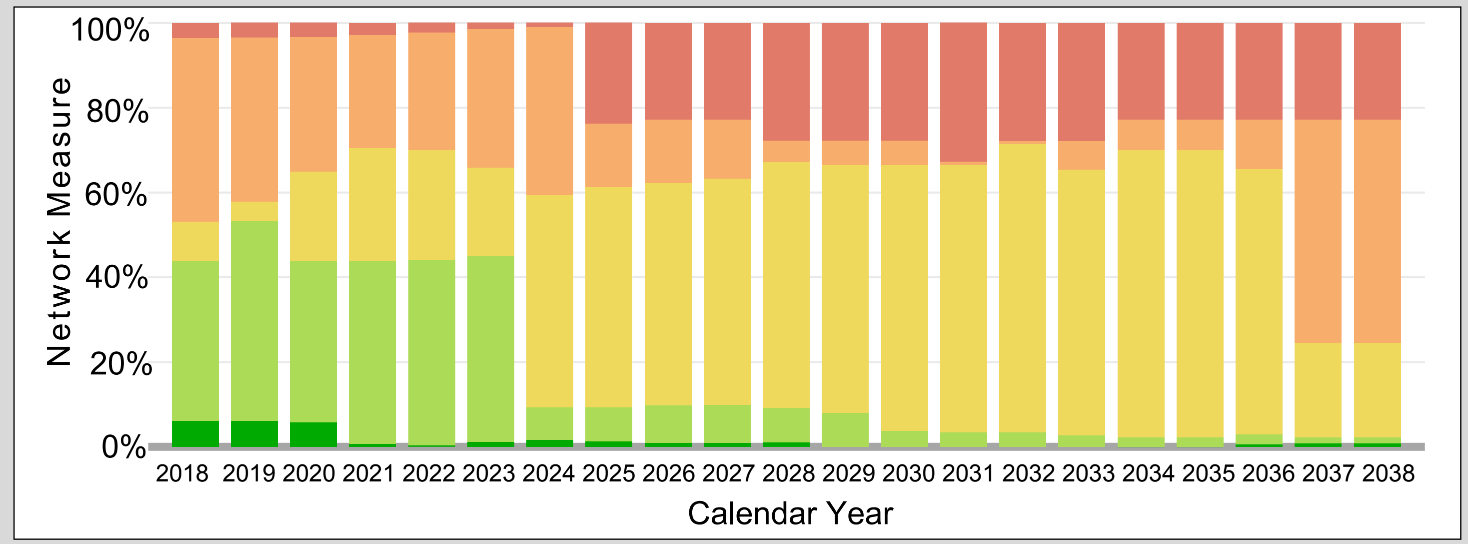


Figure 15.6 Projected 20-year Current Budget Condition Profile (Cultural Facilities Services)

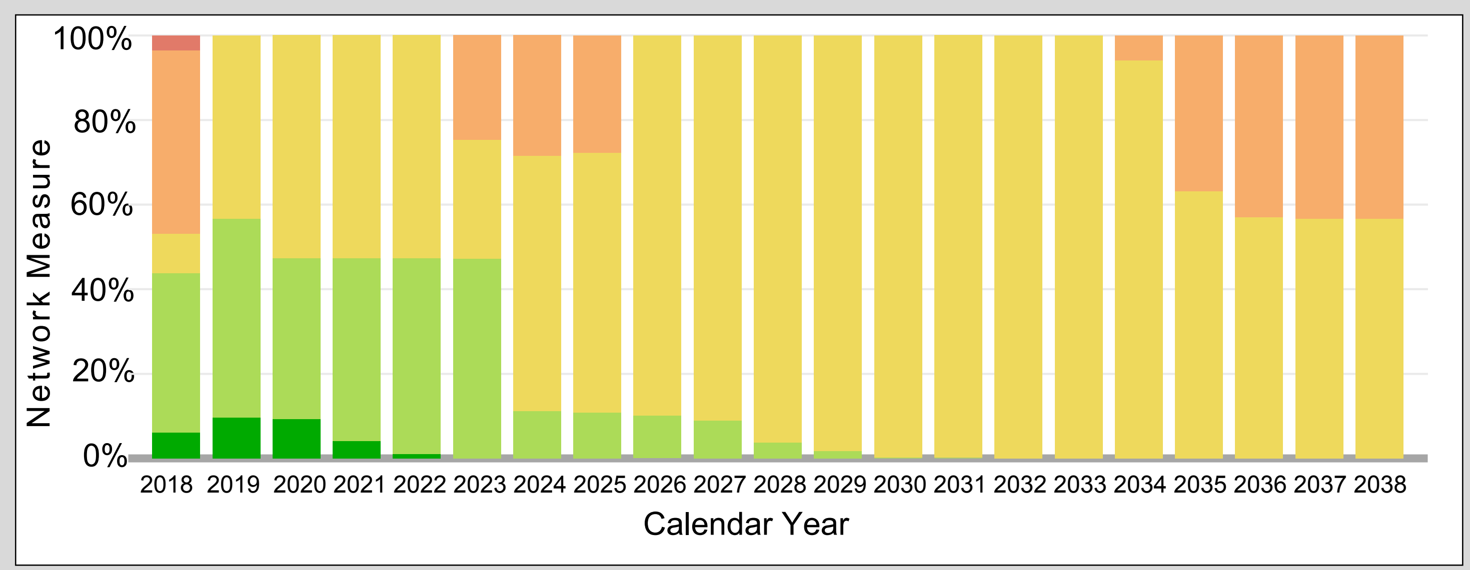


Figure 15.7 Projected 20-year Optimal Budget Condition Profile (Cultural Facilities Services)

15.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 15.6 and illustrated in Figure 15.8 and Figure 15.9. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as it is inherent in asset renewal/rehab/replacement activities and in the case of heritage buildings, disposal is not an option.

The Cumulative Infrastructure Gap for the Corporate and Cultural Facilities assets would grow to more than $51 M over the next decade. Trends presented are primarily driven by the Corporate Facilities, which accounts for roughly 62% of this deficit.

Base needs represent the costs to renew and maintain the serviceability of existing assets, and do not account for growth and the expansion of service to new areas.

Table 15.6 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Corporate & Cultural Facilities)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's) (Average annual)	Funding Gap (000's) (Average annual)
Corporate and Cultural Facilities	Lifecycle Capital Budget	Corporate Facilities	$2,453	$6,944	$1,287.4	$3,203.6
		Cultural Facilities	$907.8	$2,860.8	None Identified	$1,953
		Total	**$3,360.8**	**$9,804.8**	**$1,287.4**	**$5,156.6**

Eldon House – Ridout Street North

Flint Cottage – Commissioners Road West

Section 15: Corporate & Cultural Facilities

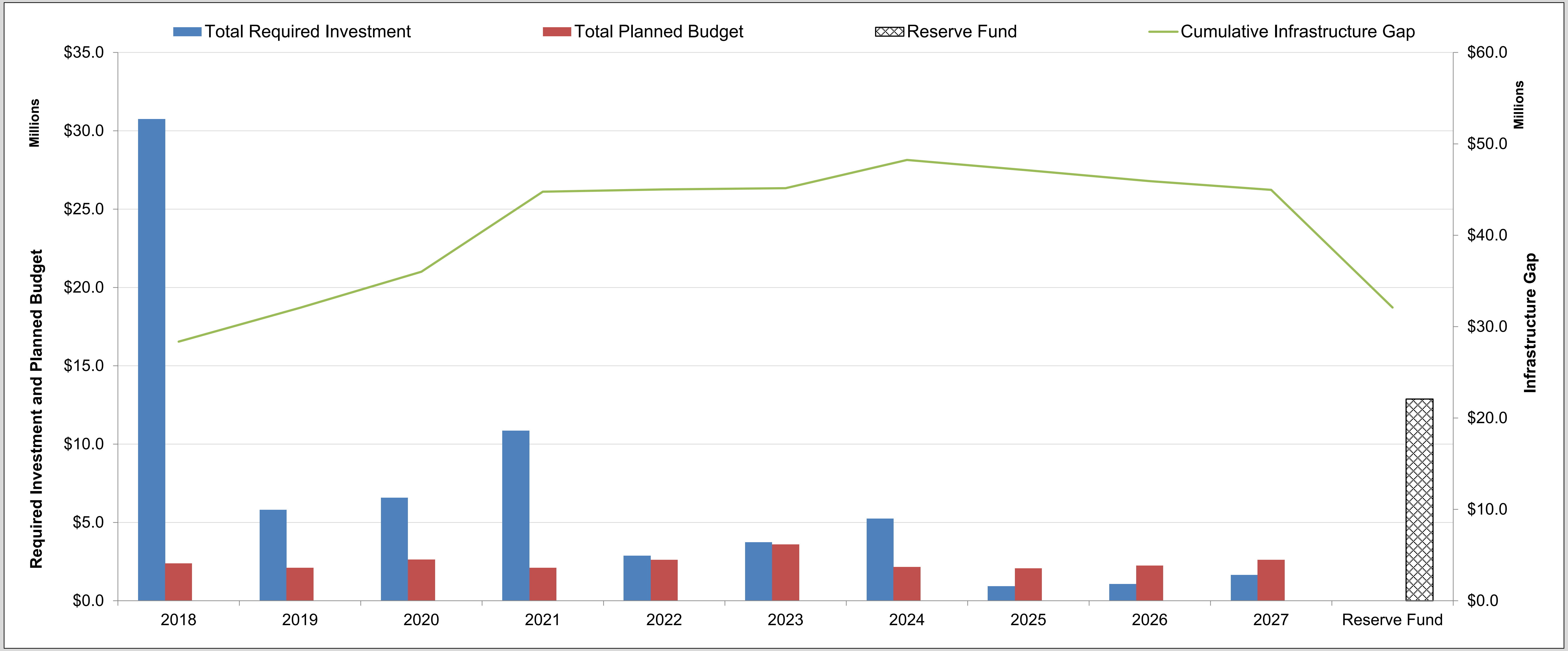


Figure 15.8 Forecasted Infrastructure Gap (Corporate Facilities Services)

The infrastructure gap for Corporate Facilities is mainly driven by the operation facilities needs having a cumulative gap of 76% of total Corporate Facilities infrastructure gap, followed equally between the needs of the other municipal buildings and the Court House. On the other hand, the Cultural Facilities infrastructure gap is driven by needs for the municipally owned heritage properties.

The projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade for the Corporate Facilities with no availability for reserve funds allocated to the Cultural assets. If these forecasted reserve fund balances are not achieved this will significantly increase the Corporate and Cultural Facilities infrastructure gap.

Section 15: Corporate & Cultural Facilities

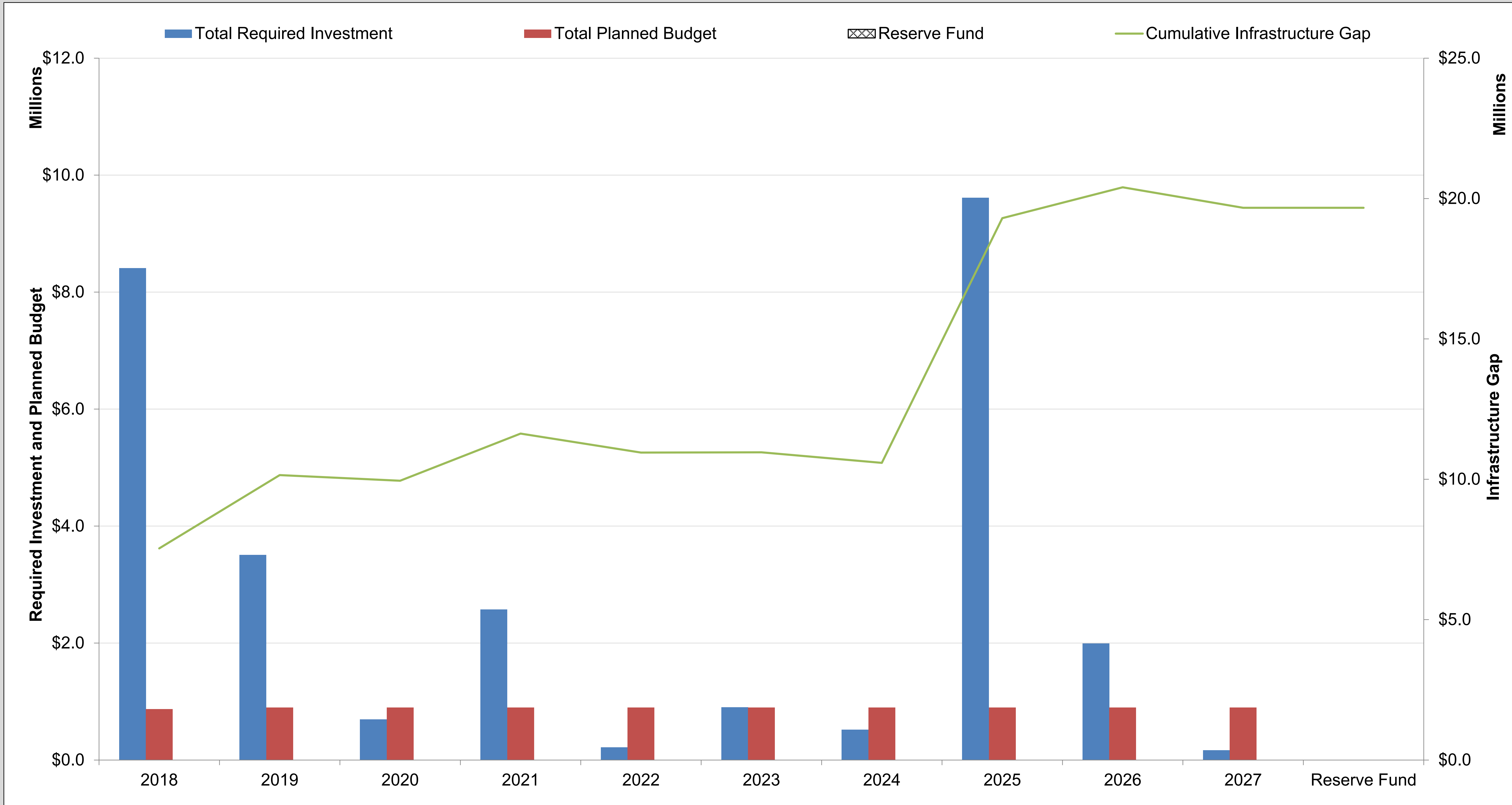


Figure 15.9 Forecasted Infrastructure Gap (Cultural Facilities Services)

Section 15: Corporate & Cultural Facilities

15.5 DISCUSSION

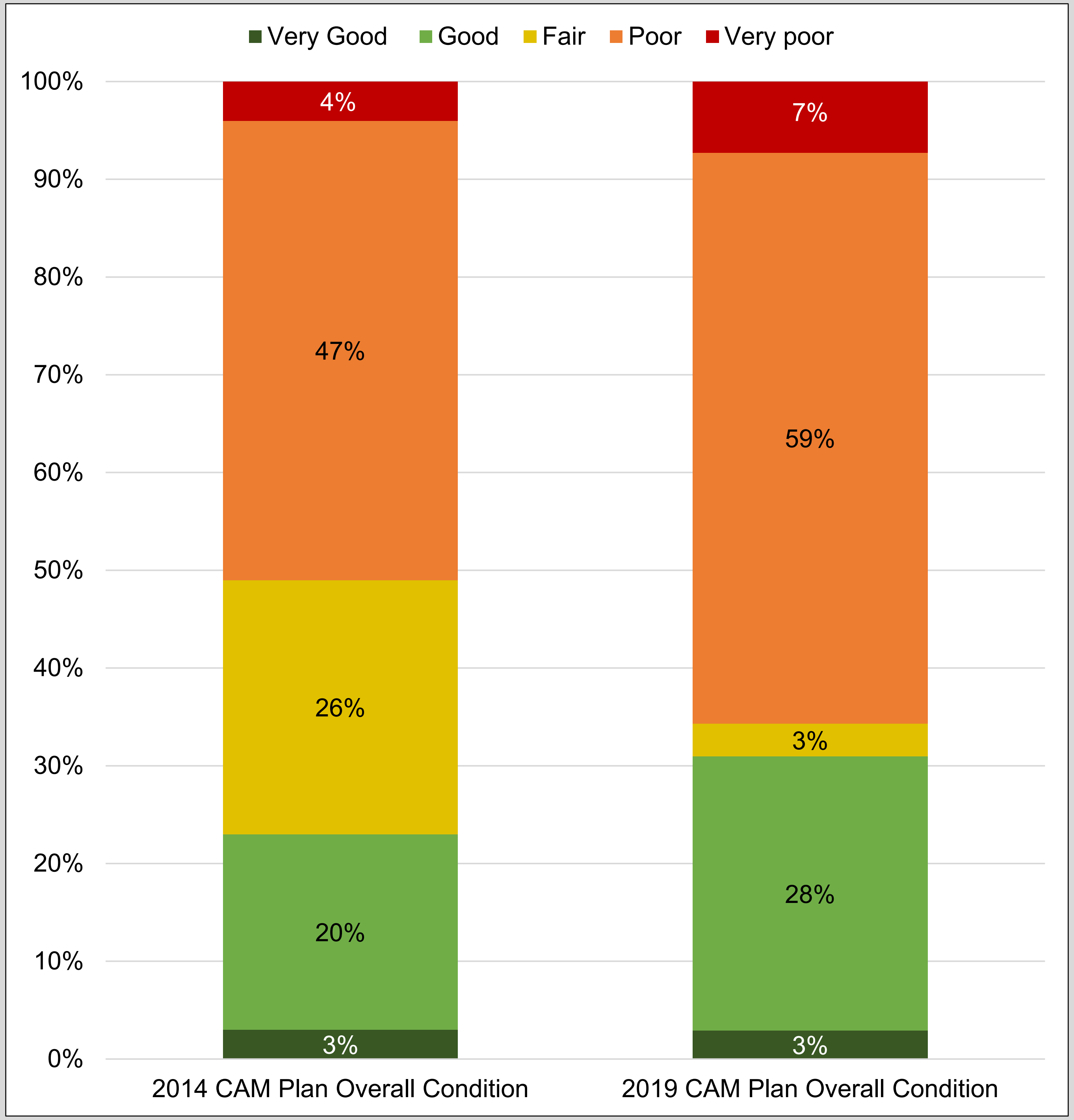


Figure 15.10 2014 CAM Plan to 2019 CAM Plan Condition Summary (Corporate and Cultural Facilities Services)

CURRENT AND FUTURE CHALLENGES

The Corporate and Cultural assets Replacement value indicated in the 2014 Asset Management Plan was $181 million, the replacement value increased to $335.6 million due to inflation, constructing new assets, and the recent increase in the construction cost in the region. Recent market pressures that are contributing to this include global trade agreement uncertainty, interest rate increases and skilled labour shortages. The 2014 CAM Plan overall condition to 2019 CAM Plan overall condition of Corporate and Cultural Facilities assets condition comparison is provided in Figure 15.10. In the 2014 CAM Plan, the assets were anticipated to deteriorate due to the limited funding; this can be seen today, where the condition profile has changed to have more assets in poor and very poor condition while also having more assets in good and very good condition. The cumulative 10 year forecasted infrastructure gap from the 2014 CAM Plan was calculated as $55.2 million; driven only with the Corporate Facilities. The current cumulative 10 year forecasted infrastructure gap for both Corporate and Cultural assets is $51.76 million, assuming that forecasted reserve fund balances are achieved and that the reserve fund amounts are available for lifecycle activities. The Corporate Facilities infrastructure gap is approximately $32.09M, which is a decrease from $55.2 in 2014 CAM Plan. Cultural Facilities had no gap in the 2014 CAM Plan and currently accounts for $19.67 million in the next decade. Increased investments in Corporate Facilities over the past five years has helped in reducing their infrastructure gap. On the other hand, Cultural Facilities conducted an asset inventory and condition assessment study over the past few years which helped to accurately define their needs.

Raccoon Mural

15.6 CONCLUSIONS

Valued at nearly $335.63 Million, the City's Corporate and Cultural Facilities assets are overall in **Poor** to **Fair** condition, indicating that sufficient investment is required to maintain the assets at the required level of service. Maintaining current investment will result in a $51.76 Million infrastructure gap. This could result in degradation of the service delivered to citizens. Further investment is needed to address the future lifecycle needs of the current Corporate and Cultural Facilities assets. Figure 15.11 illustrates the infrastructure gap as a proportion to the required investment over the next decade showing the distribution of the different types of assets contributing the gap. Table 15.7 presents the summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates for Corporate and Cultural Facilities assets.

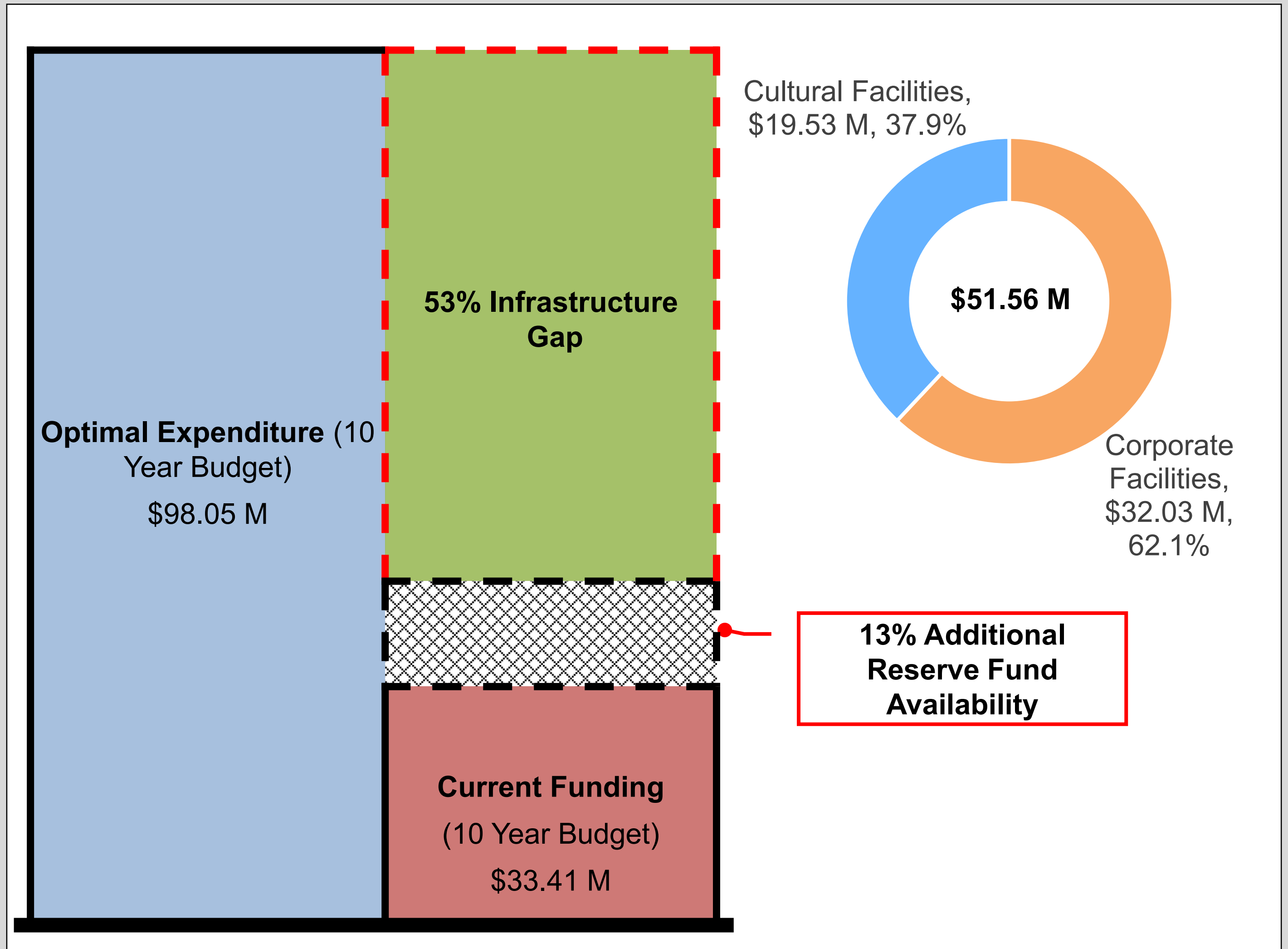


Figure 15.11 Cumulative 10 Year Infrastructure Gap Visual (Corporate and Cultural Facilities)

J. Allyn Taylor Building

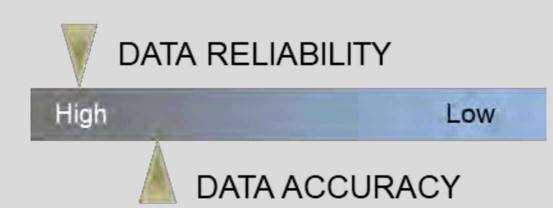
Section 15: Corporate & Cultural Facilities

Table 15.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Corporate and Cultural Facilities)

City of London - Corporate and Cultural Facilities Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Corporate Facilities	$244.6		$28.31	$32.03**	1.00%	1.7% to 2.5% *
Cultural Facilities	$91.03		$7.39	$19.53**	0.98%	2.1%
Overall Corporate and Cultural Facilities	**$335.63**		**$35.70**	**$51.56****	**0.99%**	**1.8% to 2.4% ***

* Canadian Report Card Recommended Annual Reinvestment Rate.
** This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Section 16: Fleet

Quick Facts
145 Heavy Vehicles
254 Light Vehicles
109 Medium Off-Road Equipment Pieces

Replacement Value	$57.36 Million
Condition	Fair
10 Year Gap	None
City-Wide Infrastructure Gap Contribution	None

No Infrastructure Gap Identified

Section 16: Fleet

16.1 STATE OF LOCAL INFRASTRUCTURE

Fleet vehicles and equipment are managed by the Fleet Services Division (FSD). A safe, reliable and right sized municipal fleet is a key aspect to service delivery for over 50 municipal program areas to provide their services to Londoner's. FSD manages over 1300 vehicle and equipment assets that range significantly in both complexity and value.

Rolling stock assets include both on-road and off-road vehicles and equipment such as Waste Collection Trucks, Graders, Backhoes and Tandem Dump Trucks, down to over 250 light passenger vehicles like cars, vans, SUV's and pick-up trucks.

The remaining assets are a mix of both rolling stock and non-rolling stock that include a range of equipment including turf mowers, trailers, ice re-surfacers, farm tractors, and gas powered tools and equipment.

Fleet Services provides all the licensing, registration and insurance of the vehicles and maintains a preventative maintenance program that meets or exceeds the Ministry of Transportation regulatory requirements.

Fleet Vehicle

16.1.1 Asset Inventory and Valuation

The current value of Fleet vehicles and equipment is approximately $57.4 Million. The City of London owns a significant portion of the Fleet assets and manages lease and rental agreements for over 125 additional vehicles and equipment during peak seasonal demand periods. The core services provided by FSD is Fleet Administration (Asset management, analytics, budget), Fleet Planning (procurement and remarketing), Fleet Maintenance (service and repairs), and refueling services (tanks, key readers, dispensing equipment). FSD assigns equipment and vehicle assets to service areas and recovers the operating and capital costs through the internal rental rate charges.

FSD has extended some of their services to other municipal programs including Fire Services, Libraries, Tourism London, and LMEMS on a full cost recovery basis to help maximize the use of municipal services and infrastructure.

The Fleet report section deals only with the assets of core City services and not the assets of Fire, Police and Transit. It does include vehicles owned by the City and leased to Boards and Agencies.

Table 16.1 Asset Inventory and Valuation (Fleet Services)

Asset Type	Asset	Description	Inventory	Unit	Replacement Value (000's)
Vehicles	Light Vehicle	Cars, Mini Vans, SUV's, Pick-ups	254	Ea.	$7,668
	Medium Vehicle	350,450 Series Utility Trucks, Small Ariel Units	14	Ea.	$875
	Heavy Vehicle	Packers, Dump Truck, Street Sweepers, Flushers, Tanker Trailers	145	Ea.	$30,074
Equipment	Light Equipment	Trailers, Plow Blades, Line Painters, Trailer Tool Boxes	101	Ea.	$500
	Light Equipment (Off Road)	Job Trailers, farm Tractors, Trackless Attachments, Mowers < 72”	651	Ea.	$4,054
	Medium Equipment	Snow Plow Blades and Wings, Float Trailers	42	Ea.	$2,480
	Medium Equipment (Off Road)	Trackless S/W machines, Mowers >72”	109	Ea.	$7,704
	Heavy Equipment	Sander - Rear Discharge	9	Ea.	$765
	Heavy Equipment (Off Road)	>40' Aerial Lift units, Front End Loaders, Snow Blower, Road Graders	15	Ea.	$3,248
TOTAL					**$57,368**

16.1.2 Age Summary

Figure 16.1 shows the Fleet assets (Vehicles and Equipment) average asset age as a proportion of the average useful life by asset type. The average ages for all Vehicles and Equipment were calculated using the recorded acquisition date in the Fleet Service Area databases. As shown in Figure 16.1, in general all asset types are within their average industry standard useful life.

Fleet Vehicle

Fleet Vehicle

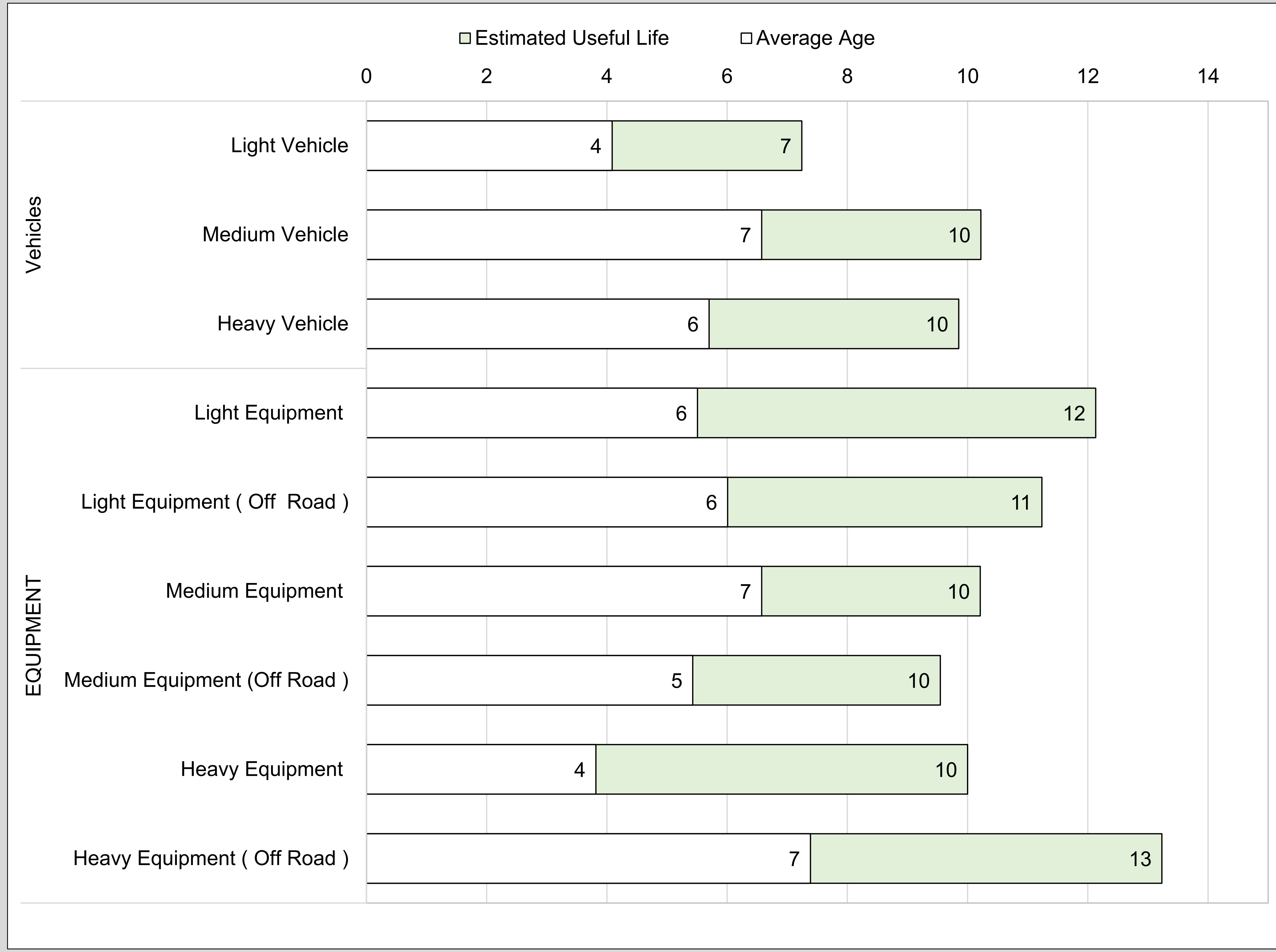


Figure 16.1 Average Fleet Asset Age as a Proportion of Average Useful Life (Fleet Services)

Section 16: Fleet

16.1.3 Asset Condition

Assets are maintained in safe, serviceable condition, with replacement occurring on a planned basis as assets reach their optimum lifecycle stage or their best economic resale time. Retired assets are sold off and the associated proceeds used to offset the purchase of new ones. Figure 16.2 presents the condition distribution of all the vehicles and equipment assets owned by the Fleet Service. It shows that 65% of the assets are in Fair to Very Good condition.

Vehicles represent the biggest value of Fleet assets. They range from standard cars and trucks (Light Vehicles), to utility work trucks (Medium Vehicles), to tandem dump trucks, garbage packers and sewer cleaning units (Heavy Vehicles). As seen in Figure 16.3, large portions of the City's vehicle fleet are shown as being in **Fair** to **Good** condition, approaching their target replacement date. Sound maintenance practices allow Fleet services to extend the lives of these assets and maintain their serviceability throughout their lifecycle. The City is updating Fleet assets to take advantage of hybrid and emerging technologies.

Fleet Vehicle

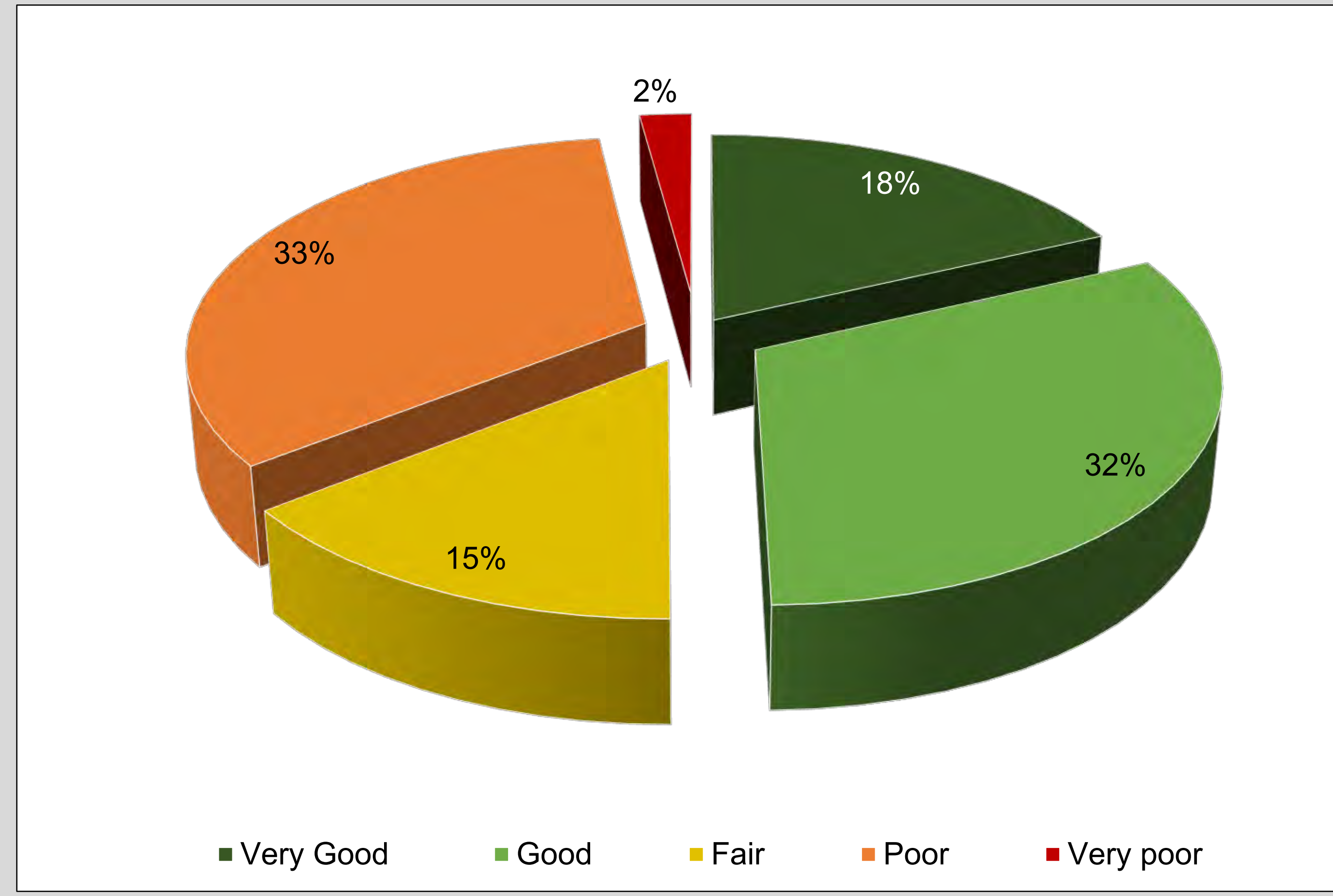


Figure 16.2 Asset Condition Summary (Fleet Services)

Equipment ranges from trailers and large manual tools (Light Equipment), to snow plow attachments and mowers (Medium Equipment), to front end loaders and road graders (Heavy Equipment). As seen in Figure 16.3, the majority of the equipment is **Fair** to **Good** condition. Fleet staff maintains these assets in a safe condition and keeps them operational as they age. The condition of the majority of the heavy equipment is in Very Good condition, while the off road heavy equipment is evenly distributed through **Poor**, **Fair** and **Very Good** condition.

Section 16: Fleet

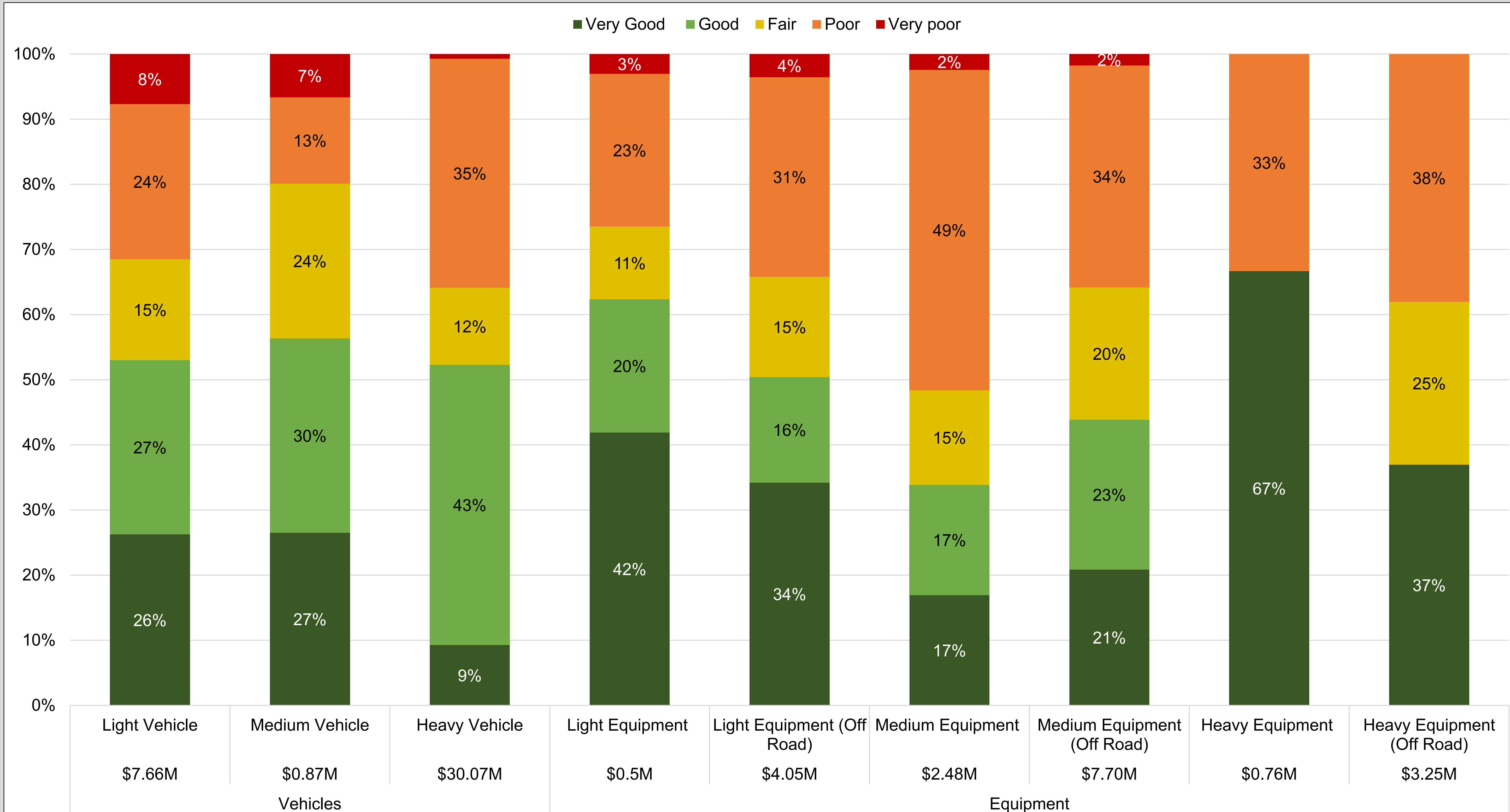


Figure 16.3 Asset Condition Detail (Fleet Services)

16.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Safety, Quality, Reliability, and Environmental Stewardship/Sustainability. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Table 16.2. They are listed as Overall Fleet Services Assets LOS metrics – for Light, Medium, and Heavy Vehicles and Equipment).

Fleet Vehicle

Fleet Equipment

Fleet Vehicle and Equipment

Fleet Vehicle and Equipment

Section 16: Fleet

Table 16.2 Levels of Service Metrics – Foundational and Advanced (Fleet Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing fleet services in an efficient manner	Annual operating cost to provide service ($/household)	$61.68	
Safe	Providing safe vehicles and equipment	% of legislated MTO safety inspections met	100%	100%
Quality	Providing fleet services at the appropriate quality	% of fleet assets that meet the quality targets	>95%	
Reliable	Providing reliable vehicles and equipment	% of fleet assets that meet the expectations of the user group	>95%	
		% of time the appropriate number of vehicles are ready for use by a service group (i.e. uptime)	90%	
Environmental Stewardship	Providing vehicles & equipment with minimal greenhouse gas emissions	Annual greenhouse gas emissions	6,730 tonnes/year	
		Annual fuel consumption	26,583,000 (ekWh)	

No Change **Positive Upward** **Positive Downward**

Section 16: Fleet

Table 16.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Fleet Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing fleet services in an efficient manner	Operating budget for fleet services	$10,909,074	↔
		Cost per km ($/km)	$0.92	↓
		% of vehicles not recovering 100% of replacement cost between recovery and salvage	3.1%	↓
		Annual Average Reserve Fund Contribution Ratio	0.76	↑
		Reinvestment Rate - Annual average of projected 10 year fleet asset renewal budget as a % of current replacement value	9.2%	↑
		% of unaccounted/indirect/unallocated capital contribution	<1%	↑
Safe	Providing safe vehicles and equipment	% of regulated MTO maintenance inspections completed	100.0%	100%
Quality	Providing fleet services at the appropriate quality	% of vehicles that meet or exceed the target design standard	95.0%	↑
		# of complaints due to uncleanliness or appearance of vehicles	<5	↓
		# of complaints due to body condition of vehicles	<5	↓

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 16: Fleet

Table 16.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Fleet Services)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing reliable vehicles and equipment	% of vehicles and equipment past their optimum service life	6.8%	↓
		# of failures by failure code	50	↓
		% of light preventative maintenance activities completed on time	85%	↑
		% of medium preventative maintenance activities completed on time	90%	↑
		% of full preventative maintenance activities completed on time	>95%	↑
		% of repair hours spent on unscheduled repairs and service not PM related.	42.0%	↓
		# of missed planned inspections	118	↓
Environmental Stewardship	Providing vehicles & equipment with minimal greenhouse gas emissions	Total fuel consumption of medium vehicles per year (L/100 km)	26.40	↓
		Total fuel consumption of light vehicles per year (L/100 km)	17.58	↓
		Total fuel consumption of heavy vehicles per year (L/100 km)	64.9	↓

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

16.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

16.3.1 Lifecycle Activities

Table 16.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Fleet Services assets:

Table 16.3 Current Asset Management Practices or Planned Actions (Fleet Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Lifecycle Management Reviews – Condition Assessment at End of Life. • Annual review and benchmarking of Lifecycles. • Test extending lifecycle to review impact. • Cost review on Assets past lifecycle.	• Extending useful life past optimum can increase the risk of critical failure of major components. • Assets beyond optimum life have reduced salvage and remarketing value. • Assets beyond optimum age can have significantly higher maintenance costs.
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• Carrying out regular preventive maintenance of all vehicles. • Reactive maintenance for circumstances that cannot be easily mitigated (vehicle accidents requiring immediate repair, faster than anticipated vehicle breakdown). • Tracking all failures as incidents in order to continue to improve. Target is to minimize unplanned non-standardized work. • Empowering staff to make decisions regarding elective repairs in order to ensure continuity of service and fewer breakdowns while in service.	• Refer to Appendix B.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• Regular preventative maintenance programs assist in determining renewals/rehabilitations required. • Major overhauls or reconditioning fleet assets are very costly and generally do not add enough extended life in order to add value. • Review opportunities to repurpose add on equipment, attachments and outfitting past the lifecycle of the parent asset.	• Refer to Appendix B.

Table 16.3 (Continued) Current Asset Management Practices or Planned Actions (Fleet Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• Optimal asset lifecycle assessed to determine timing of replacement that minimizes maintenance/repair work and maximize salvage value. • Notice to all shop supervisors and manager of end of life assets to help with service and repair decisions to mitigate non value added expenditures	• Minimizing service and repair at end of life increases the chance of failures.
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• Optimal lifecycle analysis results in salvage value. Salvage amount can vary but an average of 15% of replacement value is consistently achieved. • Fleet planning to stagger sales of similar assets at auction to ensure maximum returns and not over flooding resale market • Fleet planning to target peak season for certain items to hit auction when demand is high. (i.e. snow plow equipment – Sept-Nov.)	• Timing for replacements has an operational impact. Delaying or holding inventory requires storage and can adversely affect the function and value of the retiring asset
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• Extended warranties and service agreements • RFP procurement practices to acquire higher quality assets with longer lifecycles	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Currently provide several shared services to our other public service providers.(Fire, Police, EMS, Libraries, and Tourism. Some shared services include Fuel, vendor agreements for parts and service • Reviewing business plans to offer fleet mechanical shop services to other public services, boards and commissions • Capital growth projects are identified by Development Charges and the service area using the fleet asset (subject to Development Charges Act, 1997 requirements, such as fleet asset expecting to last less than 7 years not being eligible for Development Charge funding). The service area would finance the fleet asset, and Fleet would then be responsible for acquisition and maintenance of the growth asset. • Capital growth projects are identified by Development Charges and Solid Waste (subject to Development Charges Act, 1997 requirements and City of London policy) , or as a part of Assessment Growth Policy (where applicable with municipal policy).	• Refer to Appendix B.

Section 16: Fleet

The cost of these identified Lifecycle activities is summarized in the Table 16.4. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years.

Service Improvement activities are analyzed using planned expenditures identified through a review of the capital budget.

Table 16.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Fleet Service Area	Operating Budget (Non-Infrastructure and Maintenance and Operating Activities)	**Total**	**$10.459**
	Lifecycle Capital Budget (Rehabilitation, Renewal, Replacement, and Disposal Activities)	**Total**	**$ 5,290**
	Service Improvement Budget	**Total**	**$Nil**

Fleet Equipment

Fleet Vehicles

16.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is to ensure that the proportion of assets in poor or very poor condition remains relatively stable. Staff then consider the optimal blend of each lifecycle activity to achieve the lowest lifecycle cost management strategy that balances costs and with the forecasted change in the condition profile of each asset type.

CURRENT BUDGET CONDITION PROFILE

The condition profile expected from the current budget is forecasted by using the same logic related to condition degradation rates and appropriate condition triggers for rehabilitation/replacement activities, but the budget is constrained to the current level of planned expenditures. If there is insufficient budget in any particular year to complete a rehabilitation or replacement activity on an asset that has reached its condition trigger, then the asset remains in a poor or very poor condition state until there is sufficient budget in a future year to complete the lifecycle activity. Figure 16.4 presents the expected condition profile for the next 20 years based in the current budgets for the Fleet Services assets.

OPTIMUM BUDGET CONDITION PROFILE

The approach to establishing the optimal budget is to forecast the lifecycle activities that are required to maintain the current performance of the LOS metrics. The graph below shows the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. Figure 16.5 presents the expected condition profile for the next 20 years based in the optimum budget for the Fleet Services assets.

The graphs below show the condition profile of assets changing over the next 20 years. The analysis considers the current condition of assets, the rate that the condition is expected to degrade, and appropriate condition triggers for rehabilitation/replacement activities to forecast the condition profile into the future. The variables in the analysis are adjusted until the forecasted condition profile meets the expectation of the City's staff involved with the management of the assets. The future lifecycle activities that are required to achieve the desired condition profile are then used to establish the average annual Optimal Expenditure to maintain the current condition profile.

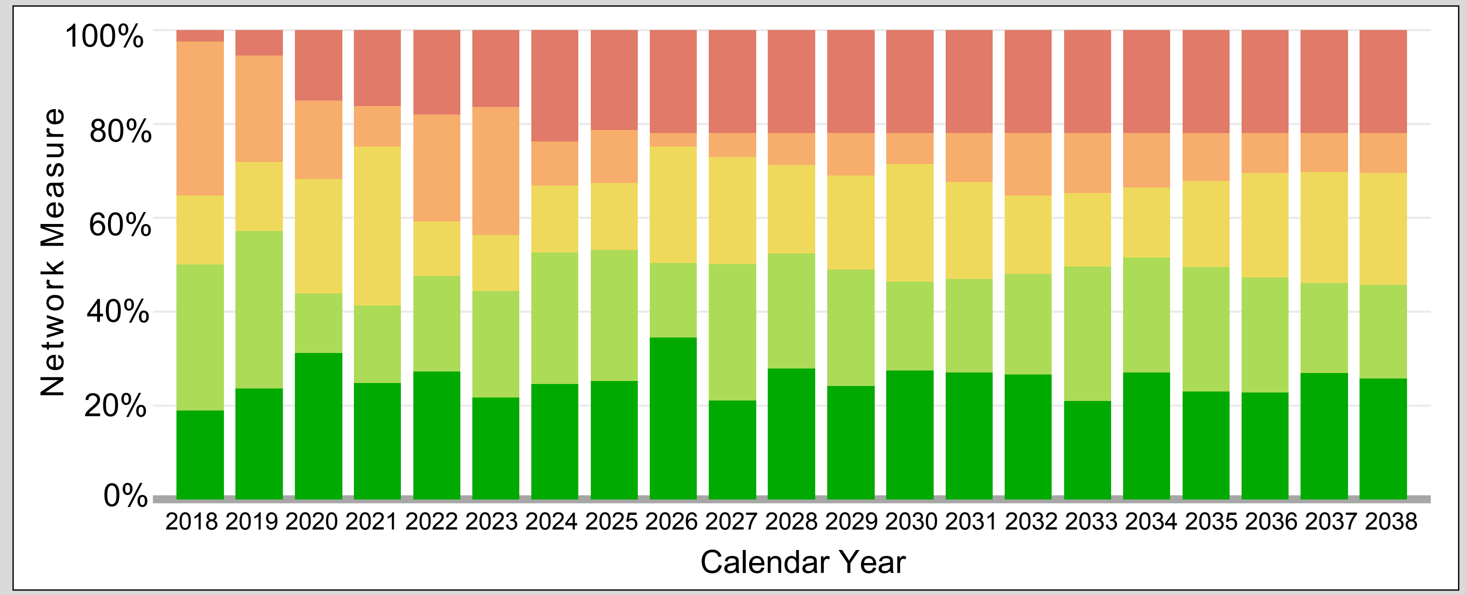


Figure 16.4 Projected 20-year Current Budget Condition Profile (Fleet Services)

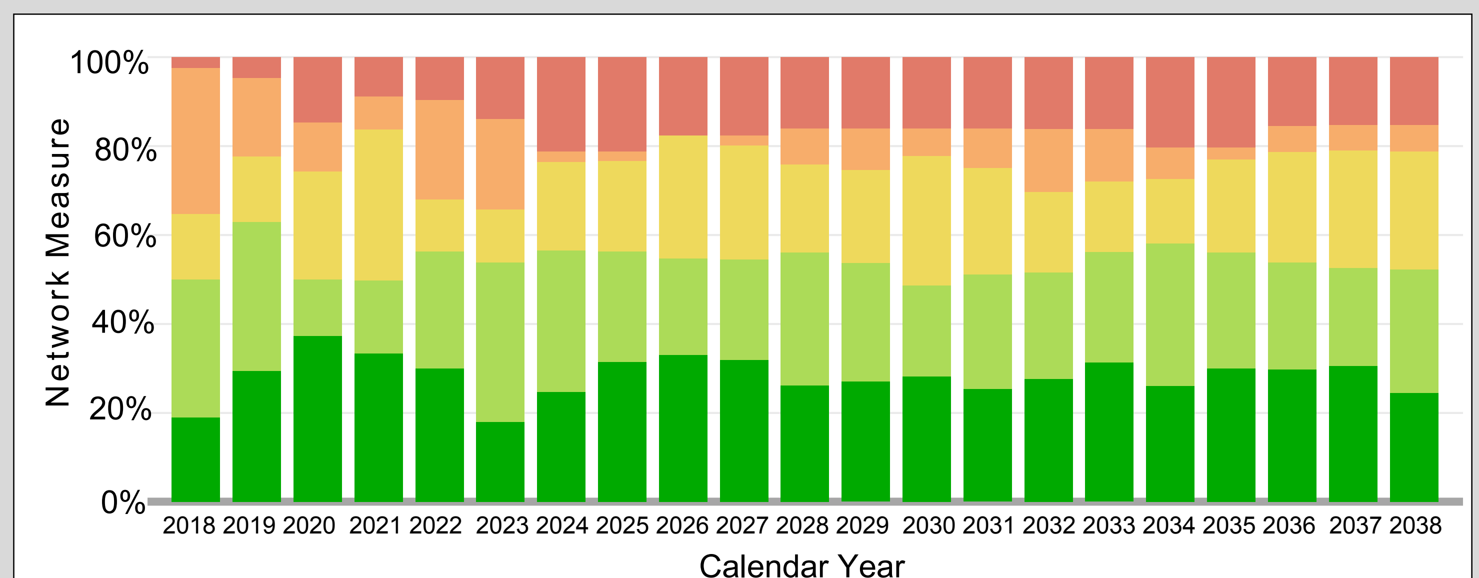


Figure 16.5 Projected 20-year Optimal Budget Condition Profile (Fleet Services)

Section 16: Fleet

16.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 16.5 and illustrated in Figure 16.6. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as it is inherent in asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

Table 16.5 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Fleet Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
Fleet Service Area	Lifecycle Capital Budget	**Total**	**$5,290**	**$6,062**	**$73**	**No Gap**

Fleet Vehicles

Section 16: Fleet

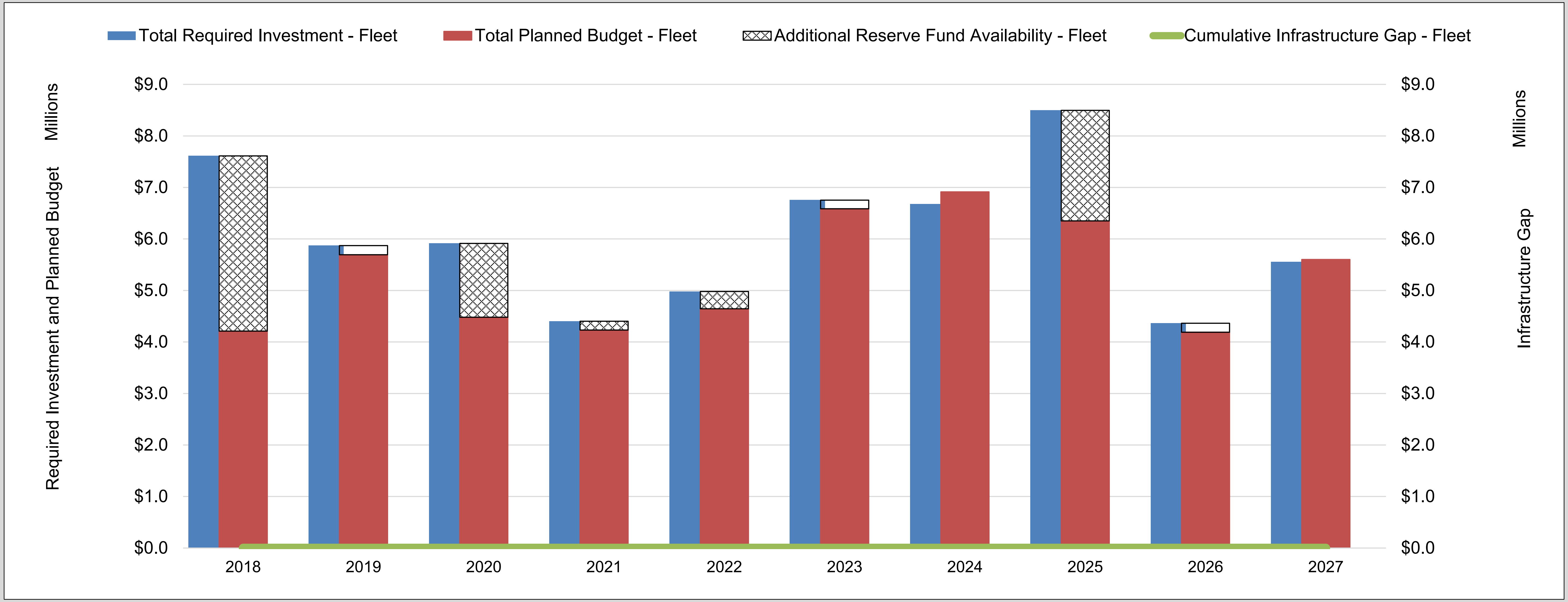


Figure 16.6 Forecasted Infrastructure Gap (Fleet Services)

Analysis of Fleet's 10 year requirements of approximately $60 million (or approximately $6 million a year) indicate that no infrastructure gap exists, after Fleet draws down on their source of financing – Vehicle and Equipment Replacement Reserve Fund (By-law NO. A-5994-509).

While the analysis indicates for the 2018-2027 period that Fleet has sufficient available funding, further analysis of the Fleet reserve fund indicates that Fleet can only rely on 82% of regular, recurring funding contributions to finance their operations. The remaining 18%, or approximately $1.08 million, of funding of annual requirements are drawn from finite accumulated reserve fund balances. Figure 7 illustrates how the average annual Fleet requirements are expected to be funded from 2018-2027.

The funding shortfall of $1.08 million does not manifest at this time in an infrastructure gap because of sufficient reserve fund balances. However, conservative calculations indicate Fleet reserve fund balances would be reaching zero by early 2030. Given the expected continually rising prices of Fleet assets and that preliminary work indicating Fleet reserve fund balances should at minimum be $2.0 minimum indicates as early as 2025 there would be insufficient Fleet funding. If this occurs, it would result in an infrastructure gap for the Corporation as any additional financing obtained by the Corporation to ensure Fleet's continual operation would take away the funding from another service area in need.

It is also noted needs represent the costs to renew and maintain the serviceability of existing assets, and do not account for growth and the expansion of service to new areas.

Section 16: Fleet

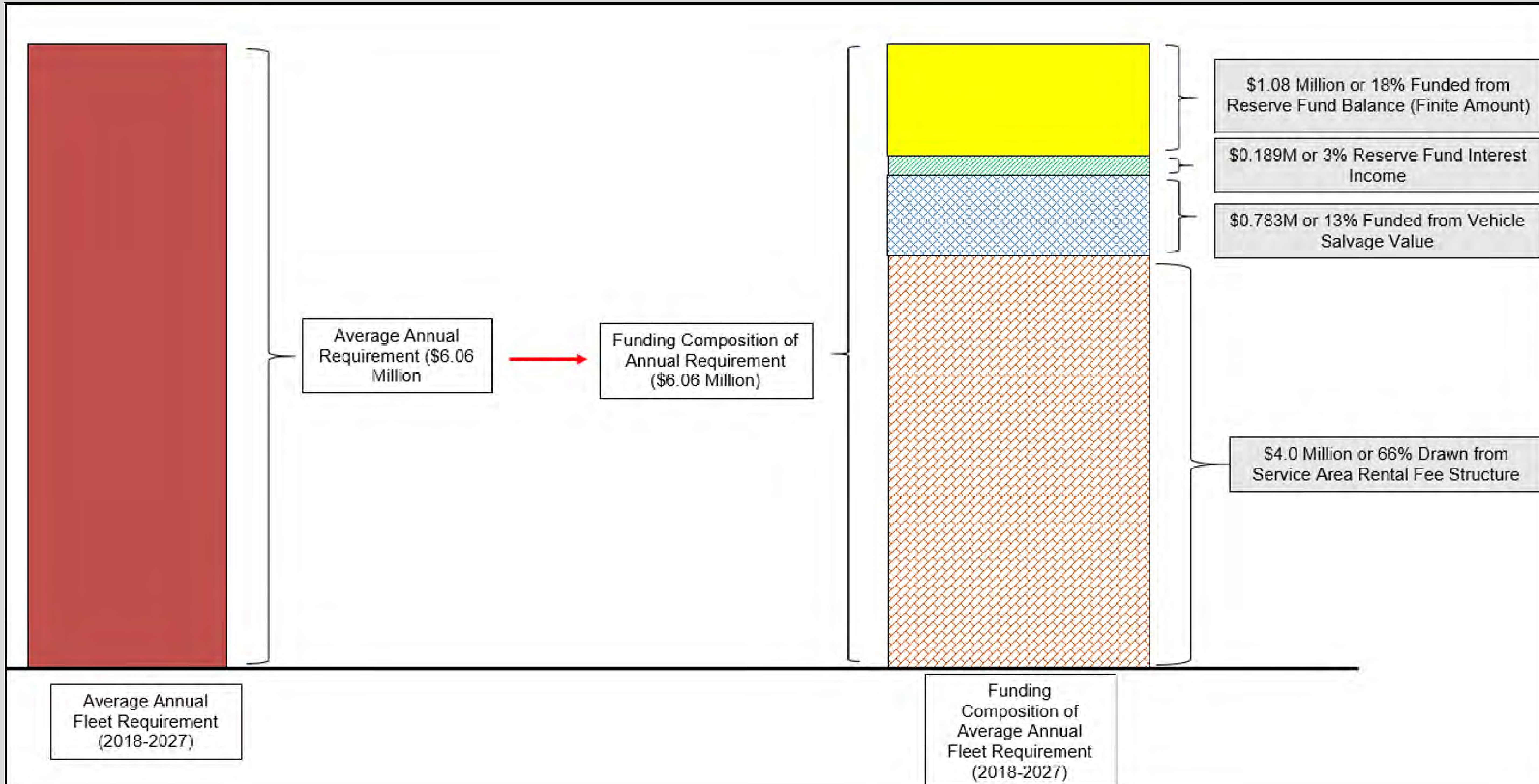


Figure 16.7 Visualization of Funding Sources of Average Annual Fleet Requirements (2018-2027)

Section 16: Fleet

16.5 DISCUSSION

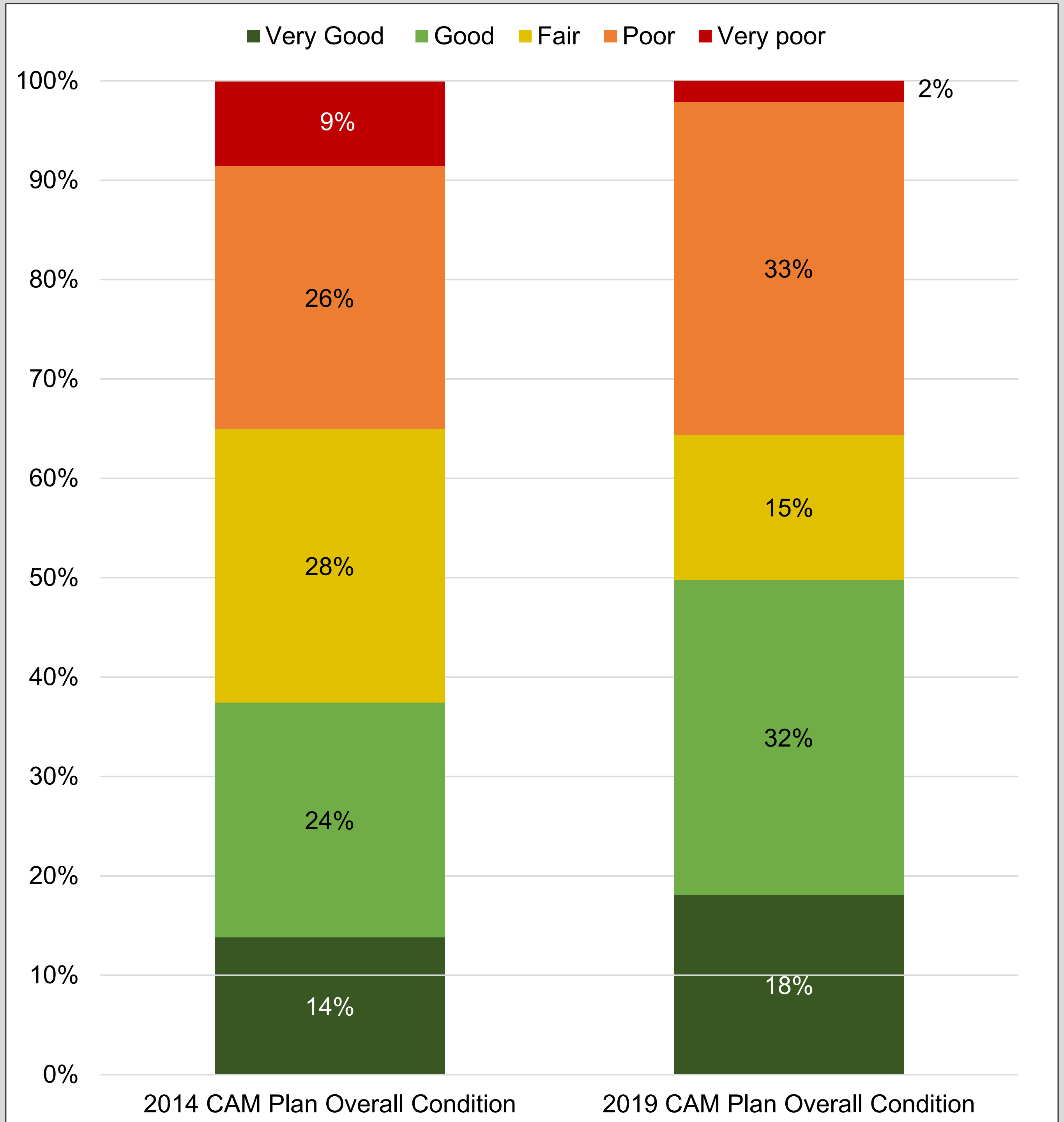


Figure 16.8 2014 CAM Plan to 2019 CAM Plan Condition Summary (Fleet Services)

CURRENT AND FUTURE CHALLENGES

The Fleet Services assets Replacement value indicated in the 2014 CAM Plan was $45 million, the replacement value increased to $57.4 million due to inflation and acquiring new assets. The 2014 CAM Plan to 2019 CAM Plan Fleet Services assets condition comparison is provided in Figure 16.8. Evaluating required investment versus planned budget shows that the Fleet has no infrastructure gap over the next decade, indicating that funding is appropriate given the City’s vehicle and equipment demands. While Fleet has sound planning and budgeting founded on a good understanding of the needs of the City’s internal customers, and Fleet has also taken steps to increase utilization and reduce the number of units by offering shared vehicle solutions across service areas, there is strong likelihood that the Fleet rental fee structure with other City service areas needs to be updated or the reserve fund Fleet relies on to finance their requirements will go to zero.

Work has begun in this regard, and draft analysis indicates the rental fee structure increase to a 1.75% annual increase, based on an approximate $4.0 million baseline annual rental collection. Additional research is being performed to predict vehicle prices past the multiyear budget period.

If these revisions occur, the expectation is that there would be sufficient funding to maintain adequate reserve fund balances to continue to allow Fleet assets to be well maintained, and allowing sustained operation while the lives of equipment and vehicles are optimized. Off-road equipment may require further attention and management as the data suggests it is vulnerable to unplanned replacements. Deferring replacements significantly beyond the identified optimum lifecycles increases maintenance costs and risk of failure, reduces salvage values and quite often increases the purchase price of the replacement.

Over the past decade, the City has taken significant steps to improve Fleet vehicle operations and adopt hybrid vehicle technology particularly for the light and medium vehicles groups. Excluded from the forecast are growth and costs associated with future service improvements. In the 2014 CAM Plan, there were no infrastructure gaps indicated for the Fleet Service area, which indicated that there was no shortfall in the required budget. The 2019 CAM Plan condition profile has not changed a lot; it shows almost the same percentage of assets from Fair to Very Good condition.

16.6 CONCLUSIONS

Valued at nearly $57.4 Million, the City's Fleet Services assets are overall in to **Fair** condition, indicating that there was sufficient funding to maintain the Fleet assets in a serviceable condition. While the analysis indicates that fleet has sufficient available funding for the 2018-2027 period, further analysis of the fleet reserve fund indicates that Fleet can only rely on 82% of regular, recurring funding contributions to finance their operations. The remaining 18% of funding of annual requirements are drawn from finite accumulated reserve fund balances. The funding shortfall of does not manifest at this time in an infrastructure gap because of sufficient reserve fund balances as shown in Figure 16.9. However, conservative calculations indicate fleet reserve fund balances would be reaching zero by early 2030. Table 16.6 presents the summary of the State of Infrastructure, Infrastructure Gap/Surplus, and Reinvestment Rates for Fleet Services assets.

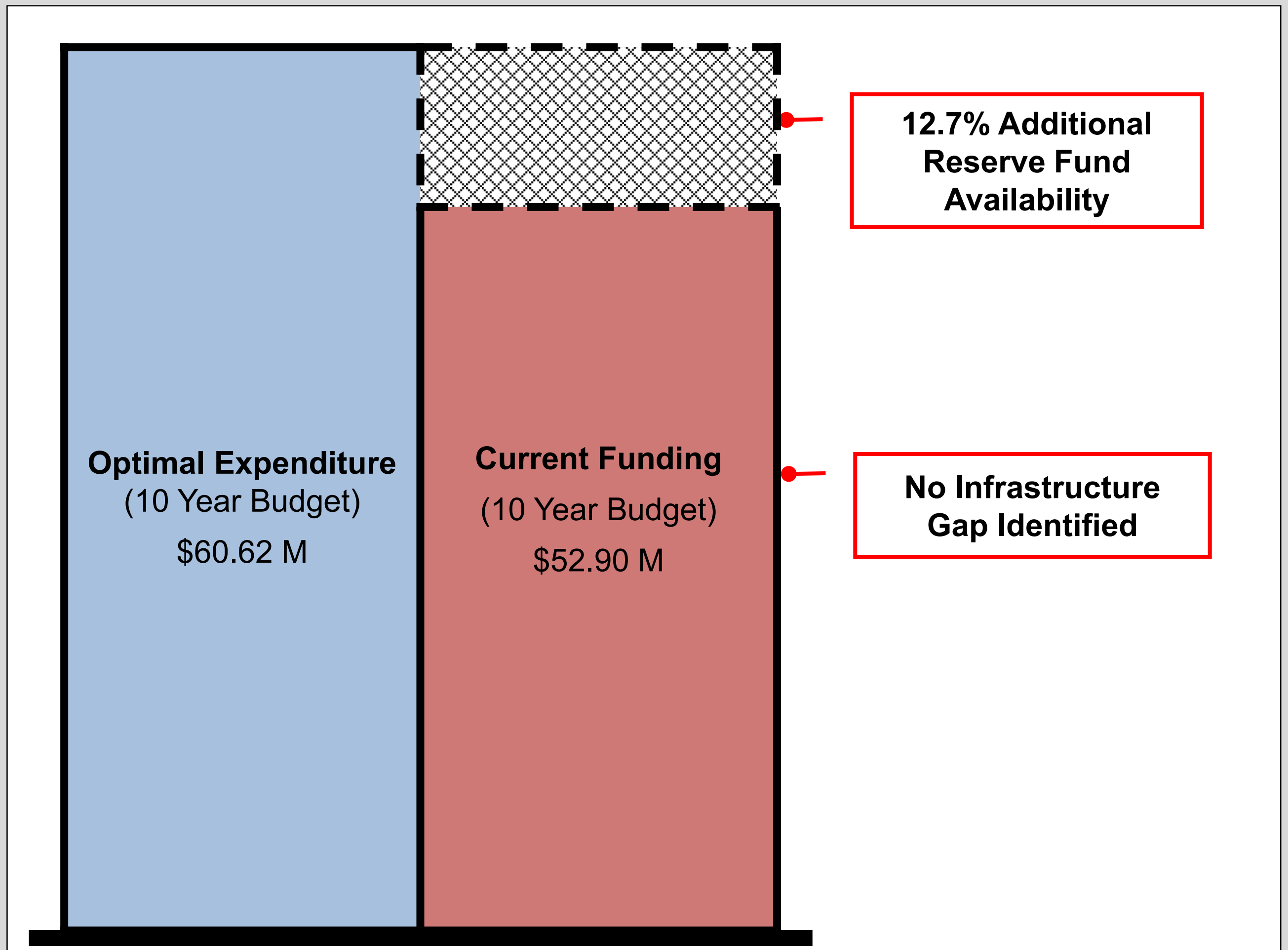


Figure 16.9 Cumulative 10 Year Infrastructure Gap Visual (Fleet Services)

Fleet Vehicle

Fleet Vehicles

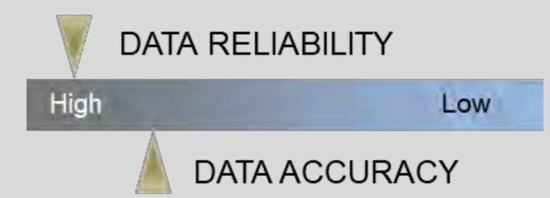
Section 16: Fleet

Table 16.6 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Fleet Services)

City of London - Fleet Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Fleet	**$57.36**		**$3.40**	**No Gap***	**9.2%**	**10.2%**

* This projected infrastructure gap is reduced by the forecasted reserve fund drawdown availability over the next decade.



Fleet Vehicles and Equipment

Section 17: Information Technology

Quick Facts
Approximately 2,500 Desktops
Approximately 10 kilometers of Fibre Optic Network
Approximately 1,350 Cell phones

IT Assets Overall Condition

Replacement Value	$38.01 Million
Condition	Good
10 Year Gap	None
City-Wide Infrastructure Gap Contribution	None

No Infrastructure Gap Identified

Section 17: Information Technology

17.1 STATE OF LOCAL INFRASTRUCTURE

With approximately $20 Billion dollars' worth of assets directly owned by the City of London, it would not be possible to effectively use and manage assets and their information without the tools offered through technology. Information and data are strategic business assets. The City of London Information Technology Services (ITS) is responsible for the technology tools used to ensure the safety and protection of the Corporation of the City of London's data, information and computer systems. ITS is an internal technology service provider that supports City Service Areas in delivering their services to the public. ITS provides information technology and other technology services to the Corporation, as well over twenty boards, commissions, and municipal corporation. The ITS assets include hardware, software, information and data which they maintain for their use and the use of both internal and external customers.

17.1.1 Asset Inventory and Valuation

To support service delivery, the City owns and maintains a large information technology infrastructure currently valued at approximately $38 Million. Through ITS, the City is responsible for maintaining this infrastructure in a condition that ensures continuity of service. IT assets include leased and owned assets, both of which have been included in this report. These include IT infrastructure, enterprise applications, end user devices and applications needed to deliver internal and external services.

End user devices are now directly owned by the City – in the previous Asset Management Plan, capital lease strategies were being used.

Like most municipal corporations, the value, condition and gap with respect to the City's soft assets of 'data' and 'information' are not currently assessed nor is any methodology readily available to undertake such an assessment.

Table 17.1 Asset Inventory and Valuation (ITS)

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
IT Infrastructure	Network, Access Points, Switches, Routers	Various	Ea.	$2,400
	Storage System, Backup System	2	Ea.	$1,600
	Servers, Blade Enclosures	40	Ea.	$1,100
	F5 Load Balancers	2	Ea.	$160
	Phone Systems	1	Ea.	$1,700
	ITS Fibre Network (does not include Corporate Security or Traffic)	10	Km.	$11,000
Applications and Software	Enterprise Applications	200	Ea.	$14,475
	Enterprise Software	4	Ea.	
End User Devices and Applications	Desktops, Laptops, Etc.	2,500	Ea.	$3,775
	Cellphones, iPads, Etc.	1,350	Ea.	$1,200
	IT Equipment - New Council Chambers and Committee Room	5	Ea.	$600
Total				**$38,010**

[1] Includes critical software programs such as J.D. Edwards, Kronos, Amanda, and Sharepoint.

17.1.2 Age Summary

Figure 17.1 shows the ITS average age and useful life by asset. Asset age has been established using internal expert opinion. Reliance on internal expert opinion used as single listing for all ITS was not readily available. ITS does have a service management tool named 'HEAT' which assisted in estimating the average asset ages.

IT Infrastructure age is based upon internal expert opinion. It indicates the IT Infrastructure age is approximately two to four years old. The two exceptions are the Corporation phone system and storage system which are expected to be replaced in 2019/2020, respectively. Fibre Optic networks, which are longer lasting assets, have an average age of 13 years.

City Cellphone Asset

Applications and Software installation dates are documented and known for major application & software. For example, the J.D. Edwards accounting software is approximately 20 years old. What is less readily available is assessing the impact on age of Enterprise Applications when upgrades/renewals have regularly occurred and have revised the original application structure. Data does not lend to traditional age assessment profiles and thus are not listed. In absence of age profile predictions for Applications and Software, ITS mitigates this by assessing asset condition and having detailed analysis for assessing expected capital needs.

End User Devices and Applications include computer hardware that is used daily across the Corporation by every service area. Since the last Asset Management Plan, the City has transitioned to directly owning End User Devices and Applications. There is detailed data listings tracking the age of newer assets (assets approximately 3 years old or less); however, for older assets it is not as readily available. Given the frequency of replacements, the expectation is that by the next CAM Plan these older assets would be replaced and a readily available age database would be available.

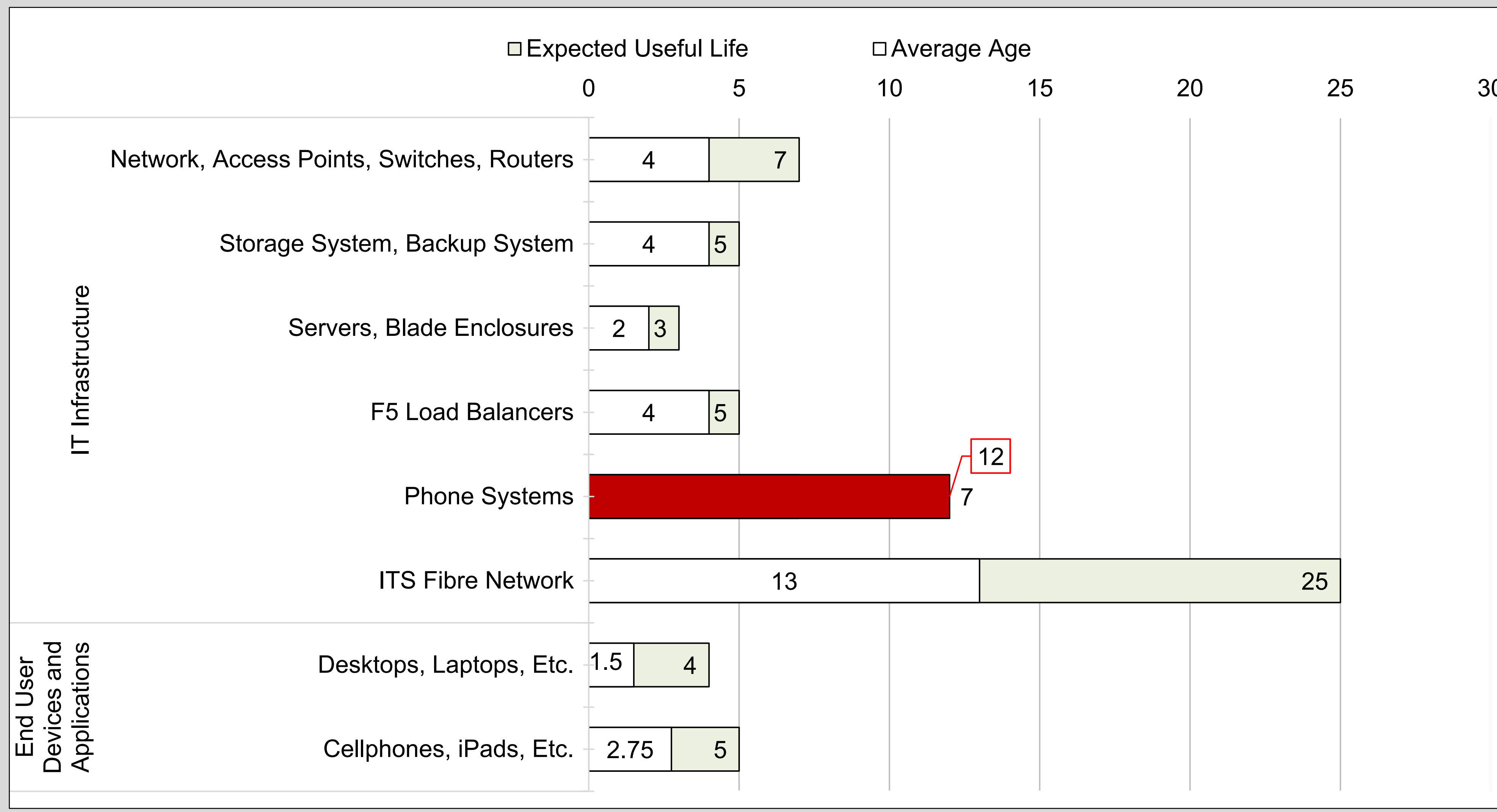
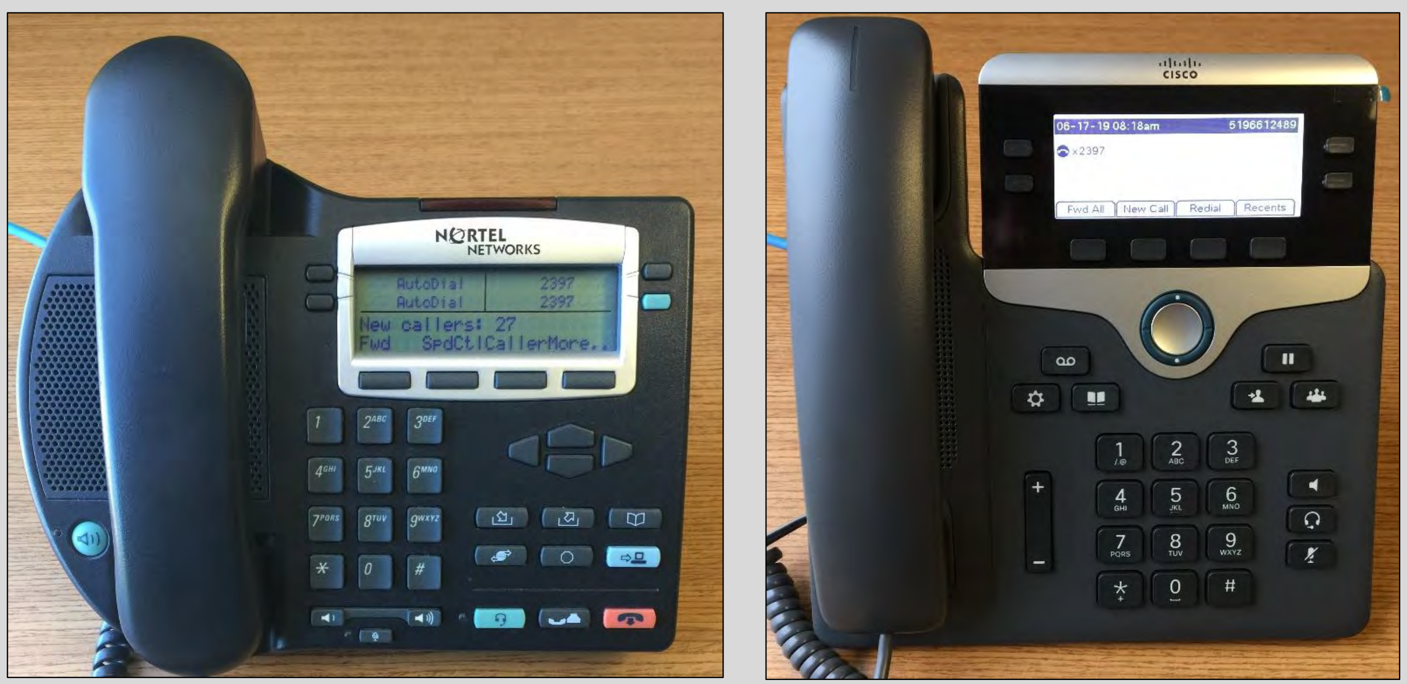


Figure 17.1 Average Asset Age as a Proportion of Average Useful Life (ITS)

Section 17: Information Technology

17.1.3 Asset Condition

The overall condition of the ITS assets is **Good** to **Very Good**. Unlike most other types of assets owned by the City, many ITS assets such as desktops and printers, have a short estimated useful lives of 4 years. The condition highlighted in Figure 17.2, was evaluated based on expert opinion and industry standards. Technology asset concerns are captured on a proactive basis through alerting applications. It also occurs through routine maintenance program executions or problems reported by the user to the internal IT Helpdesk. Only 9% of IT Infrastructure is in **Poor** or **Very Poor** condition and approaching the end of its useful life. Having a distribution of very good to very poor is consistent with asset management processes. It is noted the very poor condition is primarily from phone systems, which is expected to be completely replaced by 2019/2020.



City Telephone Asset Before and After Replacement

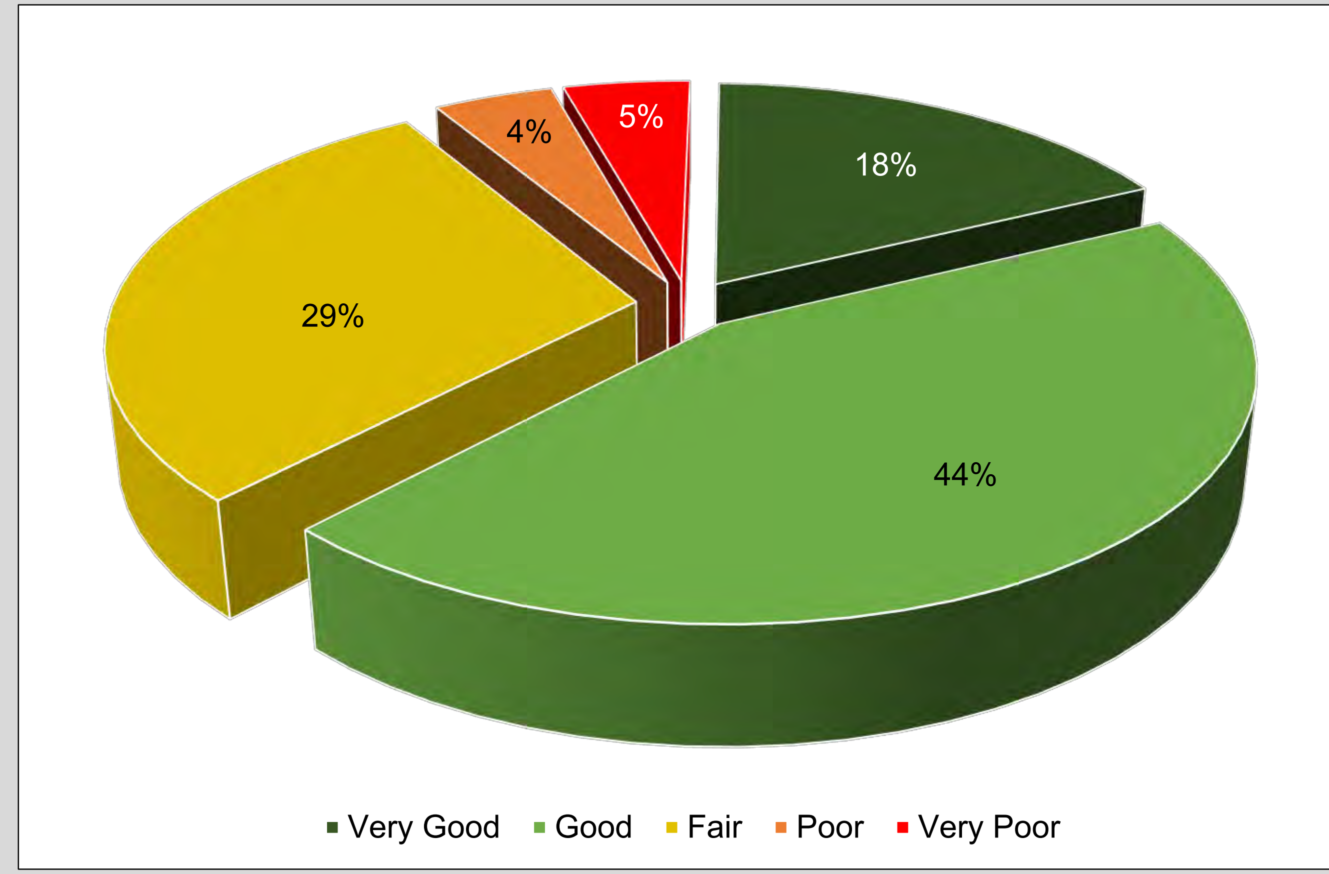


Figure 17.2 Asset Condition Summary (ITS)

Asset conditions have been established using data from internal expert opinion.

The **IT Infrastructure** primarily consists of a fibre optic network and the assets required to support the transmission and retention of data. Asset condition is assessed as **Fair** to **Very Good**. The exception is the Corporation phone system and storage system which is expected to be replaced in 2019/2020.

Applications and Software consist of various applications that service areas require to operate effectively. Such examples include the J.D. Edwards accounting software and the City of London website. The majority of these applications are assessed in **Good** to **Fair** condition.

End User Devices and Applications consist of computer hardware (desktop computers, cell phones, and IT equipment for Council Chambers and Committee Rooms). Given that the users of these assets would notify ITS if they are not functioning, the condition is assessed as **Good** to **Very Good.**

Section 17: Information Technology

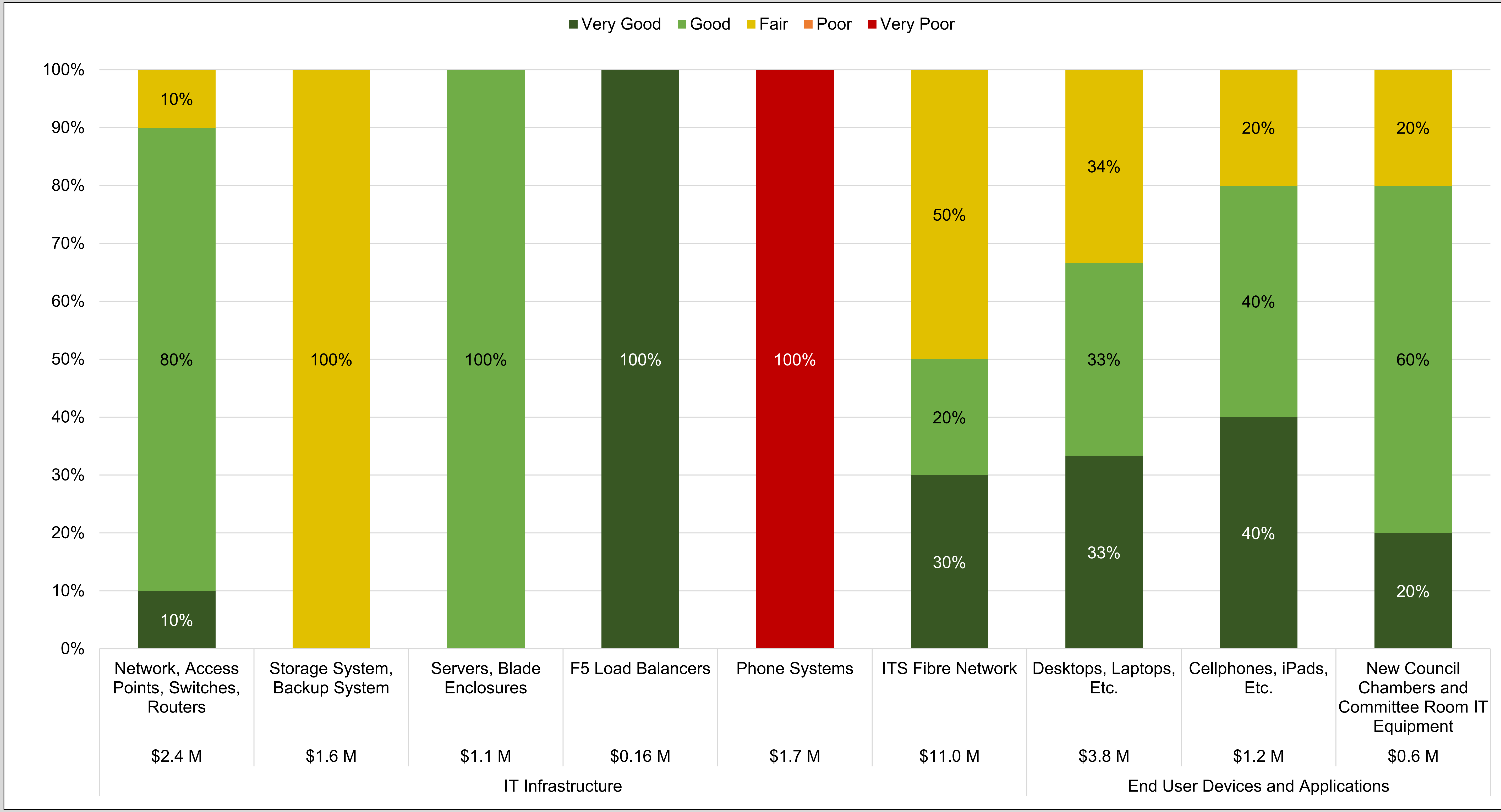
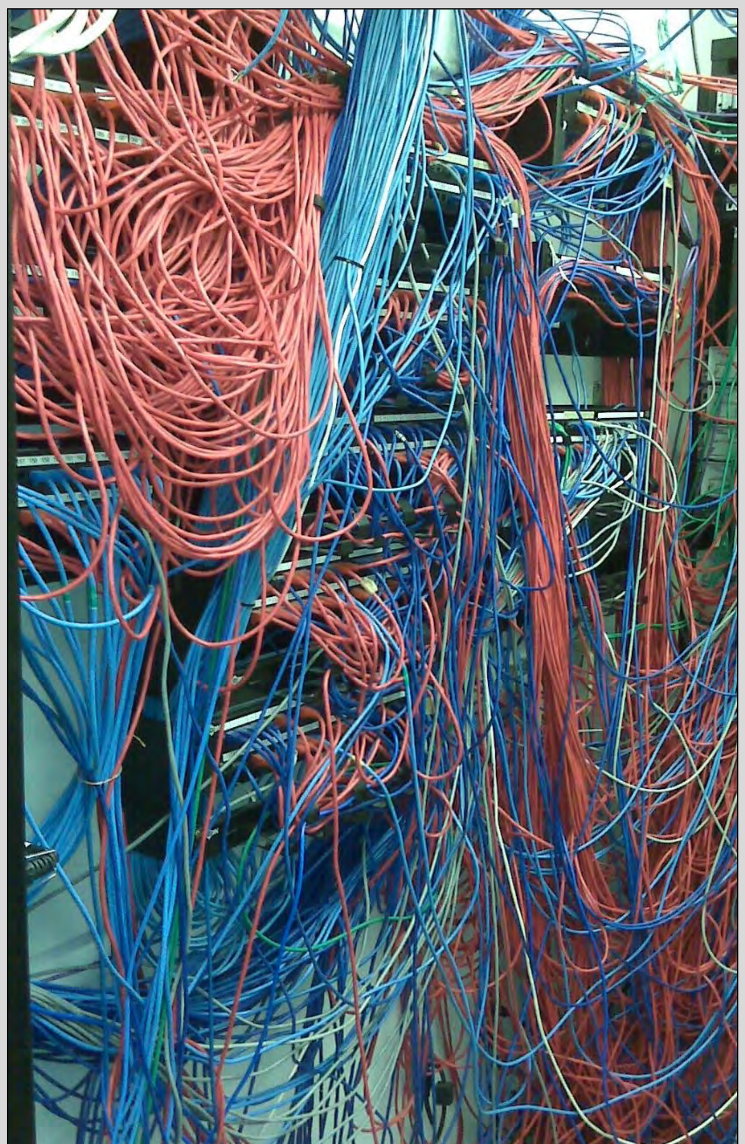


Figure 17.3 Asset Condition Summary (ITS)

17.2 LEVELS OF SERVICE

Level of Service (LOS) performance measures are related to Corporate Values of Customer Service, Cost Efficiency, Reliability, and Quantity. The metrics that go beyond the foundational or regulation required metrics are considered advanced. They indicate service areas that have documented planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or to be approximately equal in future years.

Foundational and advanced metrics are listed in Table 17.2.



Pre Network Migration Layout

Post Network Migration Layout

Table 17.2 Levels of Service Metrics – Foundational and Advanced (ITS)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Customer Service	Customer Satisfaction	Customer percentage Overall Satisfaction (Incidents and Services Request)	96%	↑
Cost Efficient	Providing IT services in a cost efficient manner	Cost to provide service ($/household)	$91.48	↔
Reliable	Providing reliable IT services	Percentage of IT assets considered fair or better	91%	↑
		Having access to database	99.96%	
		Timely completion of incident task (in hours)	8.13	↓
		Timely completion of request task (in hours)	3.18	↓
Quantity	Providing the right amount of IT services	Number of outstanding IT hardware requests greater than 30 days	0	↔

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 17: Information Technology

Table 17.2 (Continued) Levels of Service Metrics – Foundational and Advanced (ITS)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

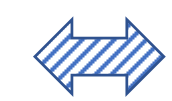
CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Customer Service	Customer Satisfaction	Customer percentage Satisfaction (Overall Service Experience)	96%	
Cost Efficient	Providing IT services in a cost efficient manner	Annual operating budget for IT	$16,179,334	
		IT Reinvestment Rate	6.3%	
		IT Infrastructure Reinvestment Rate	6.3%	
		IT Enterprise Applications Reinvestment Rate	5.3%	
		IT End User Devices Reinvestment Rate	8.3%	

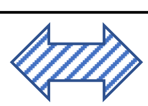
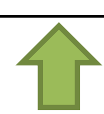
No Change   Positive Upward   Positive Downward

Section 17: Information Technology

Table 17.2 (Continued) Levels of Service Metrics – Foundational and Advanced (ITS)

Performance Measure: Customer / Council Focused | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable	Providing reliable IT services	Percentage of IT assets considered poor or very poor	9%	
		Number of hours spent for database management, planning and prevention maintenance	1,252	
		Percentage average database availability (excluding planned downtime)	99.96%	99.97%
		Average Incident Task (hours) to Completion	3.18	< 7 hours
		Average Request Task (hours) to Completion	8.13	< 35 hours
Quantity	Providing the right amount of IT services	Number of outstanding IT hardware requests greater than 30 days	0	

 **No Change**  **Positive Upward**  **Positive Downward**

17.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

17.3.1 Lifecycle Activities

Table 17.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to ITS assets:

Table 17.3 Current Asset Management Practices or Planned Actions (ITS)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• **IT Infrastructure, and End User Devices and Applications** – Monitor and track age and amount of time the asset considered a priority as to when the asset should be replaced. • **Applications and Software** – Focus is to ensure that asset is considered 'in support' to mitigate potential malware/cyber-attacks and ensure asset is operating efficiently for individuals using the asset.	• Inability to mitigate malware/cyber attacks resulting from deteriorated and non-supported asset. • Financial risk – ITS industry shift to relying on capital dollars to rely on operating licenses financed through operating budget.
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• **IT Infrastructure, Applications and Software, End User Devices and Applications** – Users of City hardware and software assets provide asset concerns on proactive basis through alerting applications and preventative maintenance. • Concerns are also addressed through routine maintenance programs reported by the user to the IT Helpdesk.	• Refer to Appendix B.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• **IT Infrastructure and Applications** - Rehabilitation programs exist for City's directly owned cable network. Proactive rehabilitation of City software programs also exist and would be referred to as 'supported' software. • **End User Devices and Applications** – Generally not rehabilitated.	• Refer to Appendix B.

Section 17: Information Technology

Table 17.3 (Continued) Current Asset Management Practices or Planned Actions (ITS)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• **IT Infrastructure** – Scheduled replacement programs in place. Replacement programs exist for City's directly owned cable network. • Coordination occurs with Utility Coordination Committee for fibre optic network installation. • **Applications** – When applications no longer receive support from ITS, generally would be replaced with new application. • **End User Devices and Applications** – Replaced when asset reaches end of useful life or unexpected event occurs with asset.	• Cost over-runs during large, complex design and construction projects.
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• ITS would work with Environmental and Engineering Services (EES) to ensure assets are properly disposed. • Laptops hard drives are wiped of data using appropriate procedures, and are typically disposed on www.govdeals.ca for a nominal amount.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability	• Service improvements projects are identified and financed by service areas using IT assets. IT would then be responsible for acquisition and maintenance of the service improvement asset.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Capital growth projects are identified by of Assessment Growth Policy (where applicable with municipal policy), or, Development Charges and the service area using the IT asset (subject to Development Charges Act, 1997 criteria, such as equipment expecting to last less than 7 years not being eligible for Development Charge funding). The service area would finance the IT asset, and IT would then be responsible for acquisition and maintenance of the growth asset.	• Incorrect growth assessments may result in overabundance of ITS assets in a particular area and insufficient assets in another.

Risks described above are compared to current lifecycle and service improvement funding, and any identified growth budgets in the 2018-2027 period.

Table 17.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
ITS (IT Infrastructure, Applications and Software, and End User Devices and Applications)	Operating Budget*	**Total**	**$1,616**
	Lifecycle Capital Budget**	IT Infrastructure	$1,138.5
		Applications and Software	$766
		End User Devices and Applications	$1,259.5
		Total	**$3,164**
	Service Improvement Budget	**Total**	**$nil**

Current funding presented for operating budgets is the average of the budgeted 2016 and 2017 fiscal years.

Service Improvements activities are analyzed using planned expenditures identified through a review of the capital budget.

Growth activities are analyzed using the draft 2019 DC Background Study.

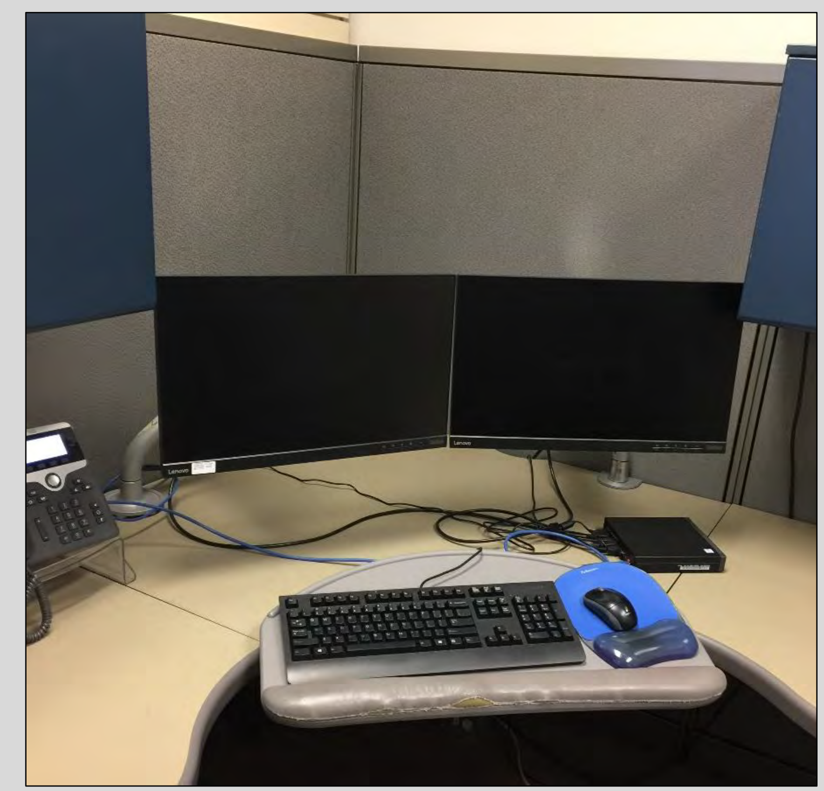
ITS traditionally does not have growth operating and capital budgets, and the draft 2019 DC Background Study has not identified any growth projects with ITS.

*(Non-Infrastructure, Maintenance and Operating Activities)

**(Rehabilitation, Renewal, Replacement, and Disposal Activities)

17.3.2 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not available for the ITS service area. Data exists for these assets but not easily integrated into condition profile assessments. Shorter-lived assets common with ITS does not lend to traditional linear assessment profiles. In absence of condition profile predictions, ITS mitigates this by having detailed analysis for assessing expected capital needs.



City Employee Workstation using ITS assets

Section 17: Information Technology

17.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 17.5. The analysis documented is related to the lifecycle rehabilitation, renewal, or replacement lifecycle activities.

Disposal activities are considered inherent with asset renewal/rehab/replacement activities.

Current funding for capital budgets presented are the annual average of approved budgets (or revise to budgets developed through capital planning) (as of December 31, 2017) for the 2018-2027 fiscal years.

Table 17.5 Comparison of Current to Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (ITS)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's)	Funding Gap (000's) (Average Annual)
ITS (IT Infrastructure, Applications and Software, and End User Devices and Applications)	Lifecycle Capital Budget	IT Infrastructure	$1,138.5	$1,138.5	**Not required**	**No Funding Gap**
		Applications and Software	$766	$766		
		End User Devices and Applications	$1,259.5	$1,259.5		
		Total	**$3,164**	**$3,164**	**Not Required**	**No Funding Gap**

Section 17: Information Technology

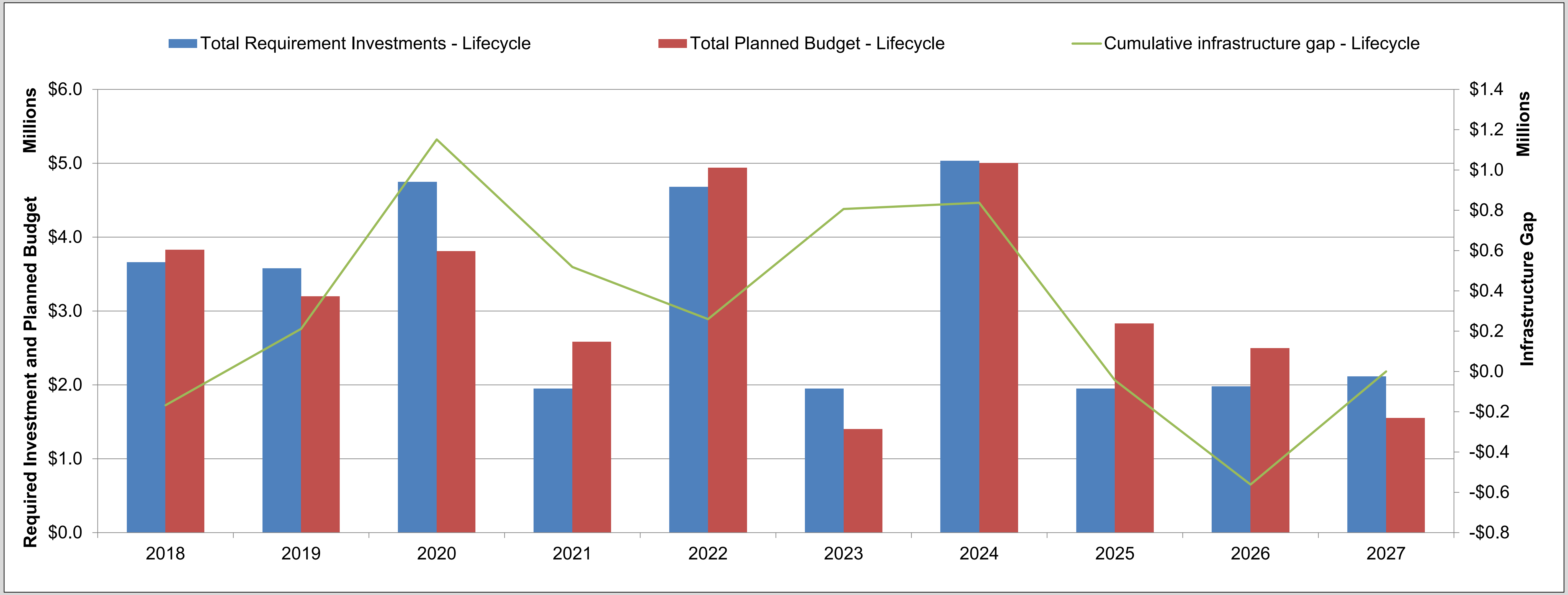


Figure 17.4 Forecasted Infrastructure Gap (ITS)

An analysis of the required investment versus planned budget, shows that ITS will experience no funding gap over the next 10 years. A phone system replacement, regular fibre network renewals, end user devices with planned software applications replacements, and less frequent but capital intensive storage and server backup projects, drive ITS requirements. The short lifecycle of these assets necessitates constant review of assumptions, investment needs, and renewal requirements. Total required investment represents the average annual costs to renew and maintain the existing assets so services can continue to be delivered. The forecast does not account for any costs to improve service, accommodate growth or expand service to new areas or customers. ITS assets are strongly impacted by rapid technology changes and pricing structures implemented through vendors. This alters projected capital and operating budgets needs frequently over a 10 year period of analysis. The accuracy and reliability of the projection are subject to annual revisions and updates as further information is provided.

In the City of London, individual service areas own specialized software exclusive to their service which may not currently be part of the software assets managed by ITS. This local software inventory is not budgeted by ITS, unlike the Applications and Software such as J.D. Edwards and Kronos for which ITS incorporates maintenance and renewals in its budget. Over the next ten years ITS is not expected to have a funding gap. ITS has a reserve fund available that can be drawn upon if any annual variances occur.

17.5 DISCUSSION

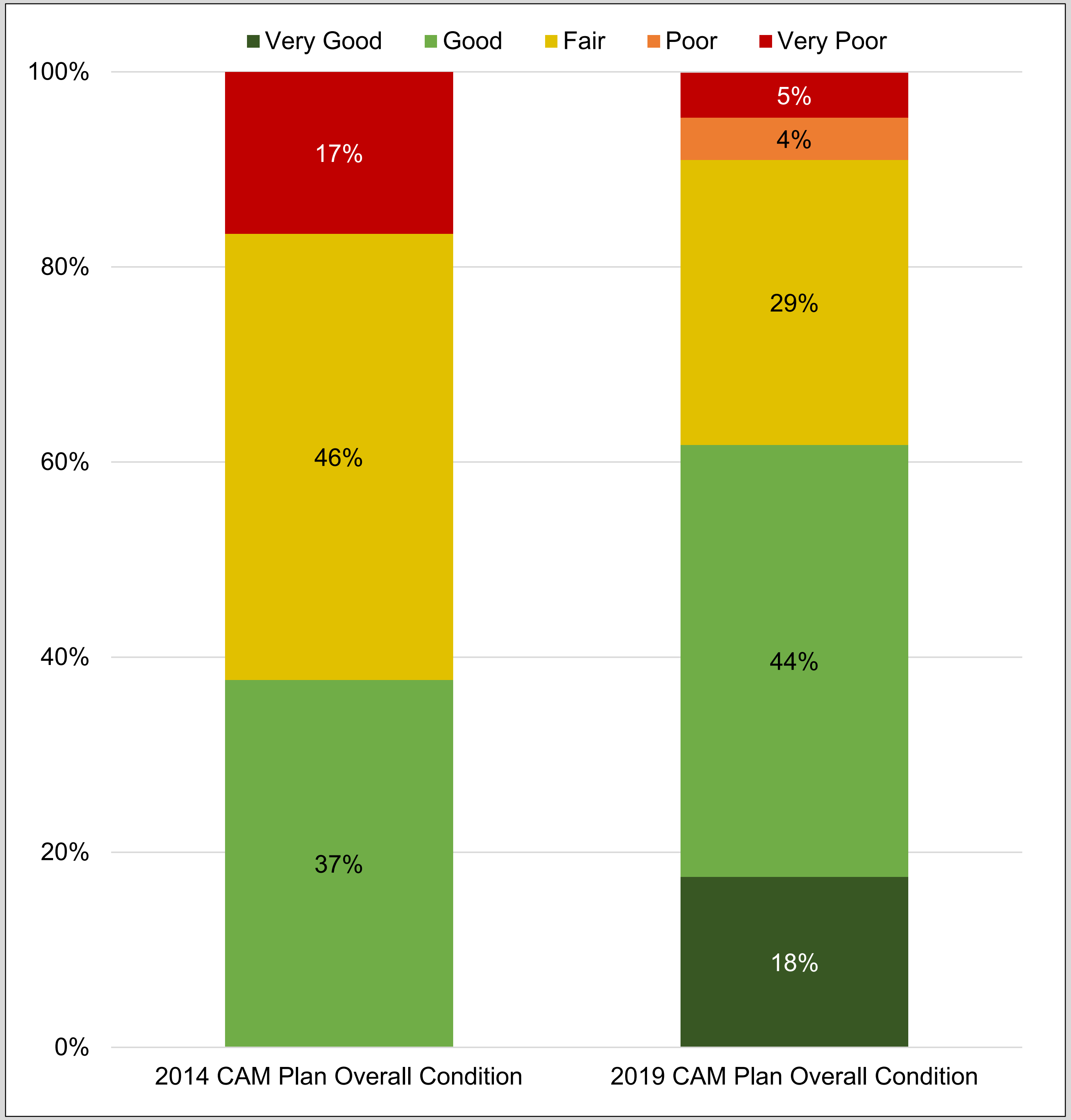


Figure 17.5 2014 CAM Plan to 2019 CAM Plan Condition Summary (ITS)

CURRENT AND FUTURE CHALLENGES

Valued at $38.01 Million, the City's IT assets are overall in **Fair** to **Good** condition. To ensure the condition distribution remains in this condition range, assets in very poor condition (primarily from phone systems) are expected to be completely replaced by 2019/2020.

Given the forecasted network and application renewals, with short expected useful life inherent in IT infrastructure, this indicates that adequate future funding will result in no gap by the end of this decade. Failure to implement current plans could result in localized reductions to service such as increased maintenance costs, inability to adapt to changing technology, decreased productivity, inconvenience to staff, loss of data and communications, etc. To assist in identifying service reductions and inventory, ITS has hardware infrastructure HEAT System to track and address hardware infrastructure data.

Consistent with asset management of any service area, current challenges primarily relate to assessing enterprise application software costs, budgeting accurately for annual licensing fees, and timely implementation of technology updates while minimizing disruption to City employees. The 2014 CAM Plan relied on internal expert opinion for IT assets. Since that time, asset listings for End User devices have been created to track assets that are owned by the City (previously a capital lease). The ITS asset replacement value decreased from approximated $46 million (in 2014) to $38 million in the 2019 CAM Plan. The decrease is attributed to having Corporate Security & Emergency Management deemed as its own Service Area chapter (in the 2014 CAM Plan valued at $10 million). Thus, for ITS-related assets replacement value has slightly increased.

The ITS asset condition comparison is provided in Figure 17.5. The change in condition profile is attributed mainly to corporate phone systems and one program part of Applications and Software being considered very poor condition in the 2019 CAM Plan. Replacement of the ITS Fibre Network since 2014 has resulted in portions being in very good condition. The replacement of phone systems is expected to be complete in 2019 to 2020 will result in overall condition enhancements.

17.6 CONCLUSIONS

Valued at approximately $38 Million, the City's ITS assets are overall in Fair to Good condition.

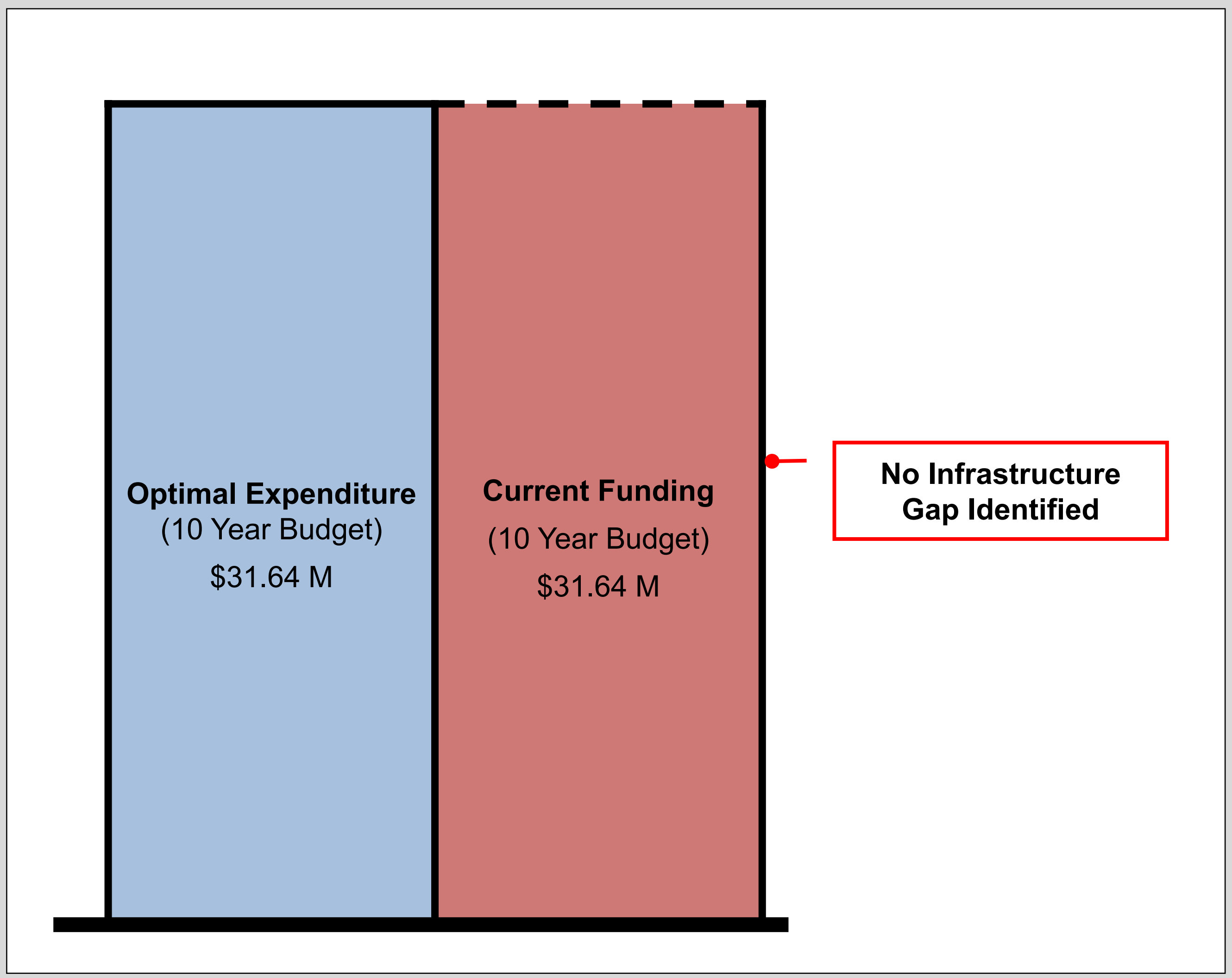


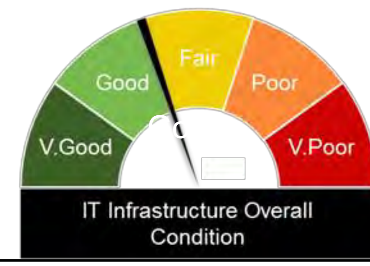
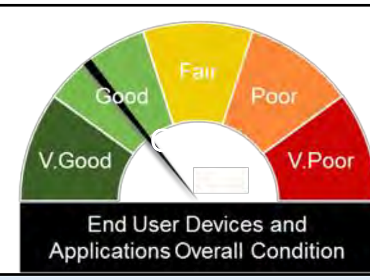
Figure 17.6 Cumulative 10 Year Infrastructure Gap Visual (ITS)

Server

Section 17: Information Technology

Table 17.6 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (ITS)

City of London - ITS Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Infrastructure	$17.96		No Gap Identified	No Gap Identified	6.3%	6.3%
Applications and Software	$14.48		No Gap Identified	No Gap Identified	5.3%	5.3%
End User Devices and Applications	$5.57		No Gap Identified	No Gap Identified	8.3%	8.3%
Overall ITS	**$38.01**	Good	**No Gap Identified**	**No Gap Identified**	**6.3%**	**6.3%**

Section 18: Land

Quick Facts
Approximately 385 Hectares of Land Held for Sale
Nearly 1,400 Hectares of Natural Areas Land
Over 1,250 Hectares of Parks Land
Over 1,600 Hectares of Road Allowance Land

Replacement Value	$650 Million
Condition	Not Applicable
10 Year Gap	Not Applicable

Section 18: Land

18.1 STATE OF LOCAL INFRASTRUCTURE

We respectfully acknowledge that the City of London is located on the traditional territories of the Anishinaabeg, Haudenosaunee, Lunaapeewak, and Attawandaron peoples, who have longstanding relationships with the land and the region. We would like to acknowledge the many longstanding treaty relationships between Indigenous Nations and Canada. The City of London recognizes its relationship with the local First Nation communities, including Chippewas of the Thames First Nation, Oneida Nation of the Thames, and Munsee Delaware Nation. In the region, there are eleven First Nation communities and a growing Indigenous urban population. The City of London values the significant historical and contemporary contributions of local and regional First Nations and those whose histories, languages, and cultures continue to influence our vibrant community. We acknowledge them and others who care for the land and its past, present, and future stewards.

Industrial Land For Sale Sign – Innovation Park

18.1.1 Asset Inventory & Valuation

The Corporation of the City of London directly owns and manages an estimated 5,783 hectares of land. Over 20% of land in urban London is owned by the City. The value of the core lands amounts to over $650 million. The majority of this land is permanently held in the public trust to provide public services, and will never be marketable. The general exception is industrial land, which the City prepares for market to encourage economic development. Table 1 summarizes the asset inventory for Land.

Table 18.1 Asset Inventory & Valuation (Land)

Asset Type	Asset(1)	Inventory	Unit	Replacement Value (000's)
Land	Park Land - Parks	1,271	HA	$70,334
	Park Land - Natural Areas	1,396	HA	
	Road Allowance	1,614	HA	$312,960
	General Government	496	HA	$96,216
	Closed Landfill & Natural Methane Areas	333	HA	$64,479
	Land Held for Sale (2)	385	HA	$45,284
	Stormwater (3)	244	HA	$47,247
	Unassumed land (Stormwater, Natural Area, Park)	71	HA	$13,752
Total		**5,783**	**HA**	**$650,272**

Land values are based on the following:

Land Held for Sale - By-law No. A.-6151-17, as at December 31, 2017
Parks and Natural Areas - Parkland Dedication By-Law CP-9 Update.
TCA inflation adjusted price per hectare of $193,850.

1 Includes unassumed lands which become City property upon registration unlike constructed works which remain the responsibility of the developer until assumed.

2 In accordance with Canadian GAAP Industrial Lands are assets held for sale in an inventory on the Statement of Financial Position and not listed in London's Tangible Capital Assets. Includes Industrial Land (Serviced and Unserviced) and Other Land Held For Sale. Replacement value is based on best achieved market conditions with reliance on Bylaw No. A.-6151-17- in effect December 31, 2017

3 Based on GIS listings and Stormwater service data on municipal drain land areas.

Section 18: Land

18.1.1 Asset Inventory & Valuation (Continued)

The responsibility for land lies in the hands of the primary service group using the land. An example of this is Park Services who are responsible for the land used for parks and natural areas. The largest landholder of the City of London is, in fact, Parks services. Land in parks and natural areas, is Park's biggest asset. The City of London has parks that cover over 2,600 hectares of land. Natural areas include environmentally significant areas, open spaces, woods and wetlands. Transportation (Roads) is the second biggest Landholder through the land used for roads commonly described as the road allowance. The General Government category covers all the remaining 'facilities' type of assets like City Hall, the fire halls, operations facilities, etc. The exception is recreation facilities which are part of the landholdings of Parks Services.

Closed landfills and natural methane areas are separated into their own category because of their unique nature that limits the range to which they can be developed. London generally uses long closed landfill lands for activities like parks and golf courses. Other activities can be considered but may need to employ engineered measures to deal with any remaining landfill and methane impacts.

The Stormwater category relates to land used for stormwater management facilities which primarily consist of storm ponds and a listing of municipal drains. The ponds can be viewed as a natural amenity and often offer recreational opportunities like bird watching areas.

There is no automated central land data registry in the City beyond the information available in the TCA database and GeoDatabase. The City also does not have a database on easements. Detailed ownership information can be obtained, by performing a title search at the Land Registry Office, Service Ontario, or online using Teraview or Geowarehouse. There is opportunity to simplify and consolidate the City owned land records for use in decision making.

Although Land constitutes a major asset to the City, its value and condition cannot be viewed in a similar fashion to other assets like buildings or equipment. Land has an unlimited life and cannot be "consumed". Land has value but no lifecycle, and it is not amortized. Land is not assessed in asset terms of Very Good, Good, Fair, Poor or Very Poor condition. Currently land is assessed for real market value and understood with respect to zoning its characteristics, like hazard or table land. As such, land cannot be considered in the standard context of this report as reflected for our other asset types and their associated infrastructure gaps.

There are needs for additional lands to serve the public. Land is needed to address existing deficiencies in services, including roads infrastructure, growth, protection of natural assets and the advancement of new and better services. Land needs are appropriately driven by capital service project needs and location, location, location. Figure 1 illustrates the percentage by area coverage of municipal land assets.

Land owned by the City of London represents an asset group valued at over six hundred and fifty million dollars and is an important consideration in many key City decisions.

Medway Valley Heritage Forest – Doncaster Ave

Section 19: Corporate Security & Emergency Management

Replacement Value	$8.81 Million
Condition	Good
10 Year Gap	$6.36 Million
City-Wide Infrastructure Gap Contribution	1.1%

Quick Facts
Communication Systems, Operation Equipment, and Public Safety Programs

1.1% City-Wide
Infrastructure Gap Contribution

Section 19: Corporate Security & Emergency Management

19.1 STATE OF LOCAL INFRASTRUCTURE

The Corporate Security & Emergency Management Services section serves the Corporation and all citizens by contributing to a safe and secure environment through a commitment to prevention, preparedness and response. Corporate Security & Emergency Management Services provide services to all Service Areas, Boards, and Commissions, on an as needed and request for service basis. The service has two branches that focus on providing a safe environment for the City's staff and public. Physical Asset Protection and Fire Life Safety focuses on protection of our physical assets. This branch is responsible for all facility protection systems, as well as physical security audits and design, the fire safety program and the Downtown Camera Program. Incident Management and investigation covers all aspects of incident management. Responsibilities include incident response, guard services, threat assessment, prevention programs, event security planning and executive protection.

Emergency Operation Centre

19.1.1 Asset Inventory and Valuation

The Corporate Security & Emergency Management Services service area owns and operates three different asset types that includes 5 different assets with a total replacement value of approximately $8.8M. The One Voice Communication System includes infrastructure such as radio towers and communication systems hardware, such as microwave radios and antennas, in addition to the associated software. The security operation equipment includes fire systems and security cameras, as well as the downtown public safety program. On the other hand, the Emergency Operation Centre includes all equipment and furniture essential to managing an emergency situation, and providing any strategic guidance to acquire and authorize extraordinary resources required to mitigate an incident. Table 19.1 summarizes the Corporate Security & Emergency Management asset inventory and their replacement values.

Table 19.1 Asset Inventory & Valuation (Corporate Security & Emergency Management Services[1])

Asset Type	Asset	Inventory	Unit	Replacement Value (000's)
One Voice Communication System	Infrastructure	Mix	Ea.	$351
	Communication system	Mix	Ea.	$5,972
Emergency Operation Centre	Emergency operation equipment	Mix	Ea.	$573
Security Operation Equipment	Security operation equipment	Mix	Ea.	$1,746
	Public Safety Program	Mix	Ea.	$170
TOTAL				**$8,812**

[1] Detailed Inventory is included in the City's internal databases, but it is not disclosed for confidentiality purposes.

Section 19: Corporate Security & Emergency Management

19.1.2 Age Summary

Figure 19.1 shows the Corporate Security & Emergency Management Services average asset age as a proportion of the average useful life by asset type. The average age for the assets was calculated based on the acquisition/installation dates from the service area databases. As shown in the figure, overall all asset types are within their average industry standard useful life.

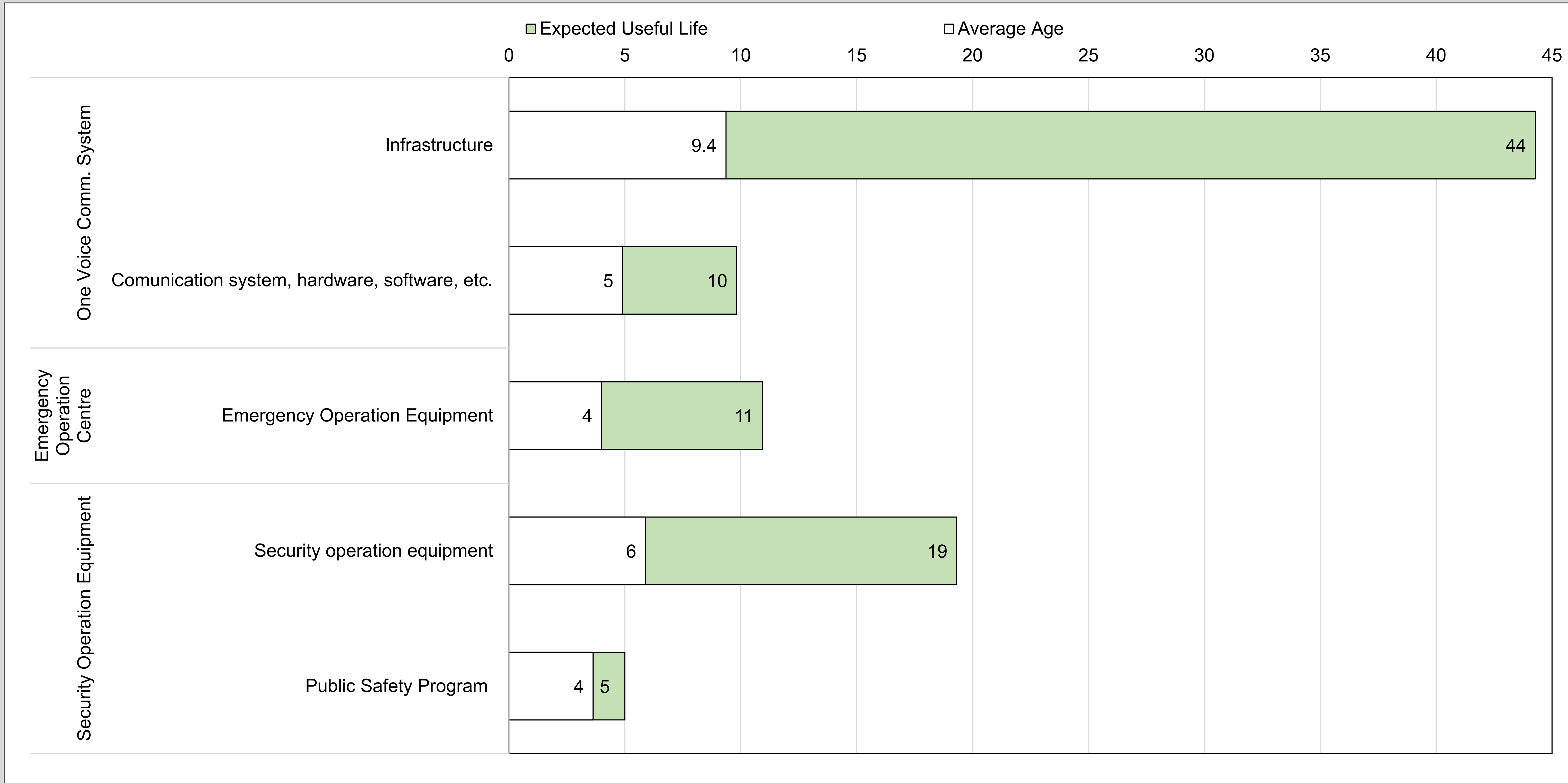


Figure 19.1 Average Assets Age as a Proportion of Average Useful Life (Corporate Security & Emergency Management Services)

Section 19: Corporate Security & Emergency Management

19.1.3 Asset Condition

Figure 19.2 shows the condition distribution of all the Corporate Security & Emergency Management Services assets. As illustrated in the figure, 98% of all assets are in Fair to Very Good condition, with the majority (95%) in Good condition.

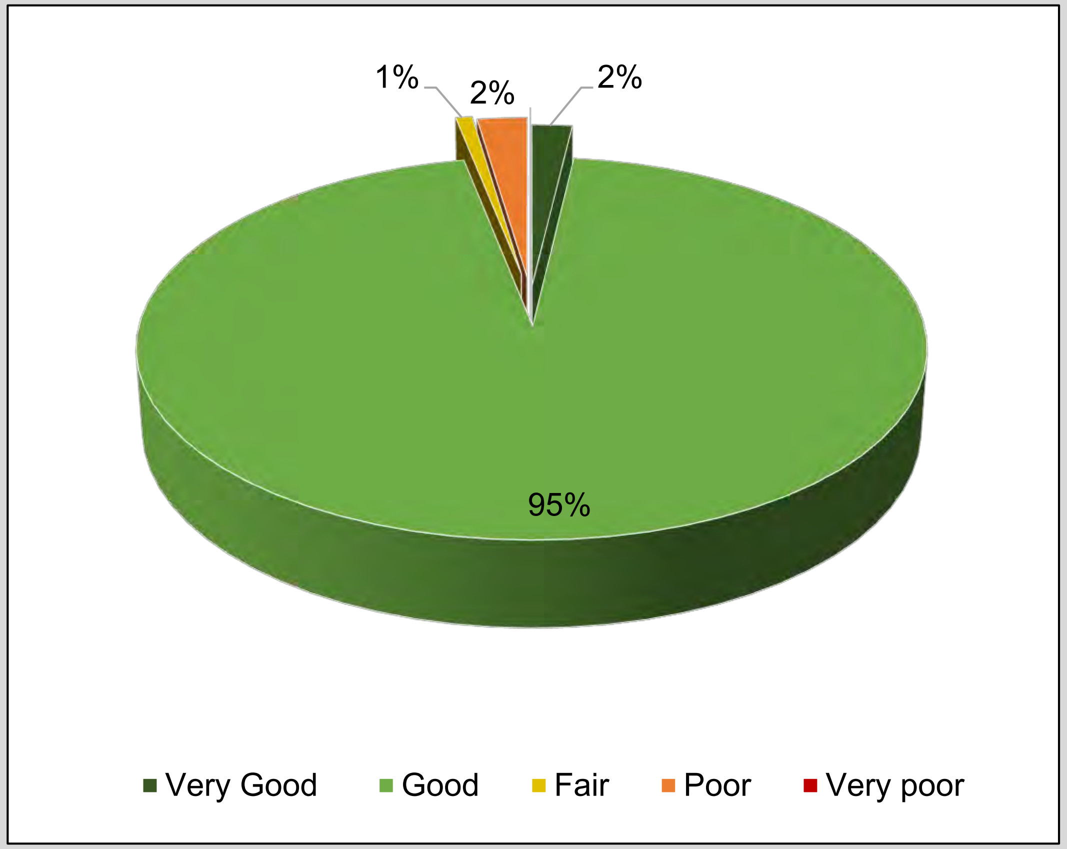


Figure 19.2 Asset Condition (Corporate Security & Emergency Management Services)

Figure 19.3 shows the condition distribution of each asset type within the Corporate Security & Emergency Management Service Area. As seen in the figure, the majority of the asset types are in Good condition; however, 85% of the public safety program assets are in Poor condition, as the much of the equipment (cameras switches, servers, etc.) are at the end of their useful life (5 years) and scheduled to be replaced.

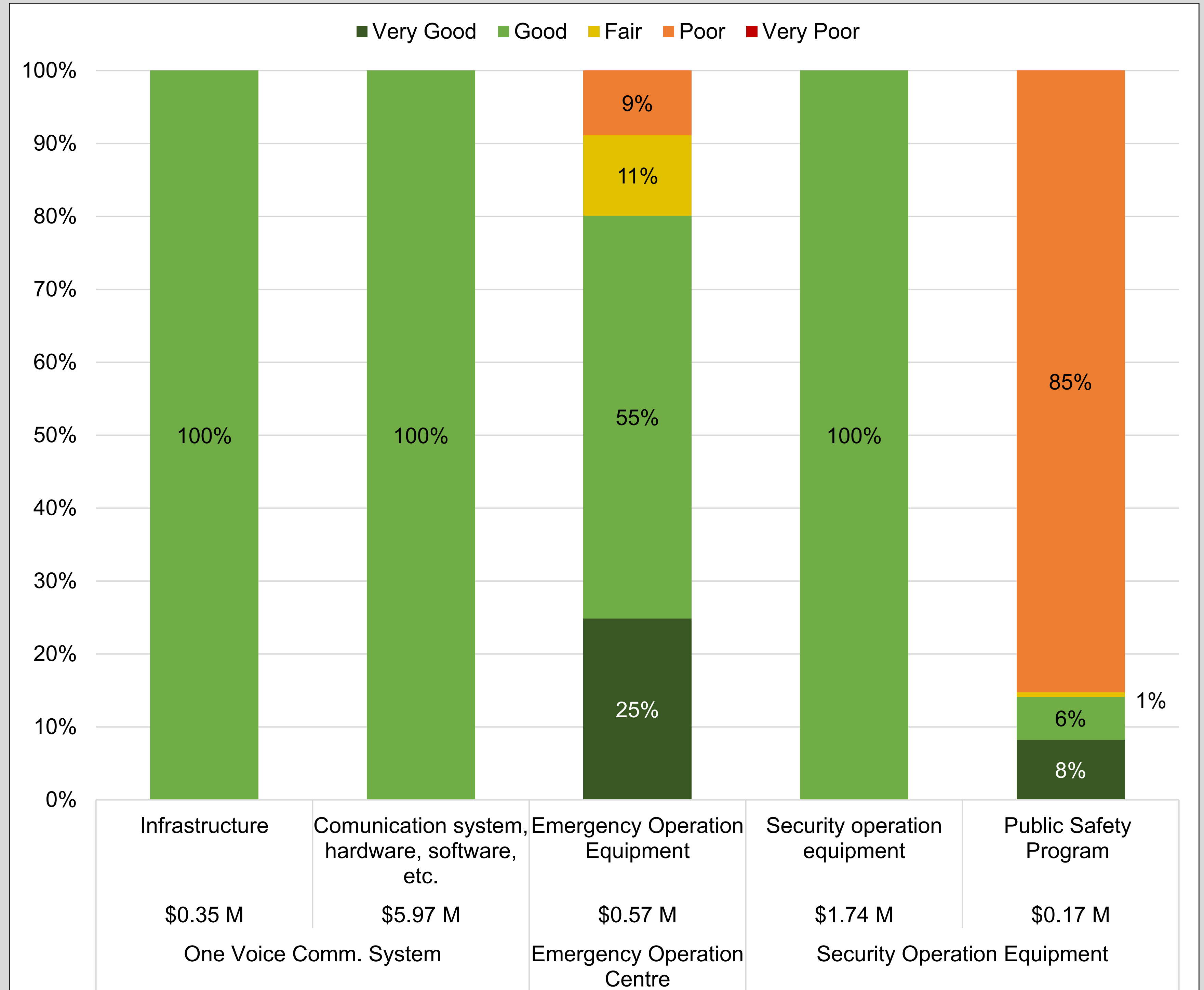


Figure 19.3 Condition by Asset type (Corporate Security & Emergency Management Services)

19.2 LEVELS OF SERVICE

LEVELS OF SERVICE PERFORMANCE METRICS

Level of Service (LOS) performance measures are related to Corporate Values of Cost Efficiency, Prevention and Public Education, Safety, Reliability/Availability, Legislative & Regulations, and Scope/Quality. The metrics that go beyond the foundational or regulation required measures are considered advanced. They indicate service areas have documented, planned approaches for operation and maintenance of infrastructure, and have considered trending indicators if the result is planned to be decreased, increased, or be approximately equal in future years.

Foundational and advanced metrics are listed in Table 19.2. They are listed as Overall Corporate Security & Emergency Management Services Assets LOS metrics.

Emergency Management Program - Poster

Emergency Operation Centre

Section 19: Corporate Security & Emergency Management

Table 19.2 Levels of Service Metrics – Foundational and Advanced (Corporate Security & Emergency Management Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Cost Efficient	Providing Corporate Security & Emergency Management in a cost effective manner	Annual operating cost to provide service ($/household)	$13.68	↑
Prevention and Public Education	Providing Corporate Security & Emergency Management services that educate the public on how to prevent and effectively respond to emergencies	Annual # of training/education sessions/days	46 days	↑
Safe	Providing Corporate Security & Emergency Management services to ensure that facilities are safe	# of incidents in facilities	Under Review	Under Review
Reliable/Available	Providing the appropriate amount of security services and ensuring Corporate Security & Emergency Management personnel are well prepared	% of Corporate Security & Emergency Management assets in fair to very good condition	98%	↔
		Uptime of the Emergency Communication System	100%	100%
		% of incidents that are successfully closed	100%	100%
		% of residents satisfied with the Corporate Security & Emergency Management Program	92%	↑
		% of customer service requests completed	100%	100%

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 19: Corporate Security & Emergency Management

Table 19.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Corporate Security & Emergency Management Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	CUSTOMER LOS MEASURE	CUSTOMER LOS PERFORMANCE	CUSTOMER LOS TARGET
Legislative & Regulation	Providing Corporate Security & Emergency Management services that meet all legislative and regulation requirements	100% Compliance with relevant legislation and regulations (Provincial Emergency Management and Civil Protection Act and Ontario Fire Code)	100%	100%
Scope/Quality	Providing adequate Corporate Security & Emergency Management services to the community	% of residents satisfied with the Corporate Security & Emergency Management Program	92%	
		% of customer service requests completed	100%	100%

No Change | Positive Upward | Positive Downward

Section 19: Corporate Security & Emergency Management

Table 19.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Corporate Security & Emergency Management Services)

Performance Measure | Customer / Council Focused | 1 | 2 | Technical Focused | 1 | 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Cost Efficient	Providing Corporate Security & Emergency Management in a cost effective manner	Operating budget for Corporate Security & Emergency Management services	$2,419,303	↑
		Corporate Security & Emergency Management Reinvestment Rate	8.52%	↑
Prevention and Public Education	Providing Corporate Security & Emergency Management services that educate the public on how to prevent and effectively respond to emergencies	Annual # of training/education sessions (or days)	46 days	↑
Safe	Providing Corporate Security & Emergency Management services to ensure that facilities are safe	% City owned Facilities with security cameras	24%	↑
		% of facilities that meet security standards of 100% functional at all times	100%	100%
Reliable/Available	Providing the appropriate amount of security services and ensuring Corporate Security & Emergency Management personnel are well prepared	% of Corporate Security & Emergency Management assets in poor or very poor condition	2%	↔
		# of minutes annually the system is down	5 mins	↓
		% of time when equipment is available and operating properly	99%	100%

↔ **No Change** ↑ **Positive Upward** ↓ **Positive Downward**

Section 19: Corporate Security & Emergency Management

Table 19.2 (Continued) Levels of Service Metrics – Foundational and Advanced (Corporate Security & Emergency Management Services)

Performance Measure: Customer / Council Focused 1 2 | Technical Focused 1 2

CUSTOMER VALUE	CORPORATE LOS OBJECTIVE	TECHNICAL LOS MEASURE	TECHNICAL LOS PERFORMANCE	TECHNICAL LOS TARGET
Reliable/Available	Providing the appropriate amount of security services and ensuring Corporate Security & Emergency Management personnel are well prepared	% of residents satisfied with the Corporate Security & Emergency Management Program	92%	
		% of customer service requests completed	100%	100%
Legislative & Regulation	Providing Corporate Security & Emergency Management services that meet all legislative and regulation requirements	Compliance with Provincial Emergency Management and Civil Protection Act	100%	100%
		# of primary and alternate Emergency Operating Centres (EOC)	1 Primary and 1 Alternate EOC	1 Primary and 1 Alternate EOC
		Ontario Fire Code - A working fire alarm system	100%	100%
		Ontario Fire Code - A fire safety plan	100%	100%
Scope/Quality	Providing adequate Corporate Security & Emergency Management services to the community	Tracking response time - respond to alarms in 30 minutes.	Under Review	Under Review
		Completed or responded within 24 hours for service requests	Under Review	Under Review
		# of customer service requests received	Under Review	Under Review

No Change **Positive Upward** **Positive Downward**

19.3 ASSET LIFECYCLE MANAGEMENT STRATEGY

19.3.1 Lifecycle Activities

Table 19.3 and Appendix B summarizes the coordinated set of lifecycle management activities that the City applies to Corporate Security & Emergency Management Services assets:

Table 19.3 Current Asset Management Practices or Planned Actions (Corporate Security & Emergency Management services)

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Corporate Security & Emergency Management have refined inventory listings to track inventory, condition, and approximate replacement value. Assistance with Facilities and external experts is obtained with complex infrastructure, such as communications towers.	• Refer to Appendix B.
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• **One Voice Communication System** – For One Voice infrastructure the requests are made through Police service area. A work order system and online interface exists for City employees to generate requests of Facilities. The Communications system requests would go through London Police or through the vendor. • **Emergency Operation Equipment** – A work order system and online interface exists for City employees to generate requests of Facilities. • **Security Operation Equipment** – conduct regular preventive maintenance.	• Completing planned maintenance activities, while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure. • Deliberate service disruption, i.e. sabotage or terrorist strike.
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• **One Voice Communication System** – Vendor determines end of life and end of service dates for Communication System • **Emergency Operation Equipment** – Generally little to nil rehabilitation expected; equipment typically replaced when not functional. • **Security Operation Equipment** – Generally little to nil rehabilitation expected; equipment typically replaced when not functional.	• Refer to Appendix B.

Table 19.3 Continued Current Asset Management Practices or Planned Actions (Corporate Security & Emergency Management Services)

Activities ***Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost***	**Specific Asset Management Practices or Planned Actions**	**Specific Risks Associated with Asset Management Practices or Planned Actions**
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• **One Voice Communication System** – Replacement activities determined with consultant assistance and with consultation of users and operators of the One Voice Communication System. • **Security Operation Centre** – Replaced when asset is at the end of its useful life. • **Emergency Operation Equipment** – Replaced when asset is at end of useful life.	• Refer to Appendix B.
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• Appropriate and proper disposal occur when assets are replaced via related vendors.	• Refer to Appendix B.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• **One Voice Communication System** – Assessments are ongoing to determine the required needs for the Communication System, and what service improvements would be required. • **Security Operation Equipment** – Typically service improvements are not identified. If they are required, this service improvement need is the baseline required replacement and is considered a lifecycle replacement need. • **Emergency Operation Equipment** – Typically service improvements are not identified. If they are required, this service improvement need is the baseline required replacement and is considered a lifecycle replacement need.	• Refer to Appendix B.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Additional tower will be built in Northwest sector of the City to improve coverage. • Capital growth projects are identified by Development Charges and Corporate Security & Emergency Management (subject to Development Charges Act, 1997 requirements and City of London policy), or as a part of Assessment Growth Policy (where applicable with municipal policy).	• Refer to Appendix B.

19.3.2 Funding the Lifecycle Activities

The cost of these identified Lifecycle activities is summarized in Table 19.4. Current funding for operating budgets is presented as the average of the budgeted 2016 and 2017 fiscal years. Service Improvement activities are analyzed using planned expenditures identified through a review of the capital budgets.

Table 19.4 Current Lifecycle (Operating and Capital), and Service Improvement (Capital) Budgets

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)
Corporate Security & Emergency Management	Operating Budget*	**Total**	**$2,344**
	Lifecycle Capital Budget**	One Voice Communication system	$505
		Emergency Operation Centre	$55
		Security Operation Equipment	$151
		Total	**$711**
	Service Improvement Budget	**Total**	**$Nil**

* Non-Infrastructure, and Maintenance and Operating Activities

** Rehabilitation, Renewal, Replacement, and Disposal Activities

Growth activities are analyzed through discussion with experts from the Corporate Security & Emergency Management service area. The service area is looking at building a tower in the Northwest sector of the City in 2025 to address coverage issues. Cost is dependent on what size and type of tower will be required. Coverage studies in the summer/fall of 2019 will assist in addressing these issues.

Table 19.5 Expected Growth Budgets (Capital and Significant Operating Costs)

Asset Type	Budget Type	Activity Type	Expected Funding (000's) (Average Annual Activity Expected over 10 year period)
Corporate Security & Emergency Management Service Area	Growth (Capital Budget and Significant Operating Costs)	Capital	TBD
		Significant Operating	TBD
		Total	**TBD**

19.3.3 Lifecycle Management Approach

The general approach to forecasting the cost of the lifecycle activities that are required to maintain the current performance of the LOS metrics is not available for the Corporate Security & Emergency Management service area.

Data exists for these assets but not easily integrated into condition profile assessments for shorter-lived assets common with Corporate Security & Emergency Management service area, don't lend to traditional linear assessment profiles. In absence of condition profile predictions, Corporate Security & Emergency Management service area mitigates this by having detailed analysis for assess expected capital needs, and if even it did, these assets are not easily assessed.

19.4 FORECASTED INFRASTRUCTURE GAP

The infrastructure gap is summarized below in Table 19.6 and illustrated in Figure 19.4. The analysis documented above is related to the lifecycle rehabilitation or replacement lifecycle activities. Disposal is not identified separately as it is inherent in asset renewal/rehab/replacement activities.

The Cumulative Infrastructure Gap for the Corporate Security & Emergency Management Services assets would grow to more than $6.36 million over the next decade. Trends presented are primarily driven by the One Voice Communication assets, which account for roughly 79% of this deficit. There is a need to build two new communication radio towers in 2024 in order to maintain the current level of service.

Base needs represent the costs to renew and maintain the serviceability of existing assets, and do not account for growth and the expansion of service to new areas.

Table 19.6 Current and Optimal Capital Budgets, Reserve Fund Availability, and Funding Gap (Corporate Security & Emergency Management Services)

Asset Type	Budget Type	Activity Type	Current Funding (000's) (Average Annual Activity Currently Practiced)	Optimal Expenditure (000's) (Average Annual Activity to Maintain Current LOS)	Additional Reserve Fund Drawdown Availability (000's) (Average Annual)	Funding Gap (000's) (Average Annual)
Corporate Security & Emergency Management	Lifecycle Capital Budget	One Voice Communication system	$ 505	$ 1,007	**None Identified**	$ 502
		Emergency Operation Centre	$ 55	$ 125		$ 70
		Security Operation Equipment	$ 151	$ 215		$ 64
		Total	**$711**	**$1,347**		**$636**

Section 19: Corporate Security & Emergency Management

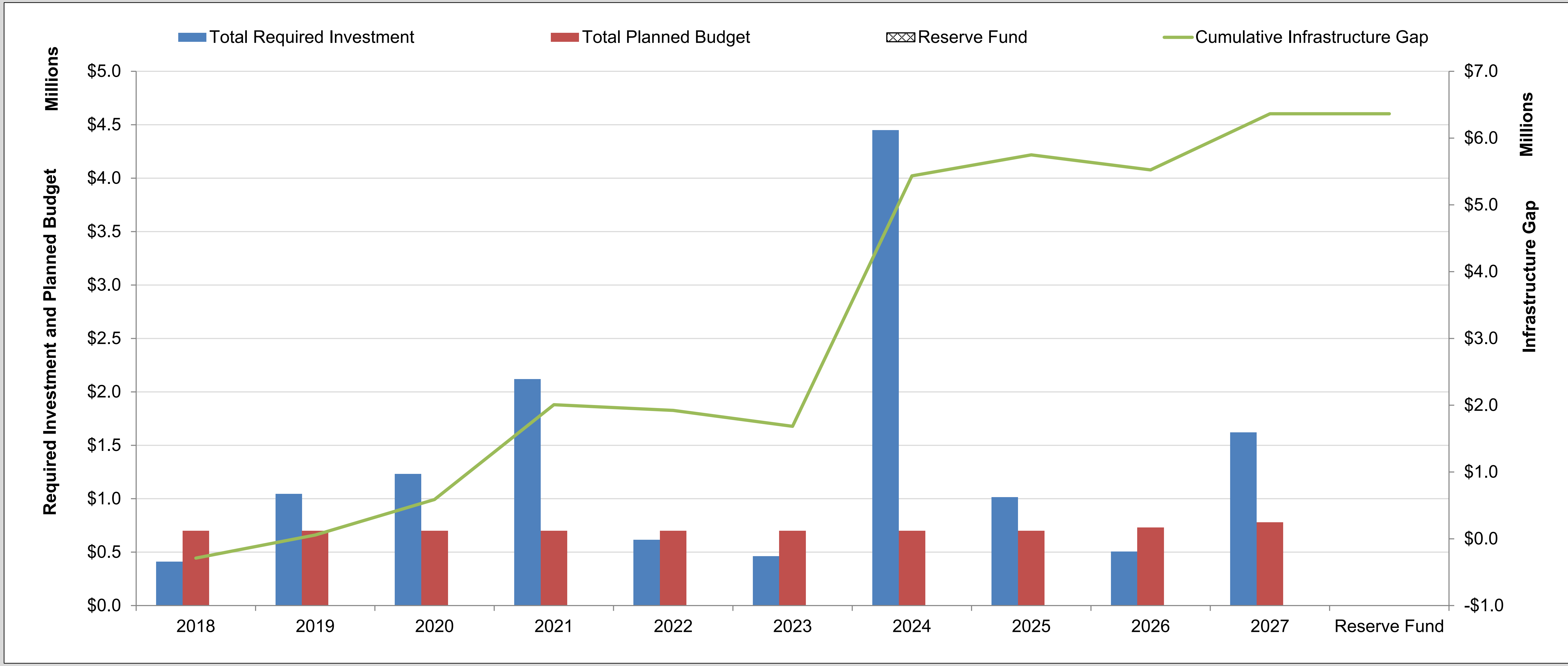


Figure 19.4 Forecasted Infrastructure Gap (Corporate Security & Emergency Management Services)

19.5 DISCUSSION

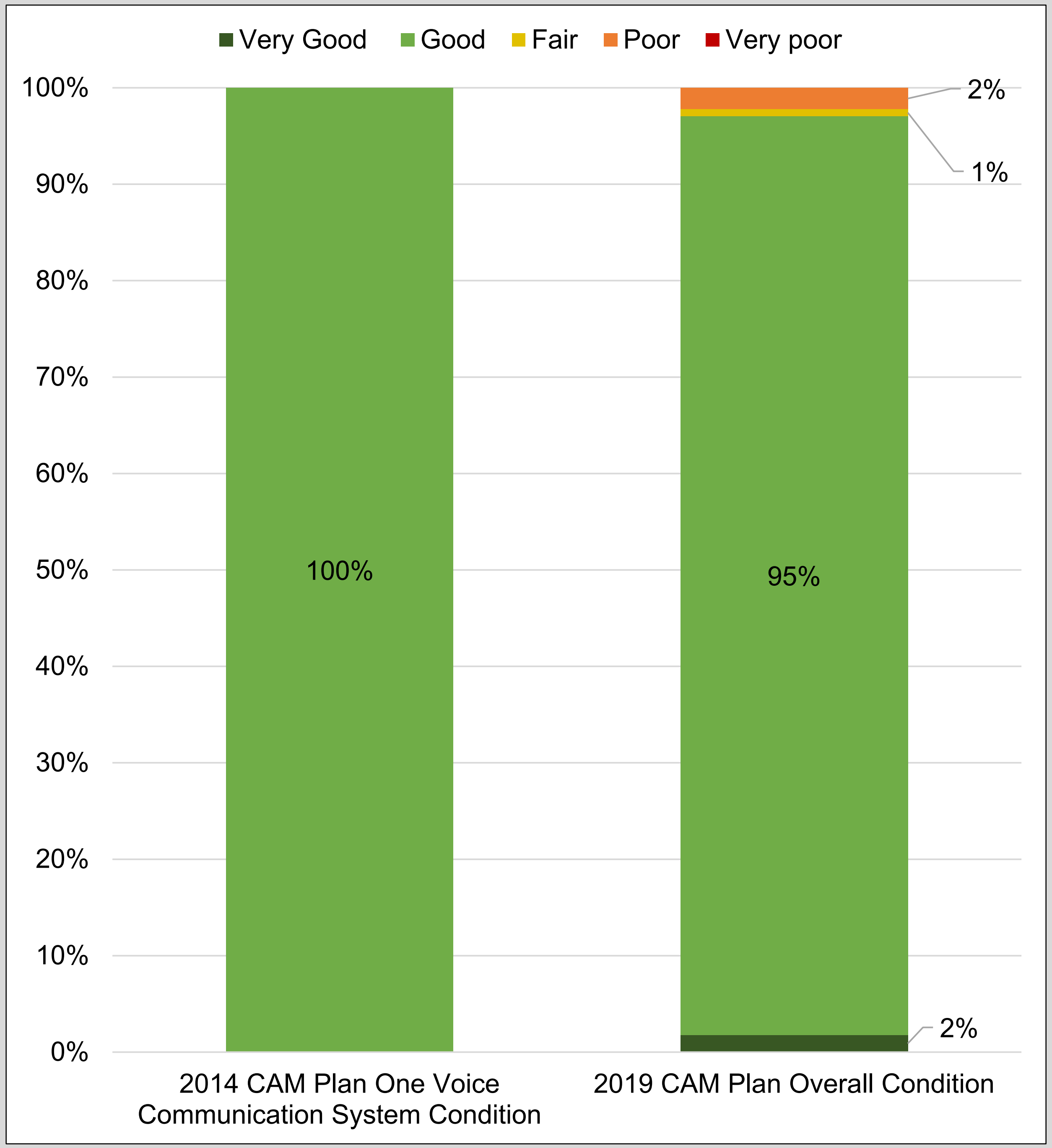


Figure 19.5 2014 CAM Plan to 2019 CAM Plan Asset Condition Summary (Corporate Security & Emergency Management Services)

CURRENT AND FUTURE CHALLENGES

The Corporate Security & Emergency Management services were not a dedicated chapter in the 2014 CAM Plan. However, the One Voice Communication system replacement value was estimated at $10 million and disclosed in the ITS chapter. The comparison of the 2014 CAM Plan to the 2019 CAM Plan Corporate Security & Emergency Management Services asset condition is provided in Figure 5. Evaluating required investment versus planned budget shows that the Corporate Security & Emergency Management Services will have an accumulated infrastructure gap over the next decade of $5.03 million, this is mainly driven by the need to build two new communication radio towers in 2024 in order to maintain the current level of service. The service area is also studying the need for additional tower(s) to address Assessment Growth in the Northwest part of the City.

Surveillance Sign – City Hall

19.6 CONCLUSIONS

Valued at nearly $8.81 million, the City's Corporate Security & Emergency Management Services assets are overall in **Good** condition, indicating that the current funding from Capital and Operating budgets has been sufficient to maintain the Corporate Security & Emergency Management Services assets in a serviceable condition. However, the trend shows that maintaining current investment will result in an accumulated infrastructure gap of $6.36 million in the next decade. The trend presented is driven by the need to build two new communication radio towers in approximately 2022 in order to maintain the current level of service. Figure 19.6 illustrates the infrastructure gap as a proportion to the required investment over the next decade. On the other hand, Table 19.7 illustrates the summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates for Corporate Security & Emergency Management Services assets.

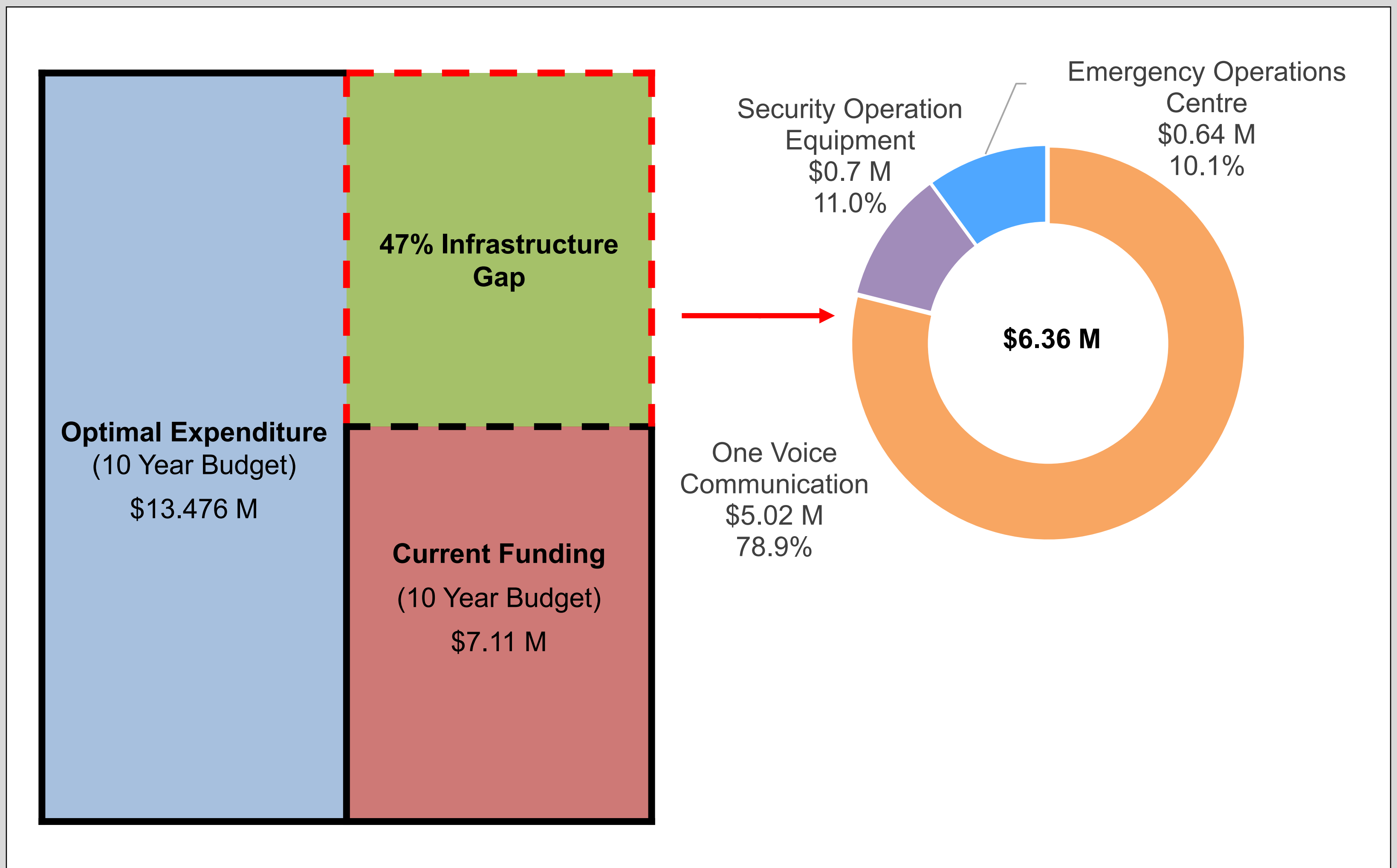


Figure 19.6 Cumulative 10 year Infrastructure Gap (Corporate Security & Emergency Management Services)

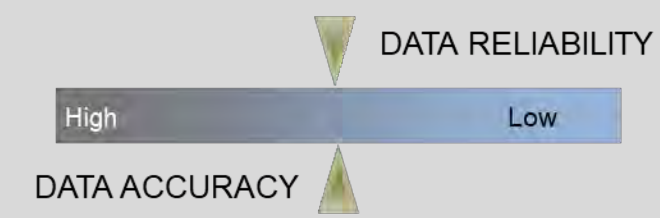
Facility Access Location – City Hall

Section 19: Corporate Security & Emergency Management

Table 19.7 Summary of the State of Infrastructure, Infrastructure Gap, and Reinvestment Rates (Corporate Security & Emergency Management Services)

City of London - Corporate Security & Emergency Management Services Infrastructure

Asset Type	Replacement Value (millions)	Current Condition	Current Infrastructure Gap (millions)	10 Year Infrastructure Gap (millions)	Current Annual Reinvestment Rate	Recommended Annual Reinvestment Rate
Corporate Security & Emergency Management Assets	$8.81		No Gap	$6.36	8.1%	7.7%



Section 20: Financial Strategy

20.1 INTRODUCTION

The financing strategy of an CAM Plan sets out the approach to ensuring that the appropriate funds are available to support the delivery of infrastructure services. It ensures consistency with the outcomes and expected results of the City's 2019-2023 Strategic Plan area of focus 'Building a Sustainable City':

"London's infrastructure is built, maintained, and operated to meet the long-term needs of our community [with an] expected result [that will] maintain or increase current levels of service [and] manage the infrastructure gap for all assets."

The financing strategy is predicated on the current financial state of the City – including, among others, revenues, operating and capital expenditures, debt, reserves/reserve funds, and forecasted future commitments. The financing strategy is meant to strengthen current budgeting processes by reinforcing a long term perspective on the impact of providing higher/lower asset-related service levels and the required revenues versus the affordability to the community.

The focus of this financing strategy is mainly for lifecycle budgets. Financing for growth and service improvement are also presented but they are not analyzed for identifying an infrastructure gap. The City has a number of programs in place to ensure 'growth pays for growth', and, service improvement budgets are established to address changing service levels, not lifecycle needs of the City's infrastructure.

This strategy starts by summarizing the infrastructure financing strategy components followed by providing a financial overview as a precursor and context to the options for addressing the infrastructure funding gap that has been identified in each service area in order to achieve the identified current asset-related levels of service.

This financial strategy uses year end 2017 as the analysis reference to achieve the identified level of service for each asset category. Infrastructure gap analysis has been calculated based on best available information for the next 10-year period (2018-2027).

Gibbons Park Sign

20.2 LONDON'S INFRASTRUCTURE FINANCING STRATEGY

The infrastructure financing strategy presented in this section of the Corporate Asset Management Plan as summarized in Figure 20.1 includes:

- Assessing capital and operating needs;
- Using debt effectively;
- Apportioning reserves and reserve funds; and
- Receiving third party contributions.

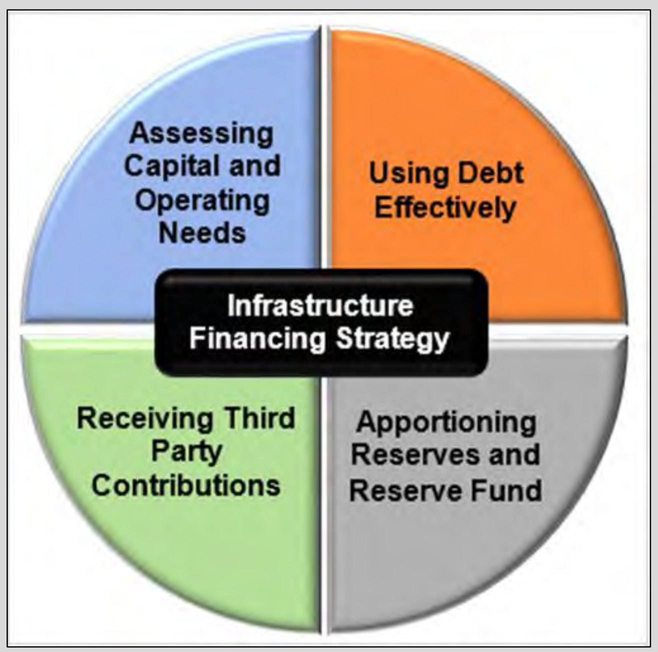


Figure 20.1 Key Considerations of the Infrastructure Financing Strategy

20.2.1 Operating Revenues and Expenditures

City budgets have operating and capital components:

- The operating budget is used to support the day-to-day operations & maintenance that provide services to the community. Staff salaries, energy bills, and fuel for vehicles are examples of expenditures that are funded from the operating budget.
- The capital budget is used to plan and fund large expenditures including the construction of infrastructure assets with long life spans. Debt financing and reserve funds (accumulated savings) are used to support capital needs and manage fluctuations over the ten year duration of the City's capital plan.

The City has three primary budgets. They include:

- Property Tax Supported Budget
- Water Budget
- Wastewater & Treatment Budget (commonly referred to as Wastewater Budget)

Capital budgets are linked to operating budgets through reserve fund contributions, debt servicing costs (principal and interest payments) and capital levy. Capital levy (also known as the capital rate in the Water and Wastewater & Treatment budgets) is the mechanism the City uses to allocate a portion of current year revenues, from property taxes and utility rates, to use as a source of capital financing.

Reserve fund contributions and debt servicing costs are incorporated into operating budgets thereby impacting the amount of current year funding required by the municipality, but contribute to intergenerational equity because most debt is applied to growth and service improvement projects, rarely to lifecycle costs.

During the budget process, project managers at the City are requested to submit any expected operating impacts of the capital projects they are budgeting. These impacts are required to be included in the respective operating budget submissions. However, not all assets acquired by the City can be considered at the time of budget development. Some assets contributed via new developments (i.e. a road in a new subdivision built by a developer and then transferred to the City) often become responsibility of the City at different times of the year through the assumption process. This can result in temporary stress on the City's operating budgets for services such as snow clearing, garbage pickup, etc. These costs are addressed by the City's assessment growth process. This provides service areas an opportunity to quantify the impacts of new growth on their operations via Assessment Growth Business Cases which are then incorporated into the City's operating/capital budgets and funded by the additional property taxes resulting from the new developments. This process is one of the primary vehicles behind the City's financial strategy of "growth pays for growth".

Section 20: Financial Strategy

20.2.2 Using Debt Effectively

In 2018, the City of London maintained its Aaa credit rating for a 42nd straight year (since 1977). Moody's Investor Services notes:

"*…the City of London displays strong governance and management practices, such as the application of multi-year budgets, which helps promote stable operations. London's recent history of posting positive operating results, application of strict controls on debt issuance, and conservative debt and investment policies which limit their exposure to market related risks and help ensure relatively smooth debt servicing costs all act as evidence of the city's strong management and governance.*"

The City of London places importance on the use of pay-as-you-go financing, and saving in advance of future needs via the use of reserves and reserve funds, while at the same time striving to limit the amount of debt required to fund its annual lifecycle capital budgets. The City has a target of 0% debt financing by 2022 for lifecycle renewal projects. London's effective use of debt is evidenced by the strong Aaa credit rating.

20.2.3 Apportioning Reserves and Reserve Funds

A critical funding strategy for the City of London involves the use of reserves and reserve funds as a funding source. The reserves and reserve funds stabilize the City's funding requirements preventing spikes in rates when significant expenditures are needed for infrastructure renewal at given points in time. Reserves are also available should unanticipated emergencies arise. Given that some reserves are intended to address unanticipated events, they were not included as a funding source for the infrastructure gap.

North London Optimist Community Centre Reception

20.2.4 Receiving Third Party Contributions

Receiving third party contributions range from user fees, donations, third party contributions, and senior government funding. Federal Gas Tax funding is considered a third party contribution, however, minimal to no additional funding is expected to be available from this funding source to finance the infrastructure gap.

Analysis of 2017 sources of financing are provided in this chapter of the CAM Plan. Consistent with the 2014 CAM Plan approach, financing strategy options are based on the assumption the City will fund 100% or 80% of the financing required to address the infrastructure gap, regardless of which budget those assets fall under. Analysis of prior years third party contribution has been in the range of 14% to 29%.

Coves Elmwood Gateway – Wharncliffe Rd S. (Medium Woodland)

20.3 FINANCIAL OVERVIEW

20.3.1 Operating Revenues & Expenditures

Table 20.1 provides the revenue and expenditure forecasts for the three primary budgets (Property Tax Supported, Water, and Wastewater & Treatment).

Table 20.1 City of London Operating (Including Boards and Commissions), Water, and Wastewater Budgets (in 000's)[1]

Property Tax Supported Budget	2016	2017	2018	2019
Total Property Tax Supported Operating Expenditure	840,957	887,114	943,535	962,670
Non-Property Tax Revenues[2]	304,523	330,134	364,003	356,133
Net Budget/Property Tax Revenues	536,434	556,980	579,532	606,537
Total Revenue	**840,957**	**887,114**	**943,535**	**962,670**
Water Budgets	**2016**	**2017**	**2018**	**2019**
Total Water Rate Supported Operating Expenditure	73,686	75,780	77,931	79,895
Water Rate Revenue	73,532	75,626	77,777	79,741
Non-Water Rate Revenues[3]	154	154	154	154
Total Water Revenue	**73,686**	**75,780**	**77,931**	**79,895**
Wastewater Budgets	**2016**	**2017**	**2018**	**2019**
Total Wastewater Rate Supported Operating Expenditure	89,720	92,524	95,415	98,181
Wastewater Rate	89,369	92,171	95,061	97,825
Non-Wastewater Rate Revenues[3]	351	353	354	356
Total Wastewater Revenue	89,720	92,524	95,415	98,181

[1] Source: 2019 Budget Update. The 2019 budget incorporates assessment growth, which is finalized post-Budget Update.

[2] Non-Property Tax Revenues include revenues like user fees, grants, subsidies, etc.

[3] Non-Water Rate and Non-Wastewater Rate Revenues include revenues like grants, subsidies, etc.

Thames Valley Parkway Sign

Section 20: Financial Strategy

20.3.1 Operating Revenues & Expenditures (Continued)

Figure 20.2 through Figure 20.4 [4] provide an overview of various funding raised via property tax and utility rates. The purpose of these Figures is to emphasize how sources of funding vary between Property Tax supported budgets compared to Water and Wastewater budgets. It highlights how the property tax-supported budget is funding a large and complex group of projects/programs that support an array of services, while the water and wastewater budgets are relatively streamlined in the services that each one supports.

The budgeted amount of revenues, source of revenues, and the different services provided by Property Tax supported budgets compared to Water and Wastewater budgets are considered when analyzing infrastructure gap financing strategy options.

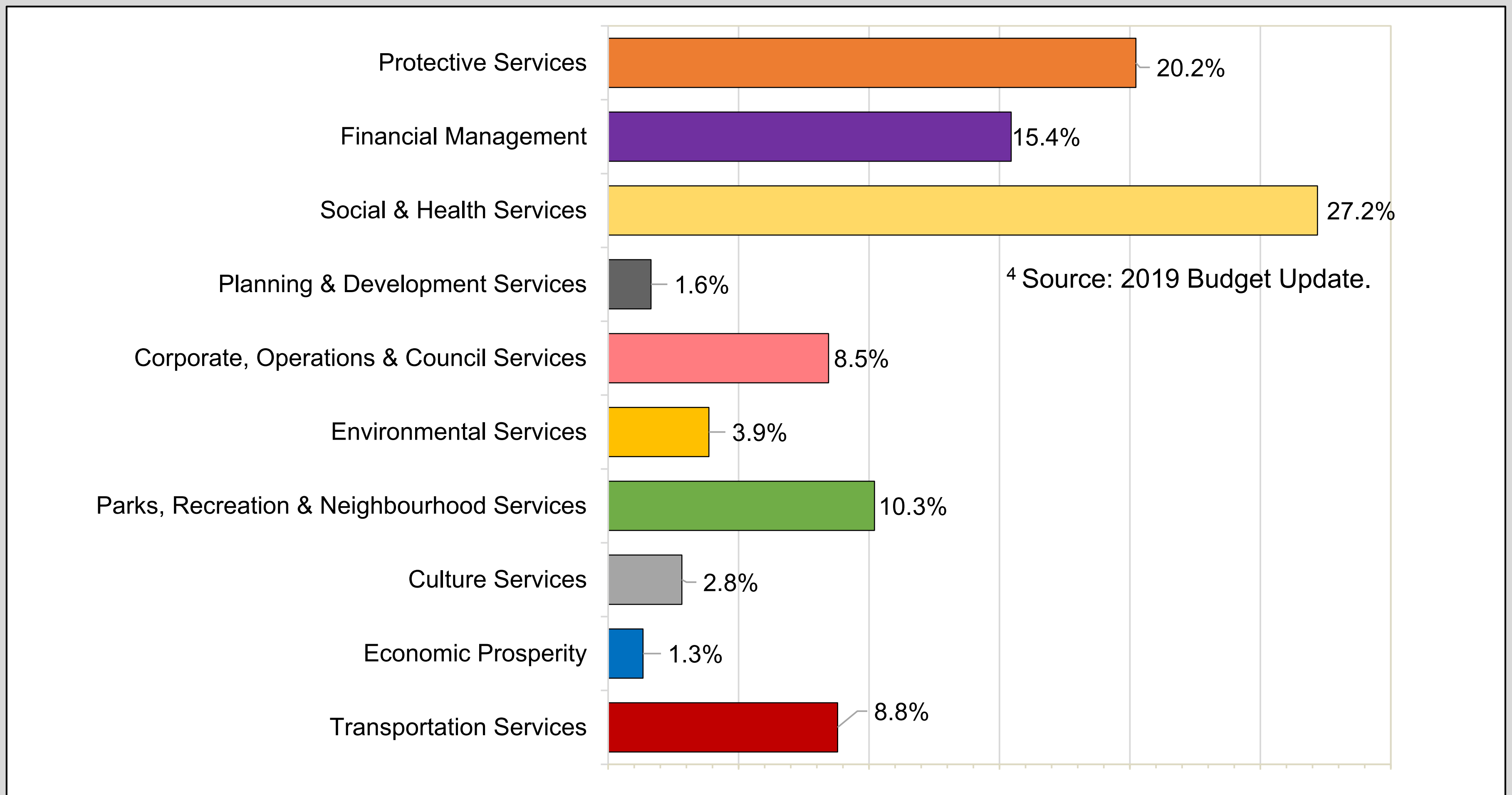


Figure 20.2 2017 Property Tax Budget Uses of Funding

[4] Source: 2019 Budget Update.

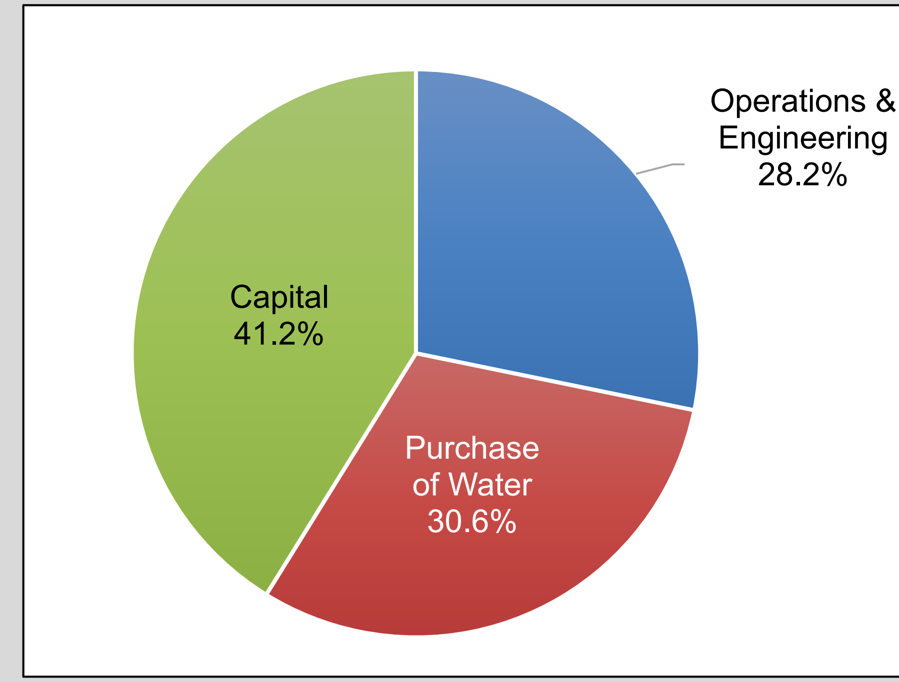


Figure 20.3 Water 2017 Budget Uses of Funding

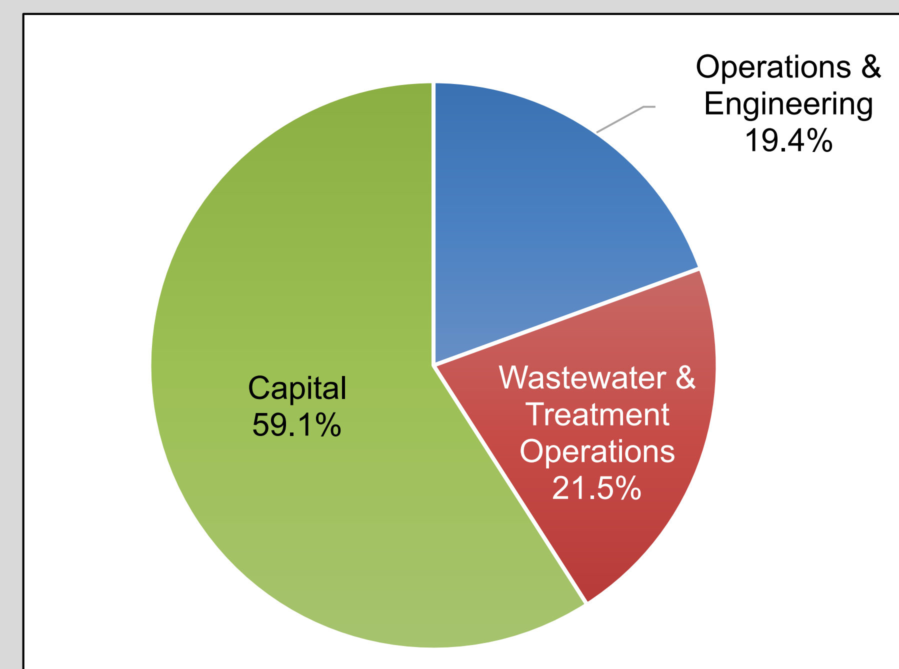


Figure 20.4 Wastewater 2017 Budget Uses of Funding

20.3.2 Capital Funding and Expenditures

The capital budget is primarily used to study and construct infrastructure assets that form the backbone of the provision of almost all City services. Even non-asset related services require a building to house staff and IT assets to ensure staff can provide services to residents. The projects funded through the capital budget are separated into three categories:

1. Lifecycle Renewal – projects to rehabilitate or replace existing infrastructure assets that have reached a point which they provide inadequate service levels to residents;
2. Service Improvement – projects to build new or expand existing infrastructure assets to improve the service levels provided to the community; and
3. Growth – projects to build new or expand existing infrastructure assets to provide services to new developments across the City.

Skateboard Park – Wonderland Rd N

Table 20.2 outlines the approved and forecasted capital spending at the City of London for Property Tax supported and Water and Wastewater & Treatment supported lifecycle renewal capital budgets from 2016-2019 and 2020-2027, respectively. The data in Table 20.2 provides a summary of Lifecycle Renewal budgets. Comparing these budgets to the requirements identified by service areas are fundamental to determining an infrastructure gap.

Figure 20.5 lists the average expected use of Property Tax supported and Water and Wastewater 2018-2027 capital budgets. The average use is split between lifecycle, growth, and service improvement projects. Figure 20.5 shows the source of funding of Property Tax supported and Water and Wastewater 2017 operating budget. The purpose of these Tables and Figures is to give context how each service's budget category uses can vary across each service to match the evolving priorities in each infrastructure system/asset category.

The sources of funding provided by Property Tax supported budgets compared to Water and Wastewater budgets will be considered when analyzing infrastructure gap financing strategy options.

Table 20.2 Property Tax and Utility Rate Supported Lifecycle Capital Budgets (000's)[5]

Capital Budget Description	2016-2019 Multi-Year Budget				2020-2027 Forecast
	2016	**2017**	**2018**	**2019**	
Property Tax Supported Lifecycle Renewal Capital Budget (Includes Boards and Commissions)	$86,942	$77,707	$75,630	$77,557	$741,178
Water Lifecycle Renewal Capital Budget	$37,701	$35,019	$25,873	$26,657	$237,539
Wastewater & Treatment Lifecycle Renewal Capital Budget	$26,144	$45,482	$22,476	$27,168	$233,946

[5] Amounts reported include the approved 2019 Annual Budget Update amendments.

20.3.2 Capital Funding and Expenditures (Continued)

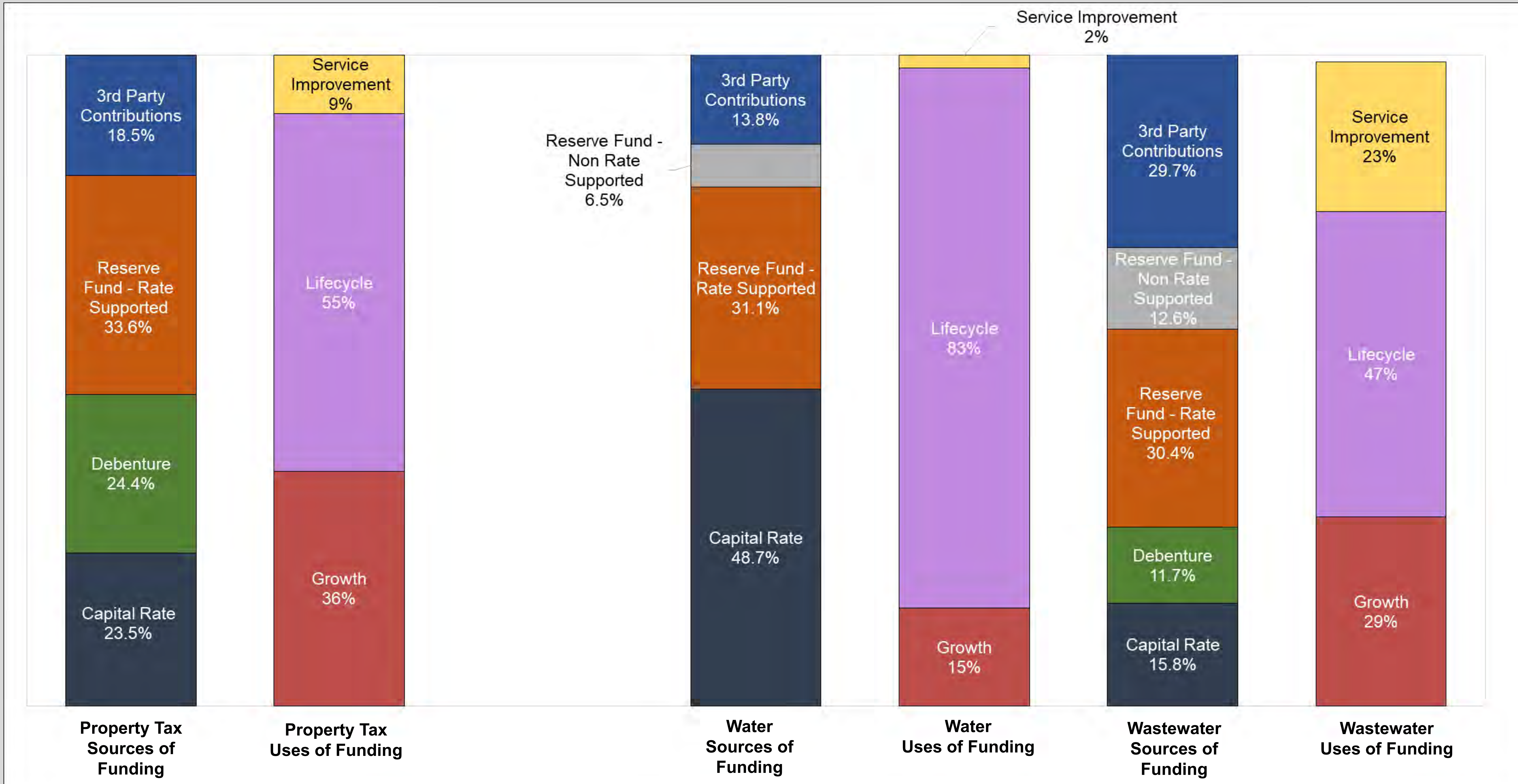


Figure 20.5 Sources of Funding and Use of Funding for Property Tax, Water and Wastewater 2017 Capital Budget

20.3.3 Apportioning Reserves and Reserve Funds

Tables 20.3 and 20.4 present the budgeted and forecasted balances in the City's reserve and reserve funds[6] that would be considered to apportion to infrastructure gap funding.

Table 20.3 City of London Capital Asset Renewal & Replacement Reserve Fund Budgeted and Forecasted Ending Balances ($000's) – General (Property Tax Budget)

Reserve Fund Description	Budget		Forecast							
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Capital Asset Renewal & Replacement Total	81,564	89,432	86,353	101,417	104,929	110,077	118,542	130,871	155,232	170,149

Table 20.4 Waterworks and Sewage Works Reserve Fund Budgeted and Forecasted Ending Balances ($000's)

Reserve Fund Description	Budget		Forecast							
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Waterworks Reserve Fund	29,405	35,557	40,512	44,629	44,648	38,754	39,027	44,148	52,647	59,032
Sewage Works Reserve Fund	42,347	57,467	45,511	49,005	53,746	51,509	61,998	72,334	83,947	96,586

Reserve fund forecasts were reviewed to establish the reasonable amount that could be apportioned for funding the infrastructure funding gap. The apportionment is based on internal expert opinion assessing committed projects already requiring reserve fund amounts and factoring in that unanticipated events may occur. In addition, the reserve fund balances presented in this section may include amounts not solely intended for existing infrastructure. For example, service improvement projects may be funded through these reserve funds. Reserve funds that relate to Boards and Commissions are also excluded as they relate to assets not in the scope of this Asset Management Plan. These factors reduce apportioned reserve fund availability for the infrastructure gap.

Reserves are excluded from analysis as the purpose of these amounts do not relate to dedicated lifecycle renewal capital budgeting.

Analysis of the Capital Asset Renewal & Replacement reserve funds indicates a cumulative $54.8 million could be used to finance the infrastructure gap from these reserve funds over the 2018-2027 period.

Analysis of the Waterworks Reserve fund indicates a cumulative $6.15 million could be used to finance the infrastructure gap from this reserve fund over the 2018-2027 period to eliminate Water's Cumulative 10 year gap.

Analysis of the Sewage Works Reserve Fund indicates a cumulative $53.0 million could be used to finance the infrastructure gap from this reserve fund over the 2018-2027 period.

The impact of the apportioned reserve fund on the infrastructure gap is highlighted in Figures 20.10 and 20.11 in section 20.5.

[6] Amounts reported include the approved 2019 Annual Budget Update amendments. The exceptions are the 2026 and 2027 forecast, which are based on data available as at May 31, 2019.

20.3.4 Using Debt Effectively

The City's Debt Management Policy was approved by Council on August 30, 2016. The policy establishes strategies for the management of the City's debt program. These strategies are outlined below.

STRATEGY	TARGET	WHERE ARE WE?
LIMIT AND REDUCE AUTHORIZED DEBT BY:		
Avoiding the use of debt financing for lifecycle renewal projects	0% Debt by 2022 for the tax/rate supported component	2%
Limiting debt financing by way of an internal debt cap	Average of $26 million over 10-year capital plan for property tax supported initiatives	Average of $25.4 million (as of the 2019 Annual Budget Update)
Reducing authorized debt as prescribed by the Surplus/Deficit and Assessment Growth Policies	No specified target - 50% of any operating surplus and 50% of excess assessment growth funding to reduce authorized debt	2018 Operating surplus applied – $1.5 million; 2019 excess assessment growth of $1.15 million applied
Applying surplus from the capital financing budget	No specified target – subject to available surplus	$860 thousand 2018 Mid-Year Report $310 thousand 2018 Year-End Report
MINIMIZING DEBT SERVICING COSTS BY:		
Setting targets for debt servicing costs by rate base: Debt servicing costs as a % of revenue	Property Tax < 8% Wastewater < 10% Water = 0%	Property Tax = 6% Wastewater = 10% Water = 0.4%
Maintaining a strong credit rating	Aaa (Stable)	Aaa (Stable)

Figure 20.6 Debt Reduction Strategy[7]

The City has a strategy to limit the use of debt (Debt Management Policy approved by Municipal Council on August 30, 2016) in order to minimize debt servicing costs and maximize the financial health of the Corporation. The City is currently at or ahead of its debt servicing targets as a percentage of operating revenue and is on target to meet its objective of having no debt financing in the lifecycle renewal budget by 2022 (refer to Figure 20.6).

Given that the City of London is committed to eliminating debt as a method of financing lifecycle renewal needs by 2022, debt financing strategies are not pursued in the infrastructure gap financial analysis. It is also noted the City has an annual average internal debt threshold of $26 million over the 10 year capital plan. Given the City is nearing this threshold, there is no additional financing for tax-supported debt without reviewing and adjusting the internal debt cap.

Shelborne Park South - (Medium Woodland)

[7] Source: 2018 Year-End Capital Monitoring Report dated April 16, 2019 and presented to Corporate Services Committee.

20.4 CURRENT AND PLANNED FINANCIAL STRATEGIES

This financing strategy section discusses City financing with the focus on infrastructure funding. In keeping with the City's 2019-2023 Strategic Plan, the City will continue leading in public service by using responsible financial management principles including:

- Promote affordable and competitive property taxes
- Reduce debt levels and debt servicing costs
- Promote pay-as-you-go financing
- Contain costs
- Ensure adequacy of reserves and reserve funds
- Consider increasing reserve fund contributions
- Invest strategically
- Adopt proven asset management techniques
- Manage the infrastructure gap for all assets
- Support intergenerational equity

It is important that the City takes all its needs, including infrastructure, into consideration when preparing budgets. The Asset Management Plan is not used in isolation of these other important considerations. The financial management of infrastructure assets to ensure the sustainable provision of infrastructure-related services is one of the key elements of the City's financial planning processes.

As highlighted in the review of the sources of funding of the capital budgets presented in the previous section, the City utilizes a range of strategies to address infrastructure funding needs:

- Capital Levy
- Debt Management
- Reserves and Reserve Funds
- Grants and Subsidies
- Development Charges (for growth projects only)
- Public Private Partnerships (P3)

Electric Vehicle (EV) Charging Stations

Municipal Council has recently adopted the new Capital Budget and Financing Policy (CPOL 52-248). The policy established a framework for capital budgeting and financing in order to ensure capital investments are budgeted with a consistent approach and financed in a manner to ensure a funding mix that places a priority on maintaining long-term financial sustainability. The financial strategy options have been developed to align with this policy. The following points summarize the framework outlined in the Policy:

- Lifecycle renewal – Non-tax funding sources like senior government grants are used first while capital levy is the second option for funding lifecycle renewal capital projects. Reserves are the third option, with debt financing as the last option if absolutely necessary;
- Growth – Non-tax funding sources like development charges and senior government grants are used first (provided any grants have be considered before establishing the growth/non-growth split of the project) while capital levy is the second option after consideration has been first given to lifecycle renewal projects. Reserves are the third option, with debt financing as the last option if absolutely necessary; and
- Service Improvement – Non-tax funding sources like senior government grants are used first while capital levy is the second option after consideration has been first given to lifecycle renewal capital projects. Reserves are the third option, with debt financing as the last option if absolutely necessary.

Pottersburg Park

20.4.1 Recent Budget Increases

The City's budgets have recently increased on an annual basis to reflect typical inflation pressures, to enhance the quality of a service currently being provided, or to provide a new service. This ensures that the City can continue to provide services at the same levels as costs to maintain existing service levels generally increase each year. Tables 20.5 and 20.6 identify the annual budget increases in the last four years. It should be emphasized that any revenue increases to fund the annual infrastructure funding gap will be in addition to the annual increases required to address inflationary pressures to maintain existing service levels.

Basketball Net – Capulet Lane

Table 20.5 Property Tax Supported Budget Increases

Budget	2016	2017	2018	2019	Average Annual Percentage
General (Tax Supported)	2.5%	2.9%	2.8%	2.7%	2.7%
Portion above related to fund the Infrastructure Gap[8]	0%	0.2%	0.2%	0.2%	0.2%

Table 20.6 Water and Wastewater Rate Budget Increases

Budget	2016	2017	2018	2019	Average Annual Percentage
Water Rate Supported	3.0%	3.0%	3.0%	3.0%	3.0%
Wastewater Rate Supported	3.0%	3.0%	3.0%	3.0%	3.0%

Gibbons Park Splashpad

[8] Contributions to the Infrastructure Gap Reserve Fund

20.5 2019 INFRASTRUCTURE GAP

The City of London has identified the infrastructure gap as the difference between the investment needs of infrastructure (based on age and condition), the forecasted capital budget expenditures, and the capital asset renewal and replacement reserve fund forecasts (balances, contributions and withdrawals) based on what is known today. In other words, what London plans to spend versus what the assets need. The estimate is based on year end 2017 data and projected over the next ten years (2018-2027). Over the next decade, the City of London projects spending in excess of $1.4 Billion to address the lifecycle needs of the assets in scope of the CAM Plan. This level of investment will result in an infrastructure investment gap of roughly **$568.8 Million** over the cumulative 10 year period of 2018-2027 (Table 20.7, Figure 20.7). The analysis reveals that the current infrastructure gap is approximately **$168 Million**. The analysis does not consider expenditures required to address growth, service improvements or inflation. The analysis does not consider Boards and Agencies.

The major contributors to the increasing infrastructure gap are insufficient investments planned for Roads, Structures, & Traffic, Recreation, Solid Waste, Corporate Facilities, Parks and Wastewater-Sanitary service areas. Table 20.7 provides a detailed breakdown of the contributors to both the current and projected infrastructure gaps by City service area.

Walnut Woods (Medium Woodland)

Table 20.7 Replacement Value, Current and Cumulative 10 year Infrastructure Gap

Service(s)	Replacement Cost ($000's)	Current Infrastructure Gap ($000's)	Cumulative 10 Year Infrastructure Gap ($000's)
Roads, Structures, & Traffic	2,468,946	40,039	223,049
Parking	5,579	No Gap	411
Solid Waste	85,004	247	46,544
Parks	187,308	13,882	31,330
Recreation	372,286	52,985	106,478
Urban Forestry	402,114	2,942	22,920
Fire	105,277	5,673	28,484
Long Term Care	64,637	1,822	11,623
Corporate Facilities	244,605	28,310	32,036
Cultural Facilities	91,028	7,396	19,530
Fleet	57,368	3,401	No Gap
Information Technology	38,010	No Gap	No Gap
Land	650,272	N/A	N/A
Corporate Security & Emergency Management	8,812	No Gap	6,364
Subtotal - Property Tax	**4,781,246**	**156,697**	**528,769**
Water	5,868,709	4,117	No Gap
Sanitary	5,047,641	7,178	36,280
Stormwater	4,408,474	No Gap	3,746
Subtotal - Water, and Wastewater	**15,324,824**	**11,295**	**40,026**
Total Property Tax, Water, and Wastewater	**20,106,070**	**167,992**	**568,795**

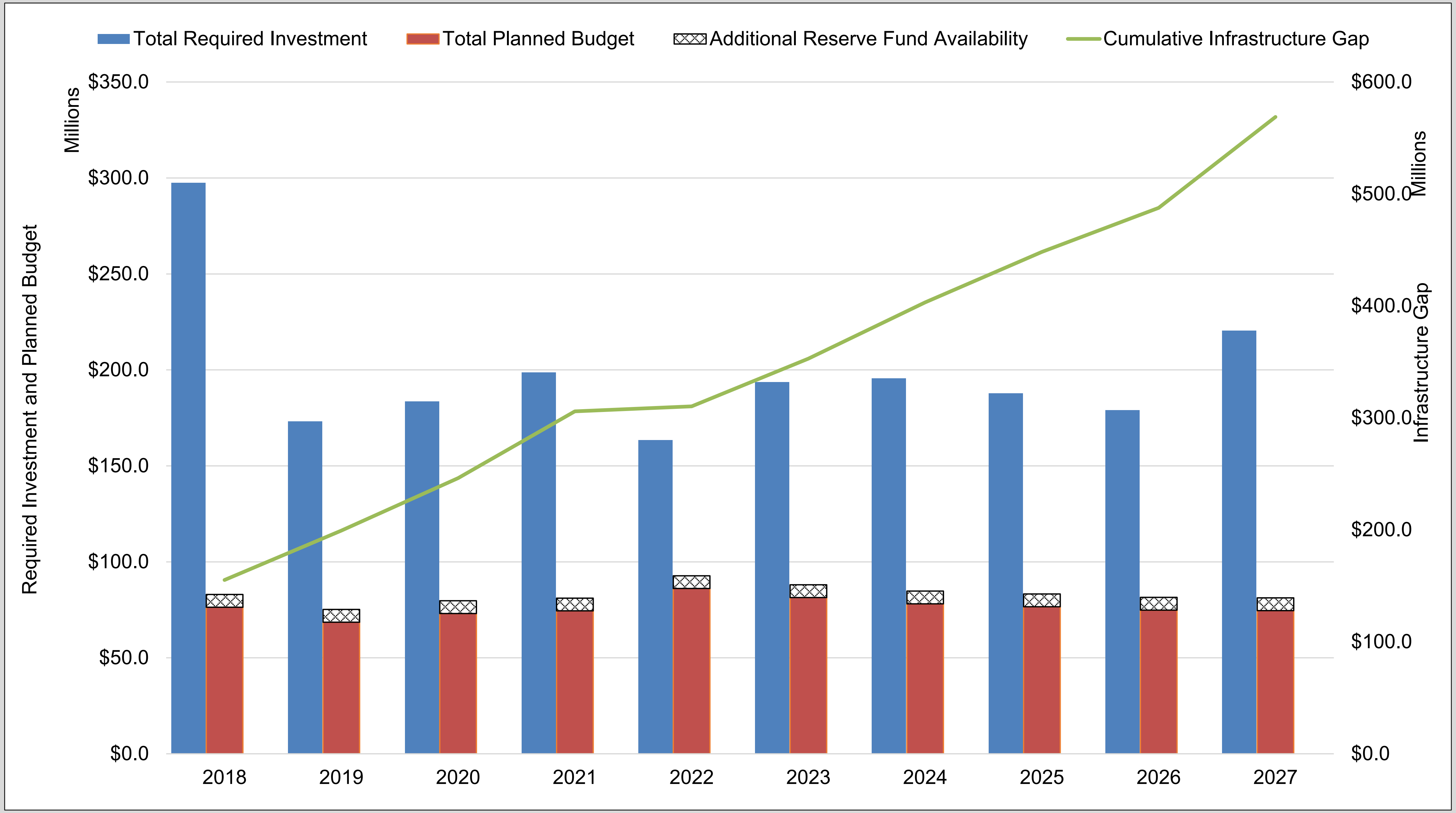


Figure 20.7 All 2019 CAM Plan Assets Cumulative 10 Year Infrastructure Gap

The analysis presented in this report indicates that the current infrastructure gap is projected to significantly increase over the next 10 years; indicating that planned investment in asset lifecycle initiatives does not sufficiently address the needs of London's infrastructure. Risk of asset failures can be expected to increase along with a corresponding drop in the levels of satisfaction with services.

This plan is intended to ensure actions are in place to mitigate the infrastructure to provide acceptable levels of service. This is a complex activity without any single solution. However, collectively the actions of the City are expected to address the growing gap.

20.6 METHODOLOGY AND STRATEGIES FOR ADDRESSING INFRASTRUCTURE FUNDING SHORTFALLS

Mitigating the infrastructure gap and its projected growth requires either an increase in investment in infrastructure renewal or a reduction in the services or levels of services the City provides. The reduction of service and level of service has never been a desirable position to promote and for the most expensive and critical infrastructure like roads and utilities, is not a viable option. This analysis explores the impacts of increasing investments in infrastructure while acknowledging that choosing to reduce service may also be available to manage affordability. The avenues that will produce the most significant, but perhaps least desirable impact are increases to wastewater rates and property taxes (Water rate increases are not considered in the analysis given no infrastructure gap has been identified). However, funding sources to address infrastructure needs are not limited to these sources. Through increasing third party contributions (user fees, transfers from upper tier governments, etc.) the City can source some of the required funding. This section discusses the approach for strategies that could be used to mitigate or eliminate the growing infrastructure gap.

20.6.1 Approach for Infrastructure Gap Strategies

At the time of this writing, in Canada, there is no standard or guidance to evaluate what is, or is not, an acceptable municipal infrastructure gap. However, the underlying assumption of Corporate Asset Management is that collectively the actions of the City are expected to address the growing gap. A balance must exist between the amount of preventative and reactive measures used to address infrastructure concerns and how much risk of asset failure is tolerable.

In this context, the Infrastructure Gap Strategies and Recommendations are split between two Approaches:

i. Approach One – Mitigate Growth of the Infrastructure Gap

- Mitigation of the growth of the infrastructure gap is determining the tax rate increase required to ensure financial sustainability is achieved. The financial sustainability of the cumulative infrastructure gap is considered to be the timeframe where the average annual infrastructure gap is closed (i.e. average annual infrastructure needs less available annual funding is equal to zero). This is not the same as eliminating the gap, because the rate increase does not address the accumulation of infrastructure needs;

20.6.1 Approach for Infrastructure Gap Strategies (Continued)

ii. Approach Two – Eliminate the Infrastructure Gap

- Eliminating or closing the infrastructure gap is determining the tax rate increase required to address the accumulation of infrastructure needs, meaning the cumulative 10 year infrastructure gap would be zero.

Figure 20.8 provides a visualization graphic to illustrate the infrastructure gap mitigation versus elimination approaches.

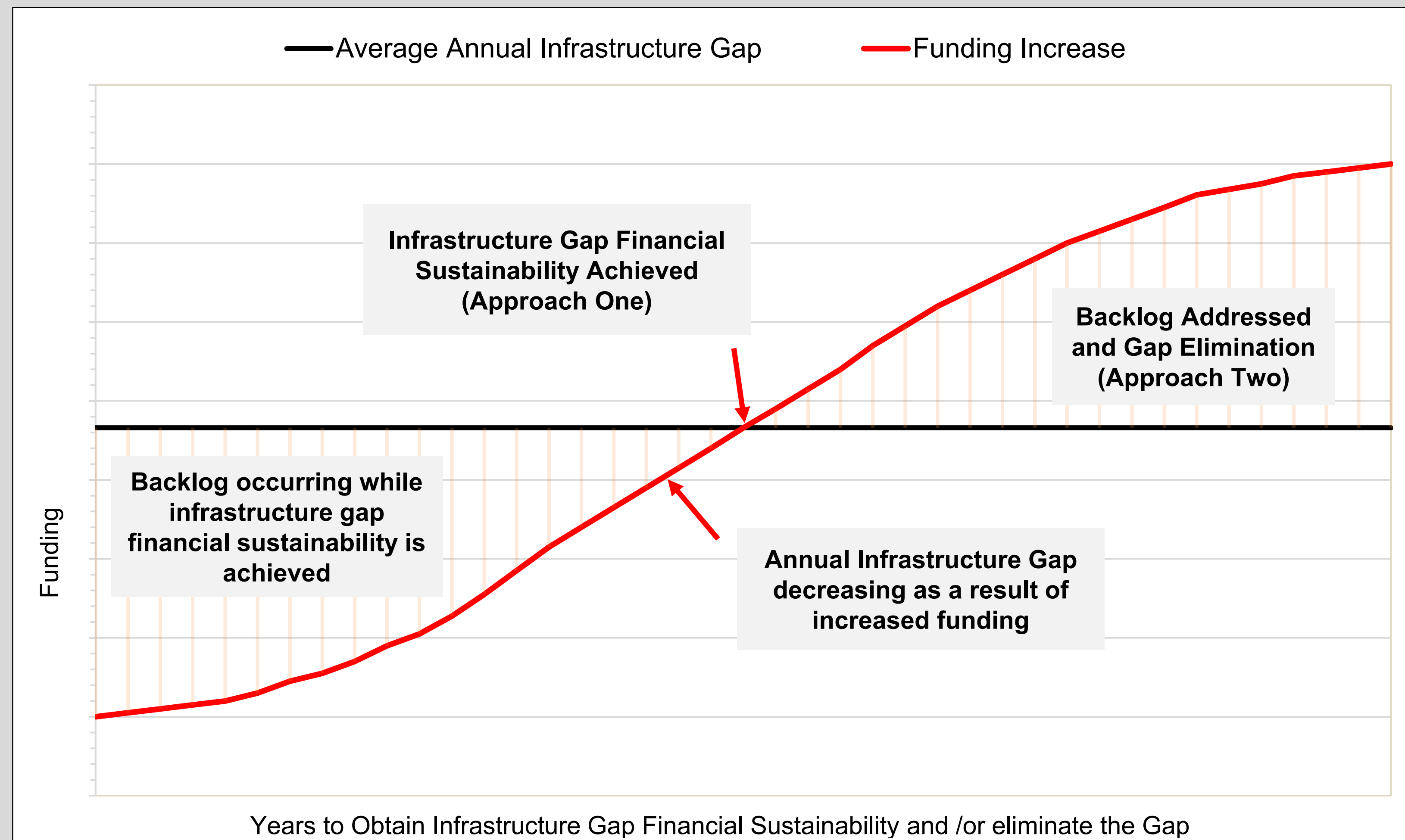


Figure 20.8 Approaches to Address the Infrastructure Gap

20.6.2 Analysis of Options to Address Infrastructure Gap

The next step in the financing strategy is to examine scenarios that will close the annual average infrastructure funding gap. The scenarios look at the rate of revenue increases under the approaches of:

1) Mitigate Growth of the Infrastructure Gap – As seen in Table 20.8, the mitigation strategies analyzed are based on whether the City is financing:
   i) 100% of the 10 year gap,
   ii) 80% of the 10 year gap, or
   iii) 100% of the current gap.

The timeframes presented to determine financial sustainability of these strategies is 75 years, 50 years, 25 years, and 10 years;

2) Eliminate the Infrastructure Gap – As seen in Table 20.9, the elimination strategies analyzed are based on whether the City is financing:
   i) 100% of the 10 year gap,
   ii) 80% of the 10 year gap, or
   iii) 100% of the current gap.

The timeframe chosen to eliminate the infrastructure gap is by the end of 2027, which aligns with the analysis timeframe for the forecasted infrastructure gap (2018-2027).

Table 20.8 Strategies to Mitigate Growth of the Infrastructure Gap

Mitigation Strategies Selected for Analysis	Cumulative 10 year Gap (100% City Financed)	Cumulative 10 year gap (80% City Financed)	Current Gap (100% City Financed)
Timeframes presented to determine Financial Sustainability	2029 (Year 10)	2029 (Year 10)	2029 (Year 10)
	2044 (Year 25)	2044 (Year 25)	2044 (Year 25)
	2069 (Year 50)	2069 (Year 50)	2069 (Year 50)
	2094 (Year 75)	2094 (Year 75)	2094 (Year 75)

Maintaining a controlled infrastructure gap is likely indicative of prudent financial management, therefore, having no infrastructure gap is likely an indication of overinvestment. The challenge exists in balancing rate increases. The pros and cons of slower rate increases (mitigation approach) to faster rate increases (eliminating the gap) include:

- Slower increases have less of an affordability impact on the community and can more easily be accommodated by the City's staff and local consulting/contracting capacity to deliver more capital projects. However, the accumulation of deferred expenditures are much greater and the service levels provided by the infrastructure systems may fail to meet the community's expectations as assets are operating in a condition state below their target for a longer period of time.
- Faster increases close the annual funding gap sooner. This limits the magnitude of the accumulation of continued underinvestment (i.e. each year until the annual funding gap is closed results in 'deferred' expenditures that must be delayed into future years), and reduces the risks posed from continuing to operate infrastructure systems with assets that are below their ideal condition state. However, faster rate increases have a larger impact on the affordability of municipal taxation on the community and are more challenging for the local contracting/consulting capacity to accommodate.

Table 20.9 Strategies Eliminate the Infrastructure Gap

Elimination Strategies Selected for Analysis	Cumulative 10 year Gap (100% City Financed)	Cumulative 10 year gap (80% City Financed)	Current Gap (100% City Financed)
Timeframe presented to eliminate the infrastructure gap	End of 2027	End of 2027	End of 2027

20.6.2.1 Mitigation Approach

(a) Property Tax Base

Table 20.10 and Figure 20.9 identify the years at which the annual funding gap is mitigated for four different revenue increase alternatives (assumed to begin in 2020) for the property tax budget. It illustrates the differing infrastructure levy (or property tax increases) that would occur depending if:

- The City is required to mitigate the growth of the Cumulative 10 year gap and finance 100% of the gap; or
- The City is required to mitigate the growth of the Cumulative 10 year gap and finance 80% of the gap; or
- The City is required to mitigate the current gap.

Table 20.10 Financial Sustainability of the Property Tax Supported Funding Gap

Year when Financial Sustainability Occurs	Annual Infrastructure Levy		
	Mitigate Cumulative 10 year Gap (100% City Financed)	Mitigate Cumulative 10 year Gap (80% City Financed)	Mitigate Current Gap ($150.8M)
2029 (Year 10)	0.90%	**0.72%**	0.26%
2044 (Year 25)	0.41%	**0.33%**	0.12%
2069 (Year 50)	0.26%	**0.22%**	0.08%
2094 (Year 75)	0.22%	**0.18%**	0.07%

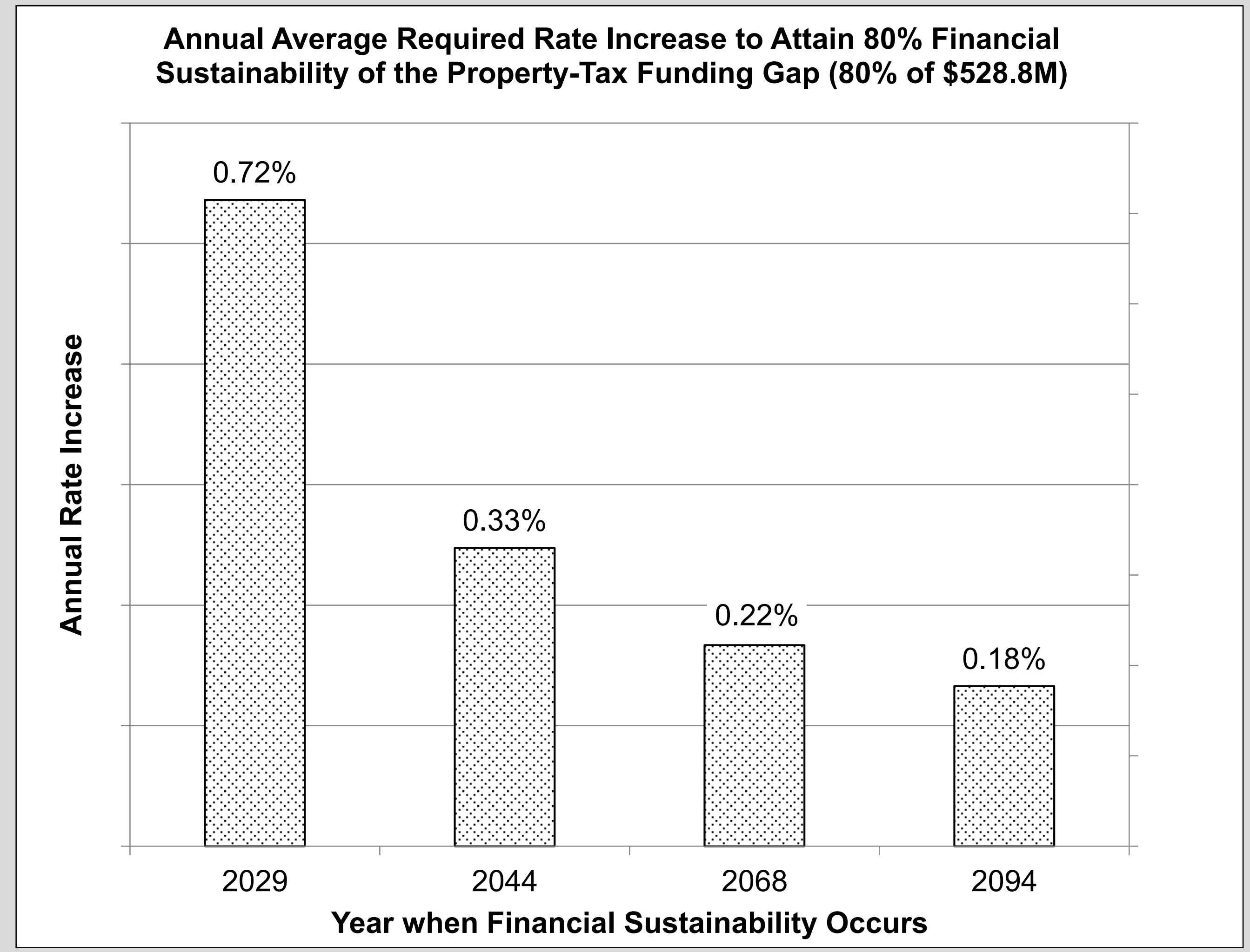


Figure 20.9 Timeline to Mitigate Growth of Property Tax Based Funding Gap (80% City Financed)

20.6.2.1 Mitigation Approach (Continued)

(b) Wastewater Rate

Table 20.9 and Figure 20.10 identify the year at which the annual funding gap is closed for four different revenue increase alternatives (assumed to begin in 2020) for the Wastewater budget. This table illustrates the differing infrastructure levy (or wastewater & treatment rate increases) that would occur depending if:

- The City is required to finance 100% of the Cumulative 10 year gap; or
- The City is required to finance 80% of the Cumulative 10 year gap.

Table 20.11 Addressing Financial Sustainability of the Wastewater Funding Gap

Year when Financial Sustainability Occurs	Annual Infrastructure Levy	
	Mitigate the Cumulative 10 year Gap (100% City Financed)	Mitigate the Cumulative 10 year gap (80% City Financed)
2029 (Year 10)	0.50%	0.41%
2044 (Year 25)	0.21%	0.17%
2069 (Year 50)	0.13%	0.11%
2094 (Year 75)	0.11%	0.09%

The current infrastructure gap for Wastewater is at approximately $7 million. It is assumed that infrastructure levy financial strategies would not be required and that reserve fund availability would mitigate the current gap, and thus the current gap is considered manageable.

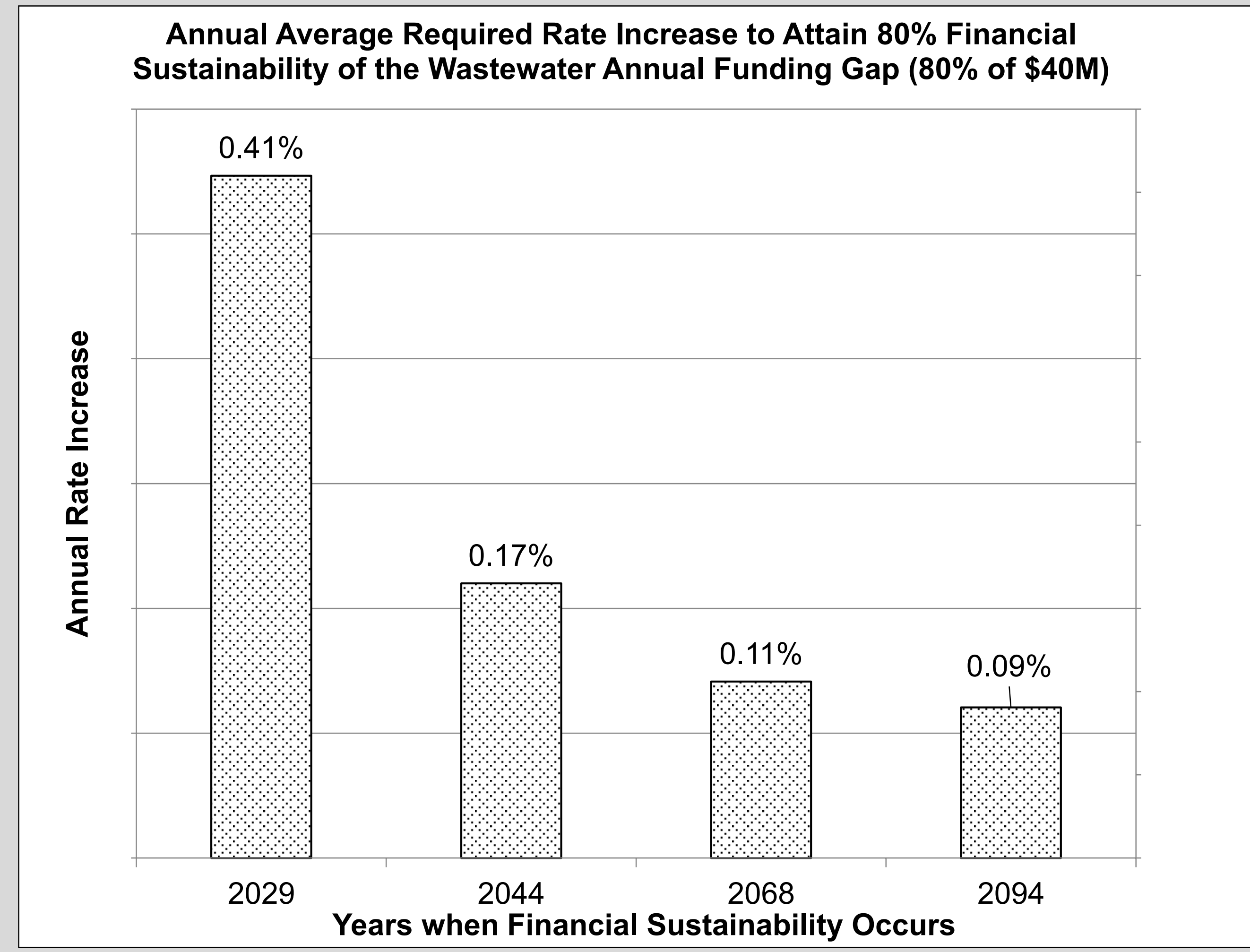


Figure 20.10 Timeline to Mitigate Growth of Wastewater Funding Gap (80% City Financed)

20.6.2.2 Elimination Approach

(a) Property Tax Base

Table 20.12 and Figure 20.11 identify the year at which the annual funding gap is eliminated to zero (rate increase assumed to begin in 2020 and last until 2027) for the property tax budgets.

It illustrates the different rate increases depending if:

- The City is required to eliminate the Cumulative 10 year gap and finance 100% of the gap; or
- The City is required to eliminate the Cumulative 10 year gap and finance 80% of the gap; or
- The City is required to eliminate the current gap.

Meeting Room – North London Optimist Community Centre

Table 20.12 Addressing Elimination of the Property Tax Supported Funding Gap

Year when Infrastructure Gap is closed	Annual Infrastructure Levy		
	100% City Financed	80% City Financed	Eliminate Current Gap
End of 2027	2.28%	1.85%	0.70%

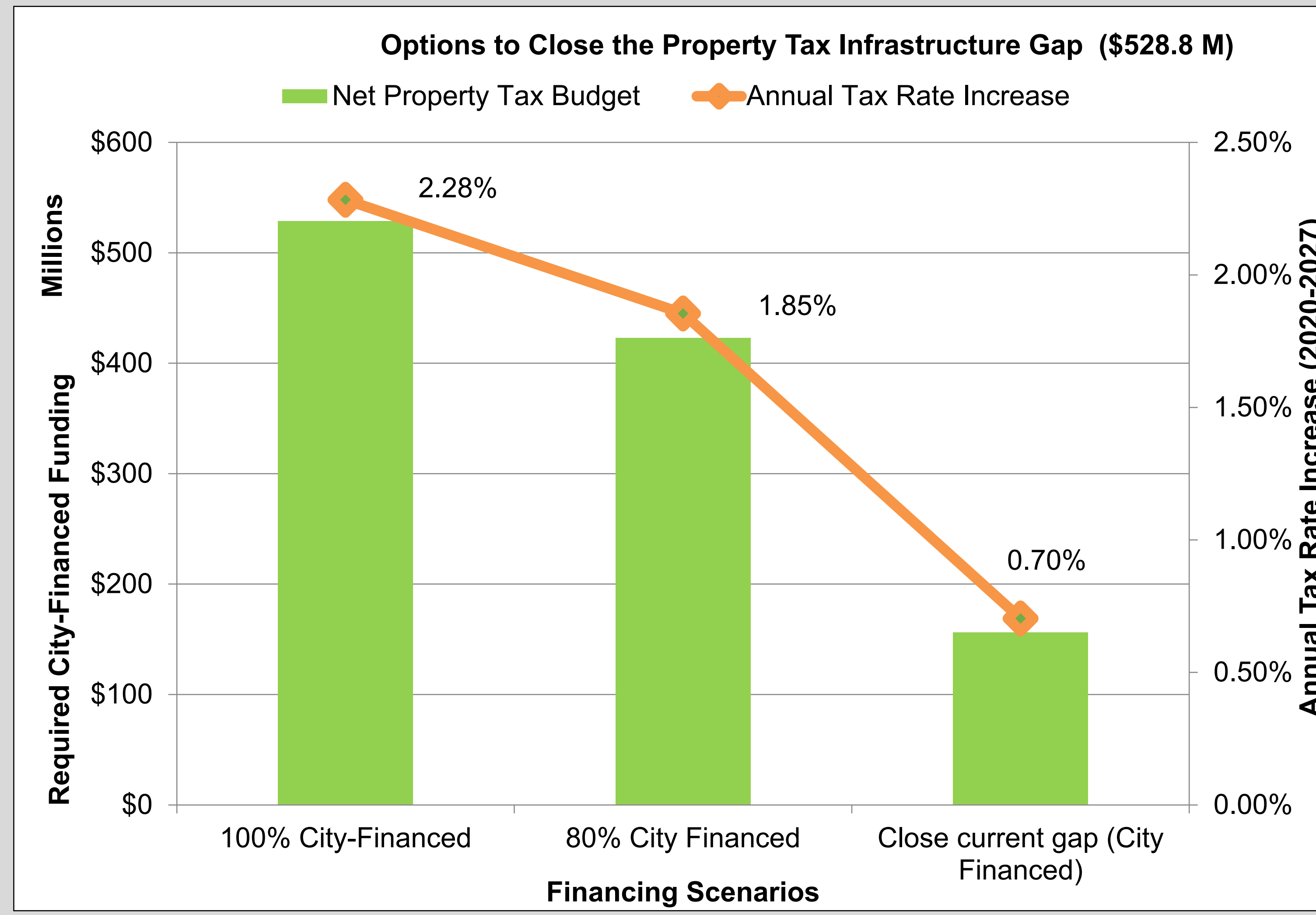


Figure 20.11 Annual Rate Increases Required to Close the Property Tax Based Funding Gap by 2027

20.6.2.2 Elimination Approach (Continued)

(b) Wastewater Rate

Table 20.13 and Figure 20.12 identifies the year at which the annual funding gap is eliminated to zero (rate increase assumed to begin in 2020 and last until 2027) for the Wastewater budgets.

It illustrates the different rate increases depending if:

- The City is required to eliminate the Cumulative 10 year gap and finance 100% of the gap; or
- The City is required to eliminate the Cumulative 10 year gap and finance 80% of the gap.

The strategy of closing the current gap is not listed given the assumption that sufficient reserve funds are available for current gap elimination.

Pebble Creek Park (Small Woodlands)

Table 20.13 Addressing Elimination of the Wastewater Funding Gap

Year when Infrastructure Gap is closed	Annual Infrastructure Levy	
	100% City Financed	80% City Financed
End of 2027	1.14%	0.92%

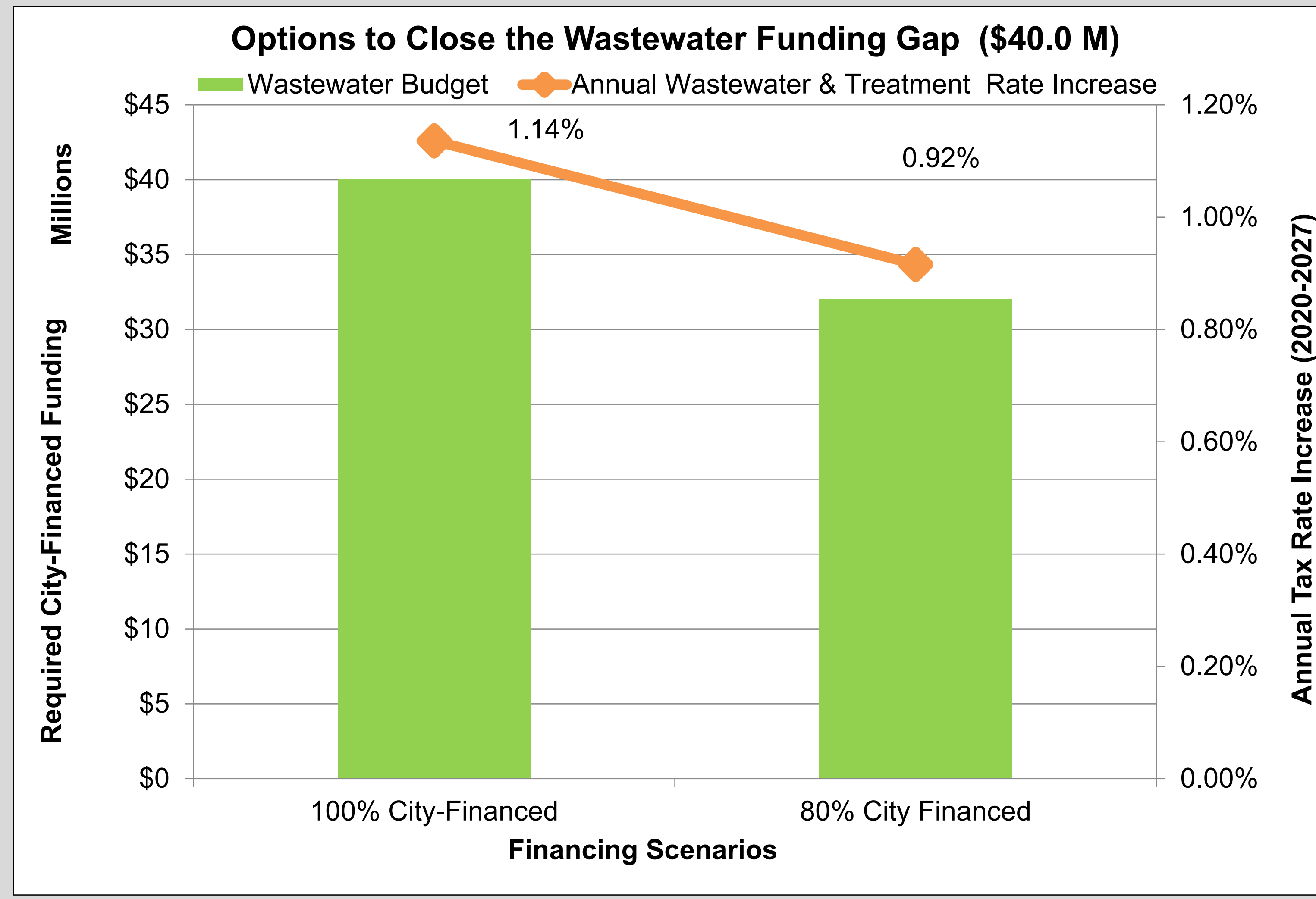


Figure 20.12 Annual Rate Increases Required to Close the Wastewater Funding Gap by 2027

20.7 INFRASTRUCTURE LEVY COMPARISON FROM OTHER ONTARIO MUNICIPALITIES

Many municipalities across Ontario are in a similar position as the City of London: asset management process have identified an infrastructure funding gap, and staff are considering solutions to mitigate the funding gap. Despite best efforts on the technical side of asset management, the refinement of optimal asset lifecycle management strategies have not been able to close the infrastructure funding gap by reducing the 'need'. Inevitably, revenue increases are determined to be the practical solution to address the funding gap.

The most common approach taken by Ontario municipalities is to create a revenue source that can have direct 'line of sight' from the revenue to the infrastructure rehabilitation or replacement activities. This line of sight provides transparency to stakeholders to demonstrate how the new revenues are used for infrastructure projects and not added to general revenue to fund other programs/projects. The term 'Infrastructure Levy' is typically used to refer to these type of dedicated revenue sources.

The following list provides perspective from Ontario municipalities that have taken steps to increase revenues to address their infrastructure funding gap:

- Guelph has an Infrastructure Levy equal to 1.0% of the Property Tax levy
- Mississauga has an Infrastructure Level equal to 2.0% of the general Property Tax Levy
- Hamilton has an Infrastructure Levy equal to 0.5% of the Property Tax levy
- Newmarket has an Infrastructure Levy equal to 1.0% of the Property Tax levy
- Barrie has an Infrastructure Levy equal to 1.0% of the Property Tax levy
- Thunder Bay has a dedicated incremental increase to the Tax Levy that has specific revenue objectives rather than being expressed as a percentage of the existing Tax Levy
- Kingston has a 1.0% incremental tax increase for infrastructure renewal started as early as 1999

Table 20.14 Infrastructure Levy Comparison from Other Ontario Municipalities

Municipality	Infrastructure Levy %	Year of Approval
Guelph [9]	1% (½ from tax rate operating contingency reserve)	2018
Mississauga	2% (Capital Infrastructure & Debt Repayment Levy)	2008
Hamilton	0.5% Property Tax Increase (Capital Levy for repair/rehab of infrastructure)	2010
Brampton [10]	2% Infrastructure Levy	2008
Region of Peel	5% (Utility Rate Supported) 1% (Tax Supported)	2018
Region of York	1% Infrastructure Acceleration Levy (Road Capital Acceleration Reserve for road construction projects)	2019
Newmarket	1% Infrastructure Levy (Asset Replacement Fund)	2015
Northumberland County	0.5% / year (2020 – 2028)	2015
Barrie	1% Infrastructure Renewal Levy	2015
Burlington	Dedicated Infrastructure levy of 1.25% (up to 2022), reducing to 1% (2023-2033) and further reducing to 0.5% (2034 and beyond) 0.2% levy beginning in 2020 to address the renewal needs of a growing asset inventory	2013 2015
Thunder Bay [11]	Net increase to the Municipal Tax Levy (after growth) is 2.95% for the 2019 budget to be sourced from property tax	2019
Kingston [12]	1% incremental capital levy	1999

[9] Guelph – 1% infrastructure levy – half funded through tax levy and half through transfer from tax stabilization fund.
[10] Financial Review of the City of Brampton: Brampton City Council approved 2% infrastructure levy in 2008 but it was not charged in 2009 and 2010 because of the economic downturn (page 13). Approved 1% starting from 2011. 2018 Operating & Capital Budget approved 2% starting in 2015 (page 7).
[11] Thunder Bay – the Net Value is shown because Total Proposed 2019 Municipal Tax Levy increase is 3.25% however investment in the community through new construction and expansions in 2018 resulted in a tax generating power of $0.6 million (0.30%) which is subtracted from 3.25% as it does not contribute to an additional cost to be carried by property tax-payers. Based on 2019 budget.
[12] Kingston – from the municipal tax rate increase of 2.5%, 1% is dedicated for capital infrastructure. Based on 2019 budget.

20.8 INFRASTRUCTURE GAP MITIGATION – STRATEGIES AND INITIATIVES SINCE 2014

The City of London released its first Corporate Asset Management Plan (CAM Plan) in 2014 which was a follow up to the 2013 State of Infrastructure Report (SOIR). This was the first time the City's infrastructure gap was quantified. Having financial tools to quantify the infrastructure gap and also inform decision making gained significant traction with Municipal Council.

As a result, Municipal Council included strategies in its 2015-2019 Strategic Plan to achieve 'Robust Infrastructure' and 'Proactive Financial Management'. These strategies included managing the City's infrastructure gap and making sure the City's finances were well planned to prevent burdening future rate payers, respectively. It led to the creation of the Capital Infrastructure Gap Reserve Fund through the City's 2016-2019 Multi-Year Budget (MYB). Creation of this reserve fund is directly linked to recommendation #8 of the 2014 CAM Plan, and a strong example of the City of London's commitment to asset management. This dedication aligns with the Province of Ontario's goals as outlined in O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure.

Supported by the 2014 CAM Plan and 2013 SOIR, Municipal Council has made significant progress investing in areas, such as Transportation, as well as setting aside funds in the Capital Infrastructure Gap Reserve Fund.

In addition to establishing a reserve fund dedicated to managing the City's infrastructure gap and an ongoing commitment to asset management made visible through approval of budget business cases, London Municipal Council has also approved two Council policies that contribute one-time funding to the Capital Infrastructure Gap Reserve Fund.

1. The Surplus/Deficit Policy which contributes 25% of any remaining annual surplus to the Capital Infrastructure Gap Reserve Fund; and,
2. The Assessment Growth Policy which contributes 50% of any excess growth funding to the Capital Infrastructure Gap Reserve Fund.

Over the past couple of years through the application of these "one-time" funding policies additional funding has enabled the execution of various projects (such as: Old East Village Parking Lot, Byron Pool & Bathhouse, Generator at Exeter Road Operations Centre and numerous road rehabilitation and Street light Maintenance). This funding will continue to enable the City to expand its capital program and mitigate the infrastructure gap. Strategies outlined in the following sections are intended to go 'above and beyond' the programs, reserve funds, and policies currently in place to address the infrastructure gap.

INFRASTRUCTURE GAP – 2014 VERSUS 2019

Figure 20.13 illustrates the projected 2014 CAM Plan infrastructure gap and the 2019 CAM Plan infrastructure gap curve due to the adopted infrastructure gap mitigation strategies. The 2016-2019 MYB strategies to mitigate the 2014 CAM Plan projected infrastructure gap had a major contribution to the reduction of the actual assessed gap in the 2019 CAM Plan. In addition, there are other factors that also contributed to this reduction such as:

- **Improving and Integration of Condition Information**: Corporate Asset Management is now depending on more detailed asset condition information. Integrating CCTV inspection data of Wastewater mains to corporate asset methodologies is an example of increasing accuracy and reliability of pipe condition, and in turn increasing the accuracy and reliability of projected lifecycle activities.
- **Data Quality:** The City now has more accurate information regarding asset inventory, replacement values, and level of service key performance indicators (KPI). This information, in addition to asset conditions and useful life, are the main drivers to better forecast the lifecycle activities costs in the future.
- **Asset Management Decisions Optimization:** The City is currently using Assetic software to assist with optimized prediction models and decision support tools for long-term planning of infrastructure assets. The tools enable the City to optimize service level outcomes and capital expenditure using industry-specific algorithms that predict the future behaviour of assets given available funding levels, replacement and renewal criteria, and enable scenario comparison to aid decision making. While the models cannot yet be applied to every service, use of this software is another step is providing a clearer understanding of lifecycle needs and the impact if optimal funding is not received.

Elsie Perrin Williams Estate – Windermere Rd

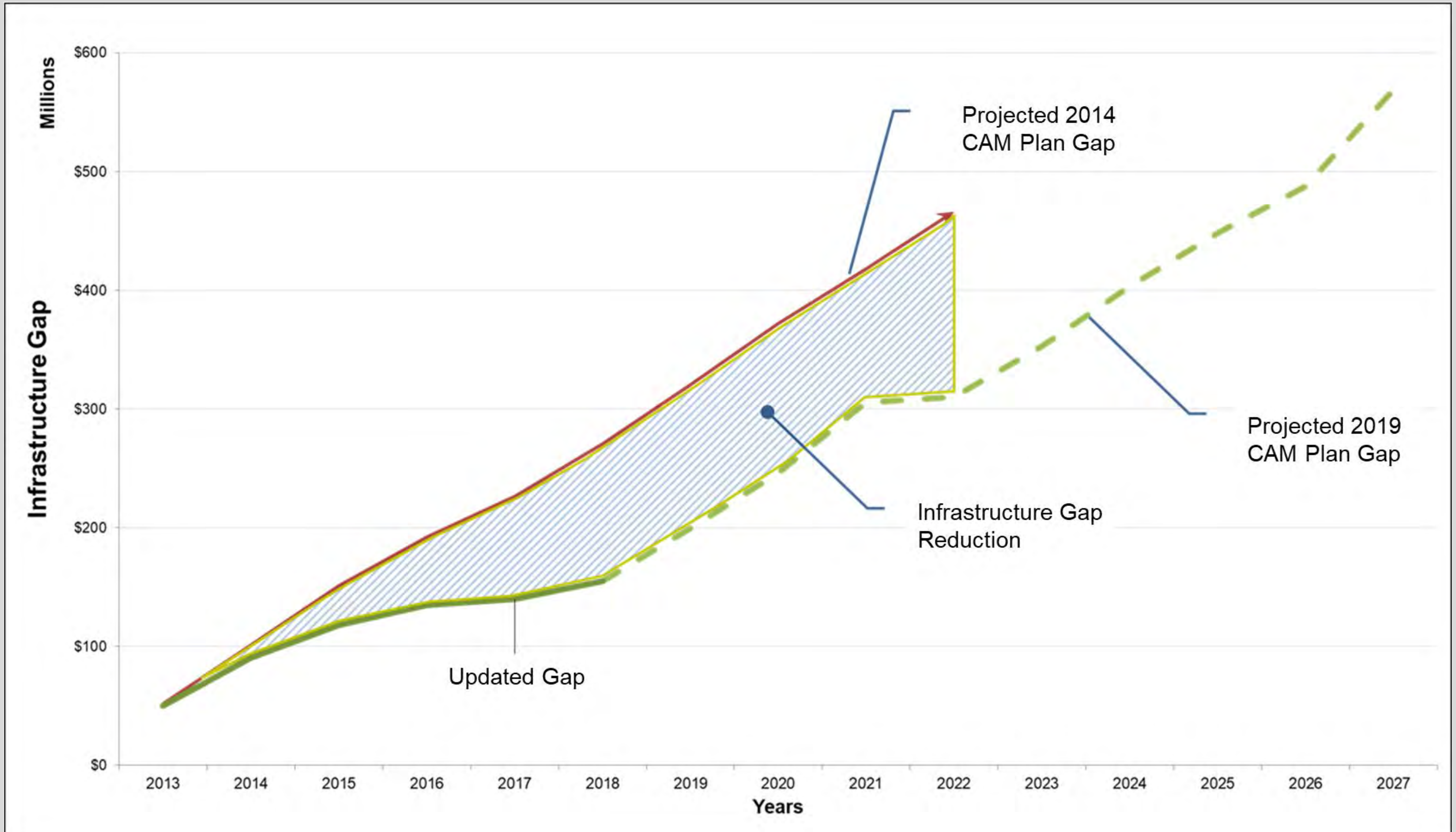


Figure 20.13 Projected 2014 CAM Plan Infrastructure Gap Compared to 2019 CAM Plan Infrastructure Gap

Table 20.12 lists the infrastructure gap to the replacement value from the 2014 CAM Plan to the 2019 CAM Plan. The table highlights how the infrastructure gap to replacement value ratio has decreased from 4.3% to 2.8%, which shows the positive impact of the implemented infrastructure gap mitigation strategies to date. It also compares Cumulative 10 year infrastructure gaps and 10 year total planned budget and reserve fund availability from each Asset Management Plan.

Table 20.15 Comparing of Cumulative 10 Year Infrastructure Gap to Replacement Value

CAM Plan Year	Total Replacement Value (all assets)	Total Planned Budget and Reserve Fund Availability	Cumulative 10 year Infrastructure Gap	Gap as a % of Replacement Value	Gap as a % of Budget and Reserve Fund Availability
2014	$10.9 Billion[8]	$1,090.3 Million	$466.1 Million[9]	4.3%	42.8%
2019	$20.1 Billion	$1,423.8 Million	$568.8 Million	2.8%	39.9%

While the Cumulative 10 year infrastructure gap overall has increased by $102.7 million, the total planned budget and reserve fund availability has significantly increased by $333.5 million. Given the City's replacement value of assets has nearly doubled, as a percentage of replacement value the infrastructure gap is decreasing. Thus, mitigation strategies are considered to be working to reduce the infrastructure gap, and Figures listed earlier show that if not for these strategies, the infrastructure gap would be a greater amount.

[8] Using the construction inflation index, $10.9 Billion (in 2013 dollars) equates to approximately $12 Billion in today's dollars.

[9] Using the construction inflation index, $466.1 million (in 2013 dollars) equates to approximately $512.6 million in today's dollars.

Gymnasium – North London Optimist Community Centre – Cheapside St

20.9 RECOMMENDATIONS

1. Continue to pursue funding from external sources to address the funding gap; and
2. Consistent with Council 2019-2023 Strategic Plan and the actions taken as part the 2016-2019 Multi-Year Budget - Strategic Investment Business Case #7, the Corporate Asset Management office will submit a business case through the 2020-2023 Multi-Year Budget process. This business case will increase the planned amount currently allocated to the Infrastructure Gap Reserve Fund with an additional amount increased each year. Considering the following criteria when providing an annual incremental tax levy increase:
    - Realizing that faster rate increases have a larger impact on the affordability of Municipal taxation on the community;
    - Mitigating the growth of the Cumulative 10 year gap and financing 80% of the gap option appears to be the preferred option;
    - The City target financial sustainability between **10 years to 25 years**, which could result in incremental tax increase between **0.72%** to **0.33%** correspondingly (as listed in Table 20.8);
    - This financial sustainability range comes with an associated risk of debt financing costs or an increased risk of reduced services; and
    - The residual risk of the unaddressed infrastructure gap may be tolerable;

    It is then Recommended that the annual incremental tax increase would be at least **0.33%.**
3. Update the Water and Wastewater 20 year Financial plans, addressing the infrastructure gap identified in Wastewater. The 2019 Corporate Asset Management Plan relies on those 20 year Financial plans being updated and followed to address infrastructure requirements.
4. Where new Property Tax supported tangible capital assets are added to the City's asset base due to growth, the Corporate Asset Management office will submit an Assessment Growth business case (equivalent to the Recommended Annual Reinvestment Rates for the added asset category) to the applicable Capital Asset Renewal & Replacement Reserve Fund to ensure that the asset(s) going forward will have a funding source available in the future to replace or to incur major lifecycle repairs.
5. Similarly for any Service Improvement business cases that will enhance or add new tangible capital asset, that the Corporate Asset Management office identify an additional contribution (based on the Recommended Annual Reinvestment Rates for the added asset category) to the applicable Capital Asset Renewal & Replacement Reserve Fund to ensure that the asset(s) going forward will have a funding source available in the future.
6. Continue to utilize one time funding made available through the application of the Surplus/Deficit Policy and Assessment Growth Policy to reducing the infrastructure gap backlog.

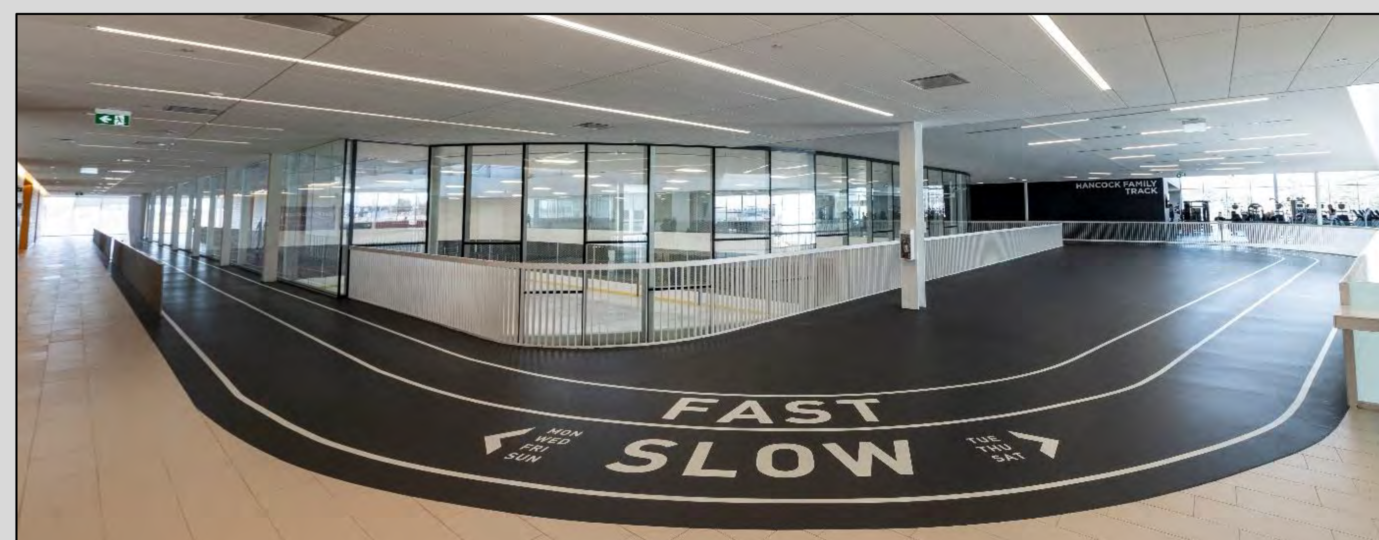
FINANCING STRATEGY CONCLUSION

This is the second Corporate Asset Management Plan for the City of London. It is a continuation of the road to implementing more efficient and effective asset management practices through the City's Corporate Asset Management Program. It should be noted that the Plan is only one management tool with regards to infrastructure assets. The Corporation has many more responsibilities and it is recognized that this is only a piece of the larger puzzle.

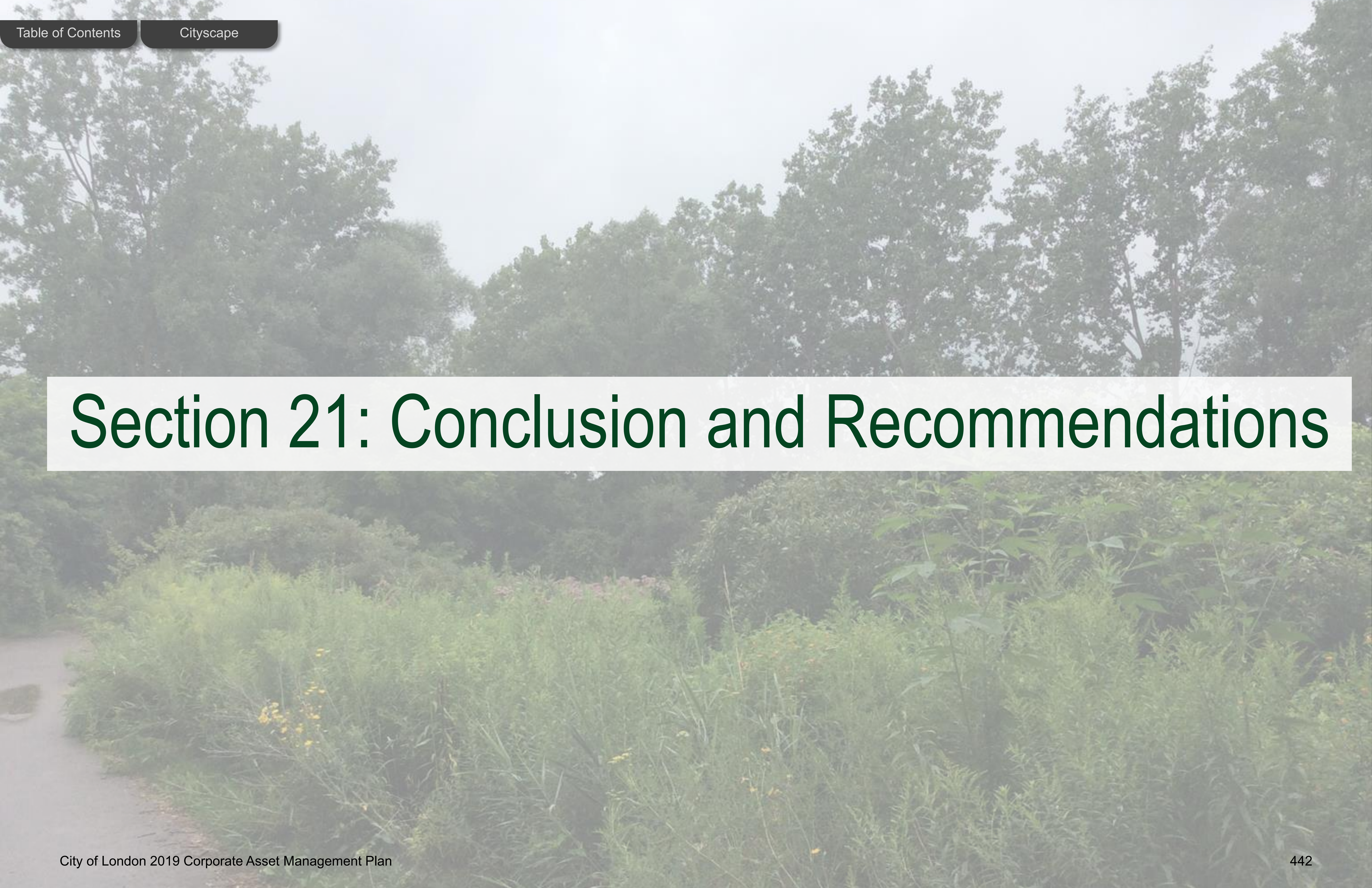
As witnessed by the forecasted growth of the City's infrastructure gap, despite the infrastructure gap decreasing as a percentage of replacement value, the growth of the infrastructure gap has not been completely mitigated. This Plan illustrates options for two approaches - eliminating the infrastructure gap completely, or mitigating the annual growth of the gap. It recommends a strategy to mitigate the growth of the infrastructure gap based on current service levels. Implementation of the Plan's recommendations would impact the City's property tax rate. Implementation would occur through established budget practices.

As the City's Corporate Asset Management Program proceeds, better information will become available regarding London's infrastructure and its needs. This heightened understanding will aid decision-makers by helping prioritize investments during the short and long term which culminates in the multi-year budget process.

Every year the effects of implemented recommendations will be monitored. The improvement in the Corporate Asset Management Program will benefit the City and its users through cost effective and data-driven decisions. It allows the opportunity to make the right investment at the right time for the right amount.



Indoor Track – Bostwick Centre – Southdale Rd W.



Section 21: Conclusion and Recommendations

Section 21: Conclusion and Recommendations

21.1 CONCLUSIONS

The Corporation of the City of London's ("City of London" or "City") infrastructure systems are the backbone of our community. They support a range of municipal services that enable the quality of life experience by residents, businesses and other stakeholders.

The CAM Plan is a strategic document that describes the state of London's assets and the approach to managing assets over their lifecycle to achieve desired levels of service at the lowest lifecycle costs. This document is the second CAM Plan produced through the City's Corporate Asset Management (CAM) program. It builds on the first report by combining data that was previously in two reports – the 2013 State of Infrastructure Report and 2014 Asset Management Plan. The 2019 CAM Plan builds on these documents by leveraging new and improved asset data/information from each service grouping, as well as using new tools and techniques. The use of updated asset data has resulted in several changes between the first CAM Plan and this second CAM Plan, which are detailed in the following section. Over time, each successive CAM Plan will be more consistent with the previous iterations to increase the ability in identifying trends to inform decision-making.

This CAM Plan is a tactical outcome of the CAM Program, setting out the current plan for the City to manage its $20.1 Billion worth of core infrastructure under the direct ownership and control of the Corporation of the City of London. The overall condition of the City's assets is rated as Good. Good condition indicates that the infrastructure is adequate for now with some elements showing general signs of deterioration that require attention. The assets that are of concern to the City are the smaller fraction of assets listed in Poor or Very Poor condition. Based on the existing City budget plans, the infrastructure gap is expected to grow from the current gap of $168.0 million to $568.8 million within the next decade. The City's proposed strategies to mitigate the annual growth of the infrastructure gap. The strategies are to balance the impact on the affordability of City taxation on the community while attaining financial sustainability of the infrastructure gap.

Bleachers and Gathering area – Bostwick Centre – Southdale Rd W.

Section 21: Conclusion and Recommendations

21.1.1 2014 CAM Plan Recommendations Progress

The 2014 CAM Plan contained ten recommendations resolved by Council in order to strongly support the development of standardized asset management practices in the City of London. The progress and status of these recommendations are described below.

Table 21.1 2014 CAM Plan Recommendations Progress Reporting

Number	Recommendation	Progress and Status
1	Continue to aggressively pursue the Corporate Asset Management Program in order to standardize quality asset management practices across the corporation that focus on service delivery through the consideration of levels of service, risk management and lifecycle management of the City's assets. This includes correcting information weaknesses, acquiring the tools needed to enable asset management and improving the quality of asset information in order to facilitate decision-making.	The Corporate Asset Management program has completed four of its seven units. Unit 5 involves the procurement of an asset management software system. Since the last CAM Plan Review in January 2017, the Corporate Asset Management program has procured and began implementation of the Assetic software solution with Go-Live planned for late 2019 for Transportation and Parks & Recreation assets. The most extensive work involved in the development of the program is in Unit 6 – Pilot Trials with the Transportation and Parks & Recreation programs. The work is well underway with development of condition, inventory and level of service modules nearing completion. Next modules of the pilot trials include risk management followed by lifecycle management. This will complete the development of the procedural frameworks needed to support and inform standardized asset management practises across the City.
2	Continue to merge the new asset management program with the existing practices in order to take maximum advantage of the history of effective past practices in the City of London.	This method continues to form the basis of the approach while exercising flexibility to achieve effective results.
3	Continue to align the Plan with the Corporate Strategic Results/Goals	The 2014 CAM Plan conforms to the City of London Strategic Plan 2015 - 2019 Strategic Plan, particularly supporting the areas of 'Building a Sustainable City' and 'Leading in Public Service'. The City's 2019 Asset Management Plan is a reflection of best practices currently in place and has been developed to support proactive management of the Corporation's infrastructure to conform to the 2019-2023 Strategic Plan.
4	Review the existing levels of service and develop a level of service registry to help define the needs of the asset base.	Development of levels of service is completed for Transportation and Parks & Recreation as part of Unit 6 of the Corporate Asset Management Project Pilot Trials. In addition, basic/foundational Levels of Service metrics have been developed in all service areas during the 2019 CAM Plan development process and ensured adherence to the requirements of the Ontario Regulation 588/17.
5	Review the results of the Corporate Asset Management Plan annually and fully update the Plan every five years to ensure its continuing suitability, adequacy, and effectiveness.	The status of the recommendations has been reviewed, updated, and reported to Council every year. The frequency of full comprehensive updates was adjusted to every four years to coincide with the City's multi-year budget cycle.

21.1.1 2014 CAM Plan Recommendations Progress (Continued)

Table 21.1 (Continued) 2014 CAM Plan Recommendations Progress Reporting

Number	Recommendation	Progress and Status
6	Continue to foster pay-as-you-go practices including the use of reserves and reserve funds to prepare for future needs.	The City remains committed to pay-as-you go financing for lifecycle renewal activities. The prudent increase in investment in Transportation assets is indicative of this commitment and has resulted in a positive outcome.
7	Rely on existing 20 year plans and their updates as means to manage infrastructure gaps in the water, and wastewater services.	Currently, the City is reviewing the existing 20 year Financial plans for Water and Wastewater assets.
8	Start building a reserve fund to be used exclusively for addressing the infrastructure gap. Plan for the new funding need as part of the 2015 property tax rate setting process and update the amount annually thereafter. Plan to initially eliminate the gap by 2022, a term matching the current understanding of the State of the Infrastructure Report 2013.	• Increased base funding for Capital budget had positive impacts on the projected infrastructure gap. Despite the substantial progress, the infrastructure gap still exists. Further mitigation actions are required as outlined in the 2019 recommendation section below. • During the 2016-2019 Multi-year budget process, City Council approved Strategic Investment Business Case #7 - State of Infrastructure Report 2013. This business case established the infrastructure gap reserve fund which is used exclusively for addressing the infrastructure gap. • Council also approved policies that would allocate one time funds to the infrastructure gap reserve fund (Surplus Policy and Assessment Growth Policy). These approvals resulted in the establishment of the Capital Infrastructure Gap reserve fund which allows the City to prudently commence saving while the Corporate Asset Management program continues its evolution toward risk-based decision-making and a standardized approach to prioritizing capital projects. This reserve fund has a projected balance of $6.8 million for year-end 2019.
9	Continue to monitor the changing gap with the objective of meeting the needs for service delivery.	Full updates of the infrastructure gap is provided in the 2019 CAM Plan, and the plan is to update every four years to inform the City of London Budget. The CAM Plan provides a useful tool during budget deliberations.
10	In the long term, extend the corporate asset management practices to the Boards & Agencies of the City as appropriate.	Ontario Regulations 588/17 indicates that the scope of the Asset Management planning includes all the services in the Consolidated Financial Statement. The Corporate Asset Management section is planning to conduct an Asset Management Maturity for each of the boards and agencies, within the scope, in order to include them in the next Comprehensive Asset Management Plan in 2023 in compliance with the O.Reg phased implementation approach.

Section 21: Conclusion and Recommendations

21.1.2 2014 2019 Asset Management Plans Comparison

A comparison to the 2014 CAM Plan information shows some noteworthy changes that are generally grouped into three areas: (1) Replacement value; (2) Asset Condition; and (3) Funding Gap. Table 21.2 summarizes the 2014-2019 Asset Management Plans outcomes comparison.

Replacement Value

Water, Sanitary and Stormwater replacement values have increased substantially due to the inclusion of road restoration costs in the estimated replacement value for linear infrastructure (i.e. watermains, sanitary sewers, and storm sewers). The replacement values of other service areas have also increased to reflect changes that have been observed in the industry. The replacement values used in the CAM Plan will continue to be refined based on the actual costs observed from construction projects. Table 21.2 indicates the comparison of 2014-2019 CAM Plans showing that the total replacement values of the City directly owned assets increased from $10.9 billion to $20.1 billion.

Asset Condition

A comparison of the 2014 CAM Plan condition profile against the 2019 CAM Plan condition profile for all service(s) are shown in Figure 21.1. Figure 21.2 shows the 2019 CAM Plan condition profile by service. It is apparent that the condition profile has improved for all service(s) areas, with a smaller proportion in poor & very poor condition, and a larger proportion in very good & good condition. This change is attributed to a larger amount of real condition data being used in the AM analysis, as opposed to condition assumptions based on asset age and service life. In addition, the City has allocated extra funding to its capital budget which has significantly improved the overall condition.

Proudfoot Community Garden – Sign

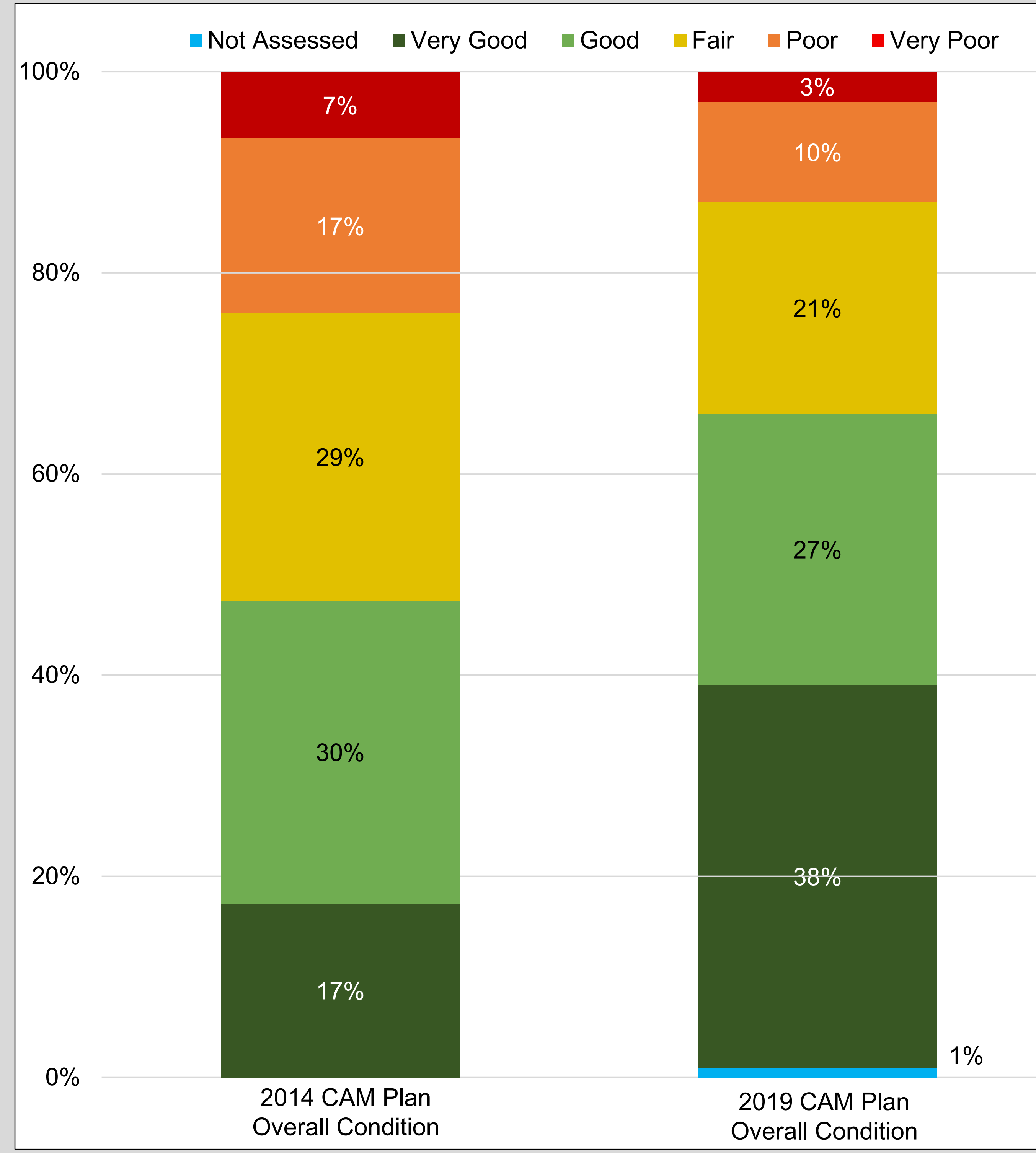


Figure 21.1 2014 CAM Plan to 2019 CAM Plan Condition Summary (City of London Overall Assets)

Section 21: Conclusion and Recommendations

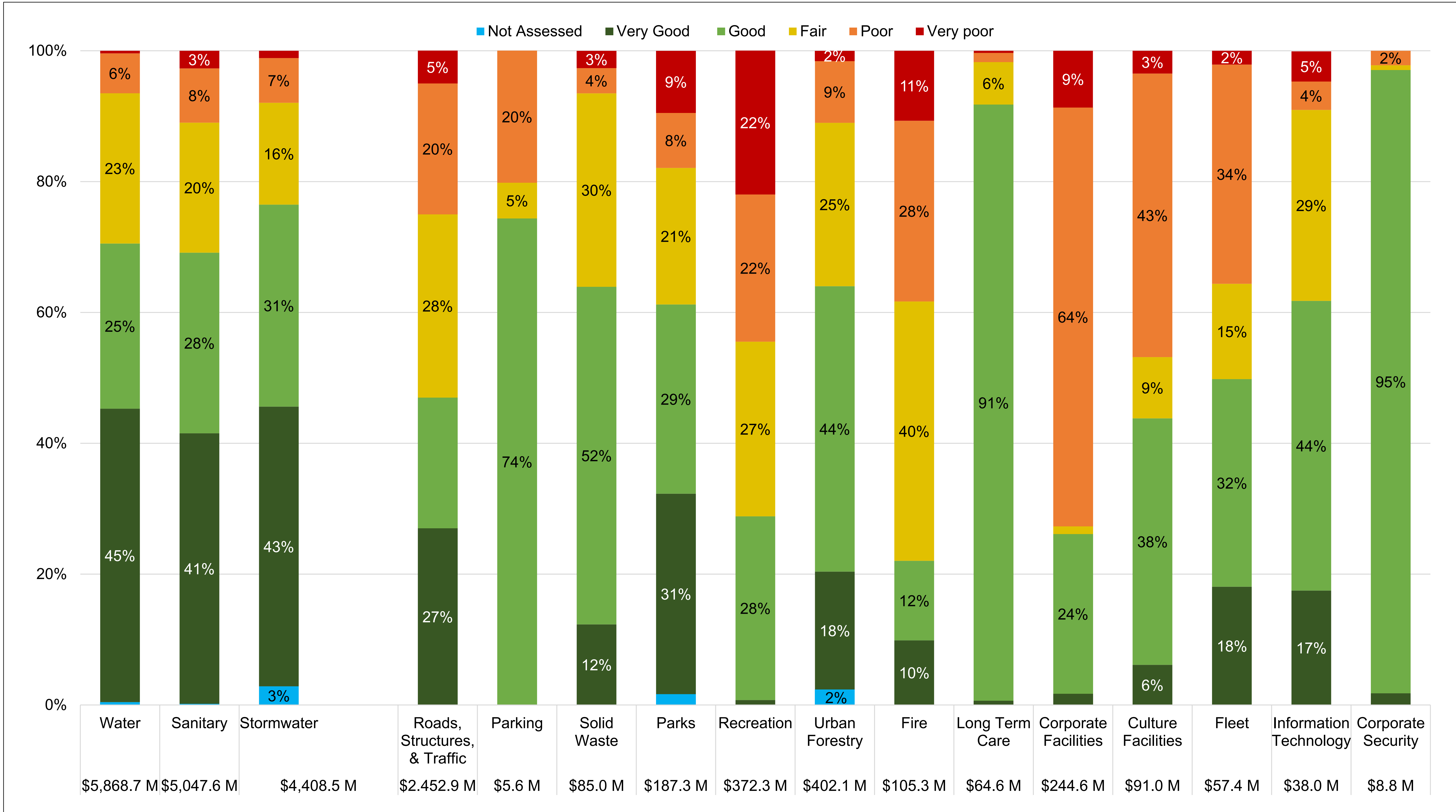


Figure 21.2 2019 CAM Plan City of London Overall Asset Condition (By Service)

Section 21: Conclusion and Recommendations

21.1.2 2014 2019 Asset Management Plans Comparison (Continued)

Funding Gap

The 10-year funding gap has increased from a total of $466.1 million in the 2014 CAM Plan to $568.8 million in the 2019 CAM Plan. The largest increase has been in the Recreation services where the funding gap has increased by $100 million, while other services such as Fire Services, Stormwater, Urban Forestry and Cultural Facilities also have an increase in the funding gap. Figure 21.3 illustrates the percentage of each service grouping contributing the Infrastructure Gap. The increasing funding gap is attributed to improved asset inventory and condition data, which has been used to establish the funding needs. Changes to the funding gap analysis are expected in the early stages of the implementation in the CAM program, as the City develops a robust and comprehensive asset inventory with condition/performance data. Table 21.2 summarizes the infrastructure gap comparison for the 2014-2019 CAM Plans.

Carling Heights Optimist Community Centre - Elizabeth Street

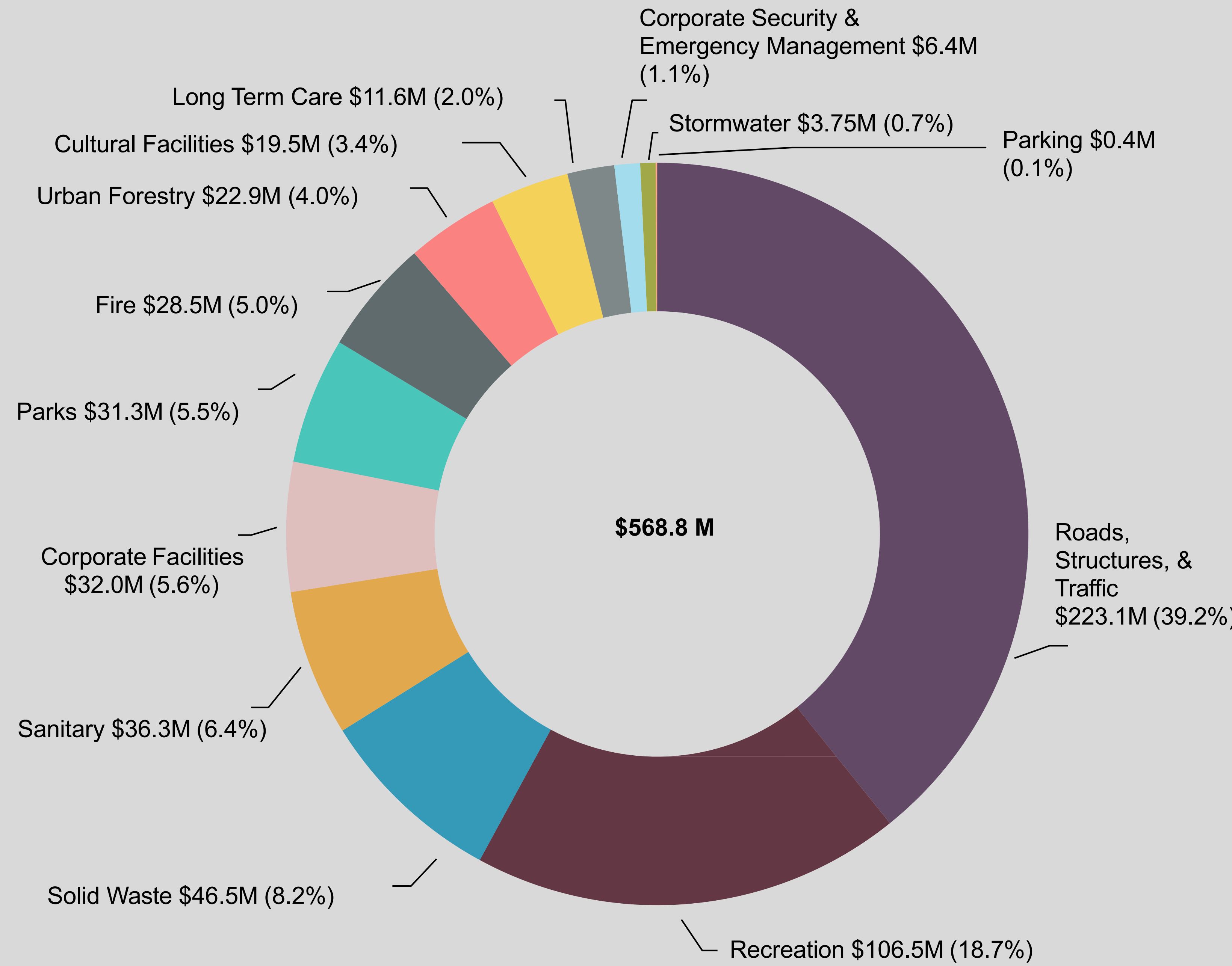


Figure 21.3 2019 CAM Plan Percentage and Amount of each Service grouping Contributing to the Infrastructure Gap

Section 21: Conclusion and Recommendations

Table 21.2 2014-2019 CAM Plans Replacement Value, Gap, Planned Budget and Reserve Fund (in $000's), and Condition Comparisons

Service Area	2014 CAM Plan R.V*	2019 CAM Plan R.V.	Trend	2014 CAM Plan 10 year gap	2019 CAM Plan 10 year gap	Trend	2014 CAM Plan Planned Budget + RF**	2019 CAM Plan Planned Budget + RF	Trend	2014 CAM Plan Condition rank	2019 CAM Plan Condition rank	Trend
Transportation	2,047,052	2,468,946	↑	271,639	223,049	↓	261,630	447,762	↑	Fair	Good	Improved
Water	2,734,373	5,868,709	↑	37,800	-	↓	242,734	302,449	↑	Fair	Good	Improved
Sanitary	2,043,409	5,047,641	↑	21,802	36,280	↑	153,588	212,834	↑	Good	Good	Constant
Stormwater	1,993,151	4,408,474	↑	973	3,746	↑	152,838	198,276	↑	Good	Good	Constant
Parking	5,694	5,579	↓	-	411	↑	3,371	1,862	↓	Fair	Good	↑
Solid Waste	64,237	85,004	↑	5,142	46,544	↑	64,948	19,782	↓	Very Good	Good	Deteriorated
Parks	141,358	187,308	↑	43,763	31,330	↓	37,293	48,644	↑	Good	Good	Constant
Recreation	246,832	372,286	↑	7,314	106,478	↑	34,982	48,248	↑	Fair	Fair	Constant
Urban Forestry	513,300	402,114	↓	9,070	22,920	↑	6,650	21,305	↑	Fair	Good	Improved
Fire	66,156	105,277	↑	-	28,484	↑	22,807	30,917	↑	Fair	Fair	Constant
Long Term Care	45,593	64,637	↑	2,562	11,623	↑	6,056	5,014	↓	Good	Good	Constant
Corporate Facilities	149,532	244,605	↑	55,199	32,036	↓	26,199	37,404	↑	Poor	Poor	Constant
Cultural Facilities	31,471	91,028	↑	-	19,530	↑	7,220	9,078	↑	Fair	Fair	Constant
Fleet	44,994	57,368	↑	-	-	↔	48,953	60,628	↑	Fair	Fair	Constant
Information Technology	36,100	38,010	↑	10,867	-	↓	18,716	31,641	↑	Fair	Good	↑
Land	751,890	650,272	↓	N/A	N/A	↔	N/A	N/A	Constant	Not Assessed	Not Assessed	Constant
Corporate Security & Security Management	10,000	8,812	↓	-	6,364	↑	2,334	7,110	↑	Good	Good	Constant
Total	**10,925,142**	**20,106,070**	↑	**466,131**	**568,795**	↑	**1,090,319**	**1,482,954**	↑	**Good**	**Good**	Constant

***R.V. stands for Replacement Value**

****RF Stands for Reserve Fund**

↔ **Constant** ↑ **Increased or improved Condition** ↓ **Decreased or deteriorated Condition**

21.1.3 City of London current compliance with Ontario Regulations 588/17

O. Reg 588/17 has a phased approach with three timelines of July 1, 2021, July 1, 2023, and July 1, 2024. The July 1, 2021 and July 1, 2023 timeline is where ‘Core’ assets (water, wastewater, stormwater, road and bridges) and all City infrastructure assets, respectively will have an asset management plan documenting current levels of service. The final deadline is to document proposed levels of service and financial strategies to fund these expenditures.

For directly-owned City infrastructure assets, this CAM Plan is compliant with the July 1, 2021 and July 1, 2023 Regulation requirements. Furthermore, it also includes some components of the July 1, 2024 requirements.

The 2019 CAM Plan has a scope of all directly owned assets by the City of London. O. Reg 588/17 has defined a municipal infrastructure assets as directly owned by a municipality or included on the consolidated financial statements of a municipality (excluding joint municipal water board). The interpretation is that Boards and Agencies will have to be in scope of the CAM Plan by July 1, 2023. The City is undertaking an asset management maturity assessment in late 2019/early 2020 to determine the appropriate work to ensure July 1, 2023 regulation requirements are met.

Table 21.3 City of London Compliance Status With O.Reg. 588/17

Measure	Phase 1 & 2: O.Reg. 588/17 due July 1, 2021 & 2023				Phase 3: O.Reg 588/17 due July 1,2024			
Asset Category	**State of Infrastructure**	**Current Level of Service**	**Lifecycle Management and Risk**	**Financial Strategy**	**State of Infrastructure**	**Proposed Level of Service**	**Lifecycle Management and Risk**	**Financial Strategy**
Core City Owned Assets	Compliant	Compliant	Compliant	Compliant	Compliant	In Progress	In Progress	In Progress
Other Directly Owned City Assets	Compliant	Compliant	Compliant	Compliant	Compliant	In Progress	In Progress	In Progress
Boards and Agencies	Under review - Due by July 1, 2023				Under review			

21.1.4 Risk Associated with the CAM Plan

There are a number of risks associated with the CAM Plan. The following table identifies the potential impacts and mitigating actions:

Table 21.4 Risks Associated with the CAM Plan and Strategy

Identified Risk	Potential Impacts	Mitigating Actions
Plan is not followed	• Less than optimal investments • Potential to shorten useful life • Failure to deliver service • Prioritization process fails • Impact to services	• Monitor and review • Implement quality asset management processes
Failed infrastructure	• Failure to deliver service • Damage to asset and neighbouring equipment and property (private or public) • Injury, death - staff and public • Customers unable to carry on their business • Non-compliance with regulation • Litigation • Damage to environment • Additional unplanned costs • Asset Loss • Negative social impacts, etc.	• Repair/replace • Increase investment/ available funding • Innovative technology • Non-infrastructure solutions • Reduce or stop delivering service
Inadequate Funding	• Increased risk of failure • Service reductions • Rising maintenance costs • Prematurely shortens useful life if not maintained • Asset Loss • increase burden on future generations • Defeat planning efforts • Plans become redundant • Lost opportunities • Unpredicted future impacts	• Reduce or stop delivering service • Find additional sources of funding • Increase investment / available funding • Update planning • Discard efforts on past planning

21.1.4 Risk Associated with the CAM Plan

Table 21.4 (Continued) Risks Associated with the Plan and Strategy

Identified Risk	Potential Impacts	Mitigating Actions
Poor quality asset information	• Inefficient maintenance program • Poor prioritization/projections • Poor decision-making • Improper investments • Inability to deliver service	• Invest in data systems and condition assessment • Determine appropriate level of service and risk metrics and ratings
Planning assumptions incorrect	• Defeat planning efforts	• Monitor Plan, update and correct projections
Regulatory requirements, standards, criteria change or do not exist	• Non-compliance • Mandatory investments and schedule • Disruption to planning efforts • Investment due to regulation reduces available funding for others • Additional costs	• Lobby against additional expenditures • Lobby for additional transfer funding • Reduce or stop delivering service • Find additional sources of funding • Increase investment/ available funding • Lobby organizations to provide standards
Economic fluctuations, inflation, downturns, revenue and use reduces/increases	• Reduced/increased needs • Less than optimal expense maintaining oversized/undersized infrastructure	• Change, create or stop delivering service
Occurrence of Climate Change/Adverse Weather/Unforeseen events and emergencies, resulting in funds being diverted to assets that were not originally planned for	• Additional unplanned costs • Damage and loss of assets • Defeat planning efforts • Plans become redundant • Lost opportunities • Unpredicted future impacts	• Deferral of planned renewals • Assess/increase insurance coverage • Increase/develop reserve funds • Develop contingency/emergency plans
Growth projections not as planned	• Infrastructure oversized or undersized • Inefficient use of available service	• Defer or advance capital projects related to growth and update plan
Service Provision Changes	• Plan either does not address or contains redundancies	• Amend the Plan

Section 21: Conclusion and Recommendations

21.2 RECOMMENDATIONS

The structure of the City's CAM Program is founded on the principle of continual improvement. The implementation of the program, following the CAM Strategy to enable line-of-sight from tactical decisions made in the CAM Plan and CAM processes to the principles and commitments identified in the CAM Policy, will increase the quality of data/information, as well as the tools and techniques that are used in decision-making. The increased quality will lead to greater confidence in the analysis documented in the CAM Plan. The following recommendations will ensure that the CAM Plan continues to help the City manage its $20.1 billion asset portfolio to provide sustainable service delivery to its citizens and keep compliant with the Ontario regulations of asset management planning. The key recommendations of the Plan are as follows:

1. **Continue to align the Corporate Asset Management Plan with the Corporate Strategic Plan:** 2019 CAM Plan is a reflection of best practices currently in place and has been developed to support proactive management of the Corporation's infrastructure to conform to the 2019-2023 Strategic Plan. The City's CAM Office is to continue to align the CAM Plan future updates with all future Strategic Plans.
2. **Continue to advance the Corporate Asset Management Program:** The CAM Program will standardize asset management practices across the corporation, connecting technical asset lifecycle strategies to customer-focused performance measures that quantify the levels of service being provided to the community in each service area.
3. **Enhance the Corporate Asset Management Plan:** The CAM Plan is a living document that will continue to reflect the evolution of asset management practices within the City. Over the next few years, the CAM Office will be working to enhance the CAM Plan and prepare for the next CAM Plan in 2022/2023. This will include working with staff in each service area to:

i. Ensure asset inventories are comprehensive and contain accurate condition and performance data.

ii. Operationalize advanced performance measures by collecting and analyzing new asset data.

iii. Analyze more complex (and more realistic) asset lifecycle strategies to understand the optimal mix of each lifecycle activity to achieve the proposed levels of service at the lowest lifecycle cost.

iv. Ensure Compliance with Phase 3 of the Ontario Asset management planning Regulatory Requirements. The Provincial Regulation O.Reg. 588/17 has specific requirements for CAM Plans that are phased in from 2018 to 2024. This CAM Plan meets all the requirements through to 2021 & 2023 for directly owned city assets, but some additional content is required by 2024. The City's CAM Office has developed a strategy to enhance the CAM Plan to meet the 2024 requirements, and it is important that the City maintains its commitment to providing the resources necessary to execute the CAM Program.

4. **Monitor the progress of the Corporate Asset Management Plan:** The CAM program will continue to monitor the progress of the CAM Plan and insure alignment with the Corporate Outcomes, Expected Results, and Strategies. As part of the Provincial regulation, the City is required to provide an annual progress review of the CAM Plan. The annual progress review will address the City's progress in implementing the CAM Plan and describe any factors impeding the ability to implement the CAM Plan (with associated strategies to mitigate impeding factors). Annual review of the progress of the CAM Plan, as described above, will enable more robust trending of performance measures over time. This is an important consideration to embed the elements of the CAM Program into 'business as usual' at the City, rather than being seen as a one-off exercise.

5. **Explore opportunities to incorporate the corporate asset management practices to the Boards & Agencies of the City as appropriate**: The CAM Office is planning to conduct an Asset Management maturity assessment for the boards and agencies to come up with the plans on how to incorporate and involve them in the process. The CAM Office recognizes that some boards and agencies will have higher level of Asset Management maturity than others in which each one will be dealt with differently.

6. **Engage the Public and Community Partners in the Asset Management Process**: A critical component of public engagement is a commitment to providing public access to as much of the data and evidence used in the CAM Program as feasible, while respecting privacy concerns. There has been previous efforts for public engagement at the City of London, which was done on an ad-hoc basis and to support several decision making processes such as budget priorities or other asset related issues. The CAM Office is planning to leverage existing public consultation initiatives and start encouraging residents, businesses, institutions, and other stakeholders to offer input in the City's asset management planning and the CAM program implementation. Additionally, the CAM Program is to effectively involve various stakeholders in the infrastructure conversation. This engagement is critical to ensuring that the desired levels of service reflect the values and priorities of the community, while balancing affordability and 'willingness to pay' considerations. To date, the CAM Program has effectively engaged with all relevant internal City stakeholders to obtain input into the CAM Plan. The CAM Office is planning to expand the coordination planning for asset management, where municipal infrastructure assets connect or are interrelated with those of our neighbouring municipalities or jointly-owned municipal bodies.

Section 21: Conclusion and Recommendations

7. **Continue to explore opportunities to address the infrastructure gap through various financial Strategies.** The following recommendations summarizes the key points to mitigate its growth:
   i. Continue to pursue funding from external sources to address the funding gap; and
   ii. Consistent with Council 2019-2023 Strategic Plan and the actions taken as part the 2016-2019 Multi-Year Budget - Strategic Investment Business Case #7, the Corporate Asset Management office will submit a business case through the 2020-2023 Multi-Year Budget process. This business case will increase the planned amount currently allocated to the Infrastructure Gap Reserve Fund with an additional amount increased each year. Considering the following criteria when providing an annual incremental tax levy increase:
      - Realizing that faster rate increases have a larger impact on the affordability of Municipal taxation on the community;
      - Mitigating the growth of the Cumulative 10 year gap and financing 80% of the gap option appears to be the preferred option;
      - The City target financial sustainability between **10 years to 25 years**, which could result in incremental tax increase between **0.72%** to **0.33%** correspondingly (as listed in Table 20.8);
      - This financial sustainability range comes with an associated risk of debt financing costs or an increased risk of reduced services; and
      - The residual risk of the unaddressed infrastructure gap may be tolerable;

      It is then Recommended that the annual incremental tax increase would be at least **0.33%.**
   iii. Update the Water and Wastewater 20 year Financial plans, addressing the infrastructure gap identified in Wastewater. The 2019 Corporate Asset Management Plan relies on those 20 year Financial plans being updated and followed to address infrastructure requirements.
   iv. Where new Property Tax supported tangible capital assets are added to the City's asset base due to growth, the Corporate Asset Management office will submit an Assessment Growth business case (equivalent to the Recommended Annual Reinvestment Rates for the added asset category) to the applicable Capital Asset Renewal & Replacement Reserve Fund to ensure that the asset(s) going forward will have a funding source available in the future to replace or to incur major lifecycle repairs.
   v. Similarly for any Service Improvement business cases that will enhance or add new tangible capital asset, that the Corporate Asset Management office identify an additional contribution (based on the Recommended Annual Reinvestment Rates for the added asset category) to the applicable Capital Asset Renewal & Replacement Reserve Fund to ensure that the asset(s) going forward will have a funding source available in the future.
   vi. Continue to utilize one time funding made available through the application of the Surplus/Deficit Policy and Assessment Growth Policy to reducing the infrastructure gap backlog.

Wood Bench – R. H. Cooper Square

Section 22: Appendices

Appendix A – Development Approach

Section 22: Appendix A

A – 1 INTRODUCTION

This section describes the methodology used to determine the findings of this Corporate Asset Management Plan ('AMP' or 'CAM Plan') report. This Plan was developed using the best currently available data already collected by the City. Whenever available, information on assets, such as inventory, and condition, was obtained from the various service areas' database and asset management software. Otherwise, data was collected from the 2017 Tangible Capital Asset (TCA) report, a requirement under the PSAB 3150 legislation. In some cases, expert opinion from staff was obtained to fill gaps in the information particularly with respect to current condition of some assets.

City owned infrastructure information was grouped and analyzed to establish a clear picture of the current state of the infrastructure operated and maintained by each service area. Each Service Area section is itemized into five parts: 1. State of Local Infrastructure (i. Asset Inventory & Valuation, ii. Age Summary, and iii. Asset Condition); 2. Levels of Service; 3. Asset Lifecycle Management Strategy (i. Lifecycle Activities and ii. Lifecycle Management Approach); 4. Forecasted Infrastructure Gap; and 5. Discussion and Conclusions.

A – 2 SERVICE AREA SECTIONS

A 2.1 State of Infrastructure

This is the first of the five itemized sections for each service area, and includes the following information:

ASSET INVENTORY & VALUATION

This CAM Plan relies on the use of 2017 TCA and GIS information to establish an inventory and valuation of major asset groups controlled by each service area. Where possible, information is verified using independent inventory information stored in GIS, work management systems, and other service area data sources.

AGE SUMMARY

This is an illustration of the average asset age as a proportion of the average useful life by asset. It also outlines key assumptions used when accurate age data is not available.

ASSET CONDITION

The condition of each asset group was evaluated to represent the current 'health' of the City's infrastructure. A five-point rating scale was used to align with that employed by the National Infrastructure Report Card produced by the Canadian Society for Civil Engineering (CSCE), the Canadian Public Works Association (CPWA), the Canadian Construction Association (CCA) and the Federation of Canadian Municipalities (FCM). In addition to providing a sound basis for assessment, this will allow for high-level benchmarking against the values presented in this document. The ratings scale ranges from 1 to 5, as described in the table below, reflecting each asset group's physical condition.

Table A – 1 Condition Scale and Definitions

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

Section 22: Appendix A

The condition of the assets was determined using one of the three methods below based on data availability and accuracy:

1) Existing condition rating systems (e.g. Pavement Quality Index, Facility Condition Index, etc.)
2) Estimated based on age and the remaining estimated useful life of the asset.
3) Estimated based on expert opinion, in the absence of 1) or 2) above, or where there was low confidence that age and useful life appropriately represented the asset.

A 1.2 Levels of Service

Complete listings of level of service metrics are described and summarized in the Asset Management Plan. Metrics that are reported consistently for each service area are considered foundational and highlighted below:

i. Percentage of assets that have a condition rating of fair or above or poor and very poor

Listing asset conditions considered foundational in assessing which assets are to be considered for lifecycle activity (renewal, rehabilitation, replacement, or disposal).

ii. Annual operating budget (Fiscal year 2017) - as approved by municipal council

Listing council-approved operating budgets are considered foundational in assessing that services provided are delivered in an efficient manner.

Note that portions of approved operating budgets relate to contributions of capital-related items. This includes reserve funds and debt repayment. These contributions are considered part of long-term service area sustainability, but not part of providing day-to-day operations; hence, these amounts are separated and analyzed in the next metric.

iii. Annual average Reserve Fund Contribution Rate

The annual average reserve fund contribution rate is a ratio of planned reserve fund contributions to planned reserve fund drawdowns.

iv. Reinvestment Rate

The reinvestment rate is a ratio comparing the annual average capital budget spent on a lifecycle renewals of an infrastructure asset to its current replacement value. The annual average capital spending is based on a 10 year planning horizon. For example, this Asset Management Plan determines the annual average lifecycle capital budget based on approved capital budgets from the 2018-2027 period.

When compared to both the expected useful life of an asset and its condition (and possibly other criteria), it can give an indication as to whether sufficient capital funding is being planned and provided to ensure an asset can perform at the optimal level of service.

An illustrative example is provided below:

- An asset's current replacement value is $10 million dollars
- For the next 10 years, the budgeted lifecycle funding is $9 million dollars
- The expected useful life of the asset is 10 years

The actual reinvestment rate is:

- Annual average of the projected 10 year budget - $900,000
- Current replacement value - $10,000,000
- Reinvestment rate = $900,000/$10,000,000 = 9.0%

The actual reinvestment rate in of itself is insufficient to determine if optimal spending is being projected. It is compared to the reinvestment rate implied by an asset's expected useful life. For example: a 10 year expected useful life indicates an optimal annual reinvestment rate of 10% (1/10 years = 10%). Given that the current reinvestment rate is 9.0%, it indicates that an average planning shortfall of 1% (or $100,000) is expected to occur each year, for the next 10 years.

Purpose and Limitation of the Reinvestment Rate

The reinvestment rate comparison can be a useful benchmark. However, it is important to note the reinvestment rate is primarily an assessment of planned infrastructure spending, and gives an indicator of how future funding can be altered to ensure a planned asset management approach is being implemented. Assets may have a low reinvestment rate but could otherwise have sufficient funding. For example, an asset may have a seemingly low reinvestment rate, but it is possible that sufficient funding is occurring from unplanned sources (such as drawing on a reserve fund), or perhaps greater than expected maintenance is offsetting the relatively low investment spending. The Asset Management Plan is assessing reserve fund availability as part of reducing any infrastructure gaps identified; however, assessing appropriate maintenance ratios cannot be performed at this time.

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A 1.2 Levels of Service (Continued)

The longer an asset's expected useful life, the more subjective it becomes to interpreting the reinvestment rate. For example, assets that are expected to last 80-100 years (such as mains and treatment plants) indicate reinvestment rates around 1.0% to 1.25%. The longer an asset's expected useful life, the more subjective it becomes to interpreting the reinvestment rate. For example, assets that are expected to last 80-100 years (such as mains and treatment plants) indicate reinvestment rates around 1.0% to 1.25%.

However, this network average may not be entirely applicable given that the network condition is not equally distributed between Very Good to Very Poor. There may be portions of the asset network that have outdated components with delays in replacement, and are therefore skewing the ratio to greater than expected funding requirements.

Another possibility is that certain components of an asset (such as a facility foundation) cannot be practically replaced or rehabilitated, although they may account for a significant portion of a replacement value. Another possibility is that a network may be in above average condition, suggesting that funding can be reduced, but reducing budgeting would create a greater infrastructure gap beyond the 10 years of analysis.

One shortfall with this analysis is assuming that replacement values will be unchanged and assets will last as long as predicted. Another shortfall is the perception that fractions of a percentage would be an insignificant planned budget investment. However, under-budgeting capital renewal by 0.5% a year for 100 years would indicate 50% of asset renewals would be coming from unplanned sources.

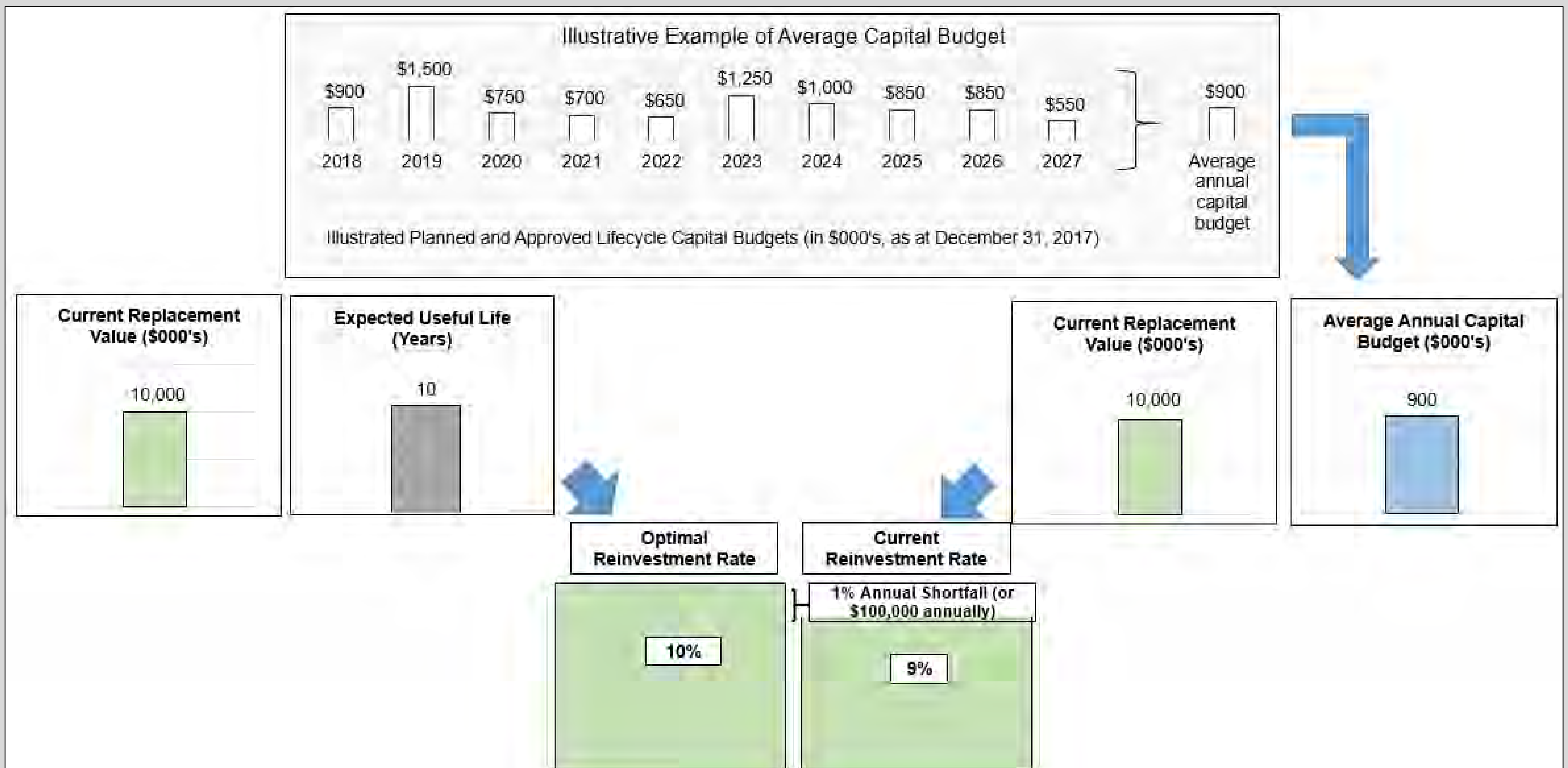

Figure A - 1 Visual of Reinvestment Rate Calculation and Implications of Reinvestment Shortfall

Section 22: Appendix A

A 1.3 Asset Lifecycle Management Strategy

The asset lifecycle management strategy is the set of planned actions that will enable the assets to provide the optimal levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost.

i. Lifecycle Activities

Generally, the City determines the criticality and priorities of candidate assets for lifecycle activities (Capital and Operating) based on several factors depending on the asset type. In certain assets, factors such as condition, material type, construction methods, location, etc. contribute to the asset condition assessment. Other contributors could be the level of security controls, assets supportability, and technology standards. Each asset type has its own criteria in determining the required actions and the needs over the next 20 years.

Asset Management decisions and Lifecycle Activities are optimized using Optimization algorithms and decision making trees that address the following:

- Maximizing the overall average condition of the entire network
- Maximize service level outcomes
- Maximizing assets useful lives
- Minimizing the Capital and Operating expenditures

Lifecycle

Lifecycle Capital Budgets include the following activities:

- Replacement
- Rehabilitation
- Renewal
- Disposal

Lifecycle Operating Budgets are split between the following activities:

- Non-Infrastructure
- Maintenance
- Operating

Non-infrastructure solutions and maintenance/operating activities are analyzed using the operating budget expenses for each asset group. Note that it is assumed the current operating budget is sufficient to meet current operating needs (unless specifically otherwise known).

Service Improvements

Service Improvement activities are analyzed using planned expenditures identified through various studies and a review of the approved service improvement capital budgets.

Current funding for service improvement capital budgets presented are the annual average of approved budgets (as of December 31, 2017) for the 2018-2027 fiscal years.

It is assumed capital budgets for service improvements are sufficient to meet service improvement needs (unless specifically otherwise known).

It is difficult to quantify changes in operating budget as a result of service improvement projects, thus unless it is specifically known of the budget changes, no amount is presented.

Growth

Growth activities are analyzed using the draft Development Charges (DC) 2019 Background Study (as of February 25, 2019) and the various Master Plans. While the draft DC 2019 Background Study lists growth needs until 2038, O. Reg. 588/17 requirements are for a 10 year period of analysis (2018-2027). The draft DC 2019 Background Study lists the expected year of project commencement. This expected year is the basis for determining growth activity for the years 2018-2027. It is noted that the draft DC Study sometimes lists expected year as a range (such as 2025-2028). Under these scenarios, the project is prorated on an equal annual average.

O. Reg. 588/17 requests municipalities to list estimated significant operating costs related to new construction or upgrading existing municipal infrastructure assets. The City determines this amount from analyzing the draft DC 2019 Background Study.

The draft DC 2019 Background Study information is applied to growth projects approved for the 2018-2027 period. This determined the analysis for current funding of growth operating budgets.

It is assumed capital budgets for growth will be sufficient to meet growth needs (unless specifically otherwise known).

Section 22: Appendix A

A 1.3 Asset Lifecycle Management Strategy (Continued)

i. Lifecycle Management Approach

There are two scenarios used to forecast the future condition profile of each asset type based on two budget values.

First Scenario - Current Budget

The first scenario represents managing the municipal infrastructure assets using the Current Funding for Lifecycle Capital and Operating budgets. The Capital Budget is based on the annual average of City approved budgets allocated for each asset type (as of December 31, 2017) for the 2018-2027 fiscal years. The current funding presented for lifecycle operating budgets is calculated using the average of the budgeted 2016 and 2017 fiscal years.

Second Scenario - Optimal Budget

The second scenario represents managing the municipal infrastructure assets using an Optimal Funding for Lifecycle Capital and Operating Budgets to achieve the target (proposed) service levels within the next 20-year planning horizon for all municipal infrastructure assets across the City. The Optimal Capital Budget is forecasted by analyzing the cost of the lifecycle activities that are required to achieve the optimal condition profile. Optimal lifecycle activities (needs) are analyzed through various studies, analysis of the projected condition of assets over the next 10 years, and expertise from the service area. The optimal funding presented for lifecycle operating budgets is calculated using the average of budgeted 2016 and 2017 fiscal years.

Lambeth Community Centre & Arena – Beattie St

A 1.4 Forecasted Infrastructure Gap

Each Service Area chapter includes an Infrastructure Investment Gap chart(s) Figure A.2 indicating the annual required investments, the City's planned budget, and the resultant infrastructure funding gap over the next decade; noting that any planned investments beyond 2018 are only forecasts that have not been approved, and are subject to budget approval in their respective years via the City of London budget process. The chart highlights whether the past maintenance, rehabilitation, and replacement of these assets have been sufficient (the current gap), and whether projected planned investments are consistent with the anticipated infrastructure needs over the next decade (gap in 10 years).

The chart displays the following information:

- Planned Budget (blue bar minus red bar).
- The Reserve red hatched bar represents the "savings" the City has accumulated to help offset investments required for infrastructure.
- The Total Required Investment blue bars represent the projected investments required to maintain our existing assets.
- The Total Planned Budget red bars represent the amount of investment the City currently forecasts spending on Lifecycle Renewal of its infrastructure.
- The Cumulative Infrastructure Gap green line is the sum total of the differences between the Total Required Investment and the Total.

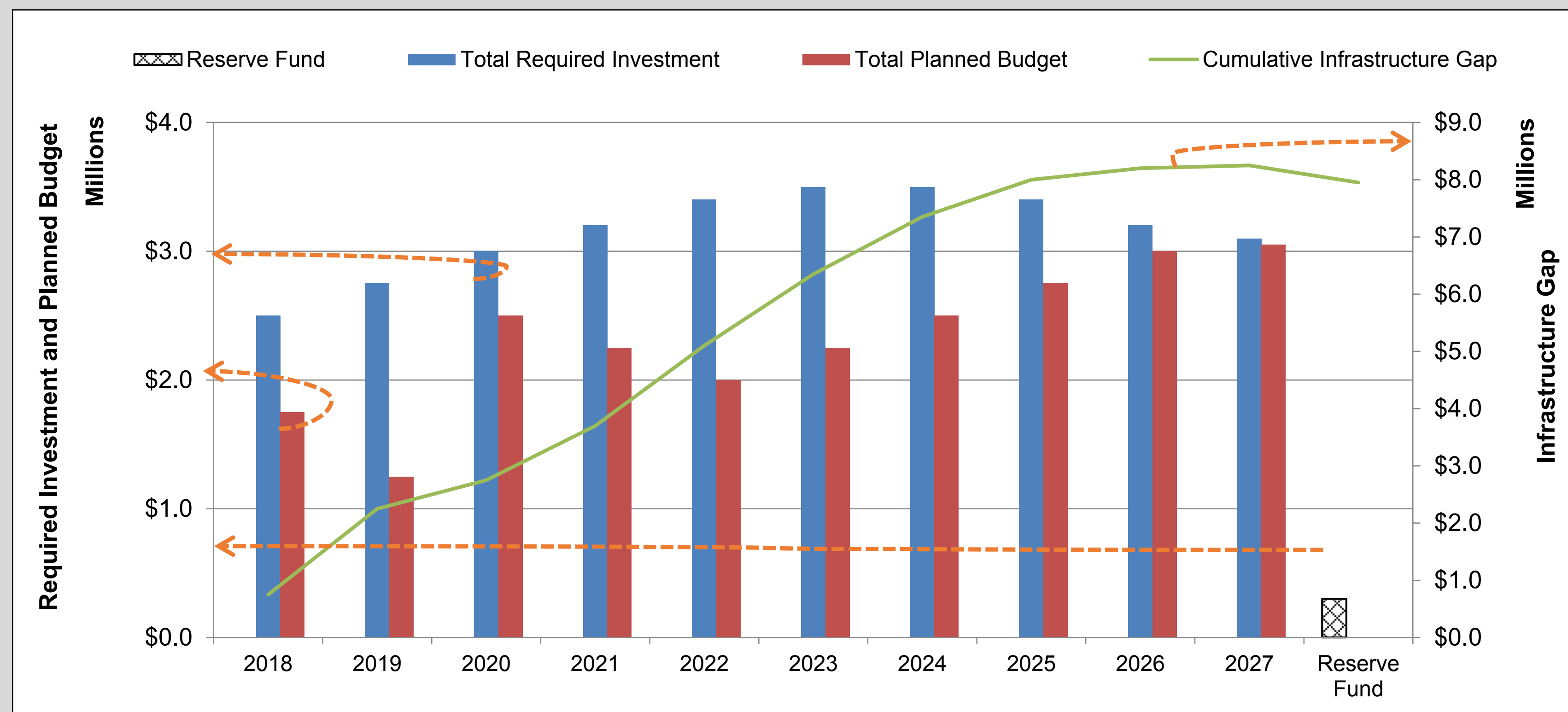

Figure A – 2 Example of Infrastructure investment Gap chart

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A – 2 FINANCIAL STRATEGY ADDITIONAL COMMENTARY

Additional commentary is provided on financial strategies listed in Section 20.

The following are discussed in greater detail:

- Debt Management
- Consequences of Underfunded Reserves and Reserve Funds
- Grants and Subsidies
- Development Charges (for growth projects only), and
- Public Private Partnerships (P3)

Debt Management

In order to manage the City's debt, the City has undertaken to amend/enact the following recent policies:

- Capital Budget and Financing Policy (By-law NO. CPOL.-355-246), where tax and rate supported lifecycle renewal capital budgets shall only be authorized to use debt after all other funding options have been applied and exhausted;
- Investment Policy (By-law CPOL.-39(a)-372). Given the first priority is to ensure security of investments, thus reducing the risk of requiring debt. It aligns with the City's overall investment strategy is to invest public funds in a manner that prioritizes security and liquidity of principal over attaining higher investment returns;
- Reserve & Reserve Fund Policy (By-law No. CPOL.-368-372) that reduces tax/rate supported debt (where appropriate) by substituting reserve/reserve funds with previously approved debt financing.

Provincially, the Ministry of Municipal Affairs and Housing imposes an annual debt repayment limit of 25% of 'own source' revenues as a measure of financial constraint and sustainability. It should also be noted that Provincial legislation allows the use of debt only for capital expenditures.

The City of London strives to maintain its debt levels at targets below the provincial limit to minimize the impact of debt servicing charges on its operating budget. It is also noted the City has an annual average internal debt threshold of $26 million over the 10 year capital plan. Given the City is nearing this threshold, there is no additional financing for tax-supported debt without reviewing and adjusting the internal debt cap.

Consequences of Underfunded Reserve and Reserve Fund Balances

The potential consequences of inadequate reserve levels include:

i. **Increased Cost of Short Term Borrowing:** Lack of available reserve funds may require the City to seek short term financing from external sources at an increased cost to the municipality.

ii. **Loss of London's AAA Credit Rating:** Moody's has outlined that improving reserve funds levels assist the City of London in achieving its credit rating. A drop in this rating would increase the overall cost of borrowing levels resulting in a direct impact to the operating budgets.

iii. **Reduction in Capital Plan:** Reserve funds balances assist the City to finance its capital programs. Depleting or reducing contributions to reserves would negatively impact the ability of the City's capital plan to accommodate capital needs. This could result in changes to service levels, or more costly financing options such as capital levy or debenture sources.

iv. **Improper Intergenerational Equity (Pay Now or Pay Later):** Failing to set aside funds now to pay for known future costs (unfunded liabilities, capital asset replacement), places the burden to pay on future generations that may not benefit from the investment (matching consumption with cost).

v. **Address Unplanned Expenditures:** Reserve funds can be used as appropriate to address unexpected emergencies that arise from time to time, as well as smooth out spikes in annual expenditures.

Earl Nichols Recreation Centre – Homeview Rd

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Grants and Transfer Funding

Grants and Transfers from the Provincial and Federal government are financial sources sometimes used to fund capital projects at the City. Ongoing funding agreements include Federal Gas Tax transfers. However, many grants are a result of stimuli, or other one-time funding events that may be difficult to forecast. Grants are only included in the budget forecasts when confirmed and there is a good degree of certainty. The City will continue to pursue grants and transfer funding where possible.

This Corporate Asset Management Plan is the latest prerequisite moving forward for many funding applications to upper tier governments, and to be compliant with Ontario Asset Management Regulation 588/17.

Development Charges

Development Charges (DC) are collected by the City from developers under the City's Development Charges Bylaw. Development Charges are used to finance the development (growth) share of the capital programs and are stored in designated DC reserve funds, primarily the City Services Reserve Fund, until they are needed to pay for growth-related infrastructure as prescribed in the Bylaw. These funds will continue to be used in the prescribed manner to fund growth related projects at the City. Projections relating to DC revenues are based on results of the regularly updated Development Charges Study, its ongoing recommendation of rates, and the anticipated infrastructure requirement to facilitate growth of the City.

Public Private Partnerships (P3)

Public Private Partnerships is a capital project delivery method whereby a public entity, such as the City, partners with a private entity for the purpose of delivering public infrastructure. The federal government offers grants in support of these shared initiatives. Generally, this involves the participation of a design build team, a maintenance firm, and a lending firm in partnership with the City. The City has entered this kind of relationship infrequently and where applicable, such as for the construction of the Budweiser Gardens. Typically, the profit needs of the private sector partners are intended to be achieved through user fees, while the City benefits from shifting the risk of operating and maintaining these investments to the private sector. While considered a rare strategy, the City considers the P3 approach as projects arise, and makes decisions based on the individual merit of the proposals.

Squash Court – North London Optimist Community Centre – Cheapside St

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A – 3 DATA ACCURACY/RELIABILITY COMMENTARY

Data Reliability and Accuracy

To aid interpretation, a Data Accuracy and Reliability rating is noted in the conclusion section of each service area chapter. The Data rating scales are defined below.

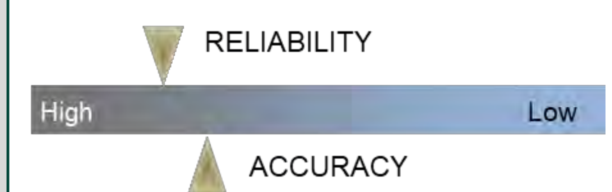
Table A-3 Reliability and Accuracy Scale and Definitions

Measure	Description	High	Moderate	Low
Reliability	Can be trusted to be accurate or to provide a correct result	Based upon sound records, procedures, or analyses that have been acceptably documented, and are recognized as the best method of assessment	Based upon known reasonable procedures, or analyses that have been acceptably documented	Based upon expert verbal opinion or cursory inspections/ observations
Accuracy	Probable difference between a recorded parameter and its true value	+/- 1%	+/- 20%	+/- 50%

Reliability and Accuracy Scale

Water Data Reliability and Accuracy

Data reliability for the Water service area is rated as moderately high to high. Watermain Inventory has been verified through GIS. Water facilities have been corroborated through appraisal reports and publicly available information for bulkwater stations. Watermain valuation is based on external expert opinion based on recent tender prices which factors width of watermain and depth which the watermain is installed, and restoration costs. Condition for linear assets with diameter less than 600mm (approximately 54% of replacement value) are based on engineering analysis and internal database of watermain data. Watermains greater than 600mm have received external opinion data to assess condition and risk profile. Investment profile is based on engineering estimates. The majority of water facilities are based on external expert opinion on condition, replacement value, and lifecycle investment needs. Remaining assets (bulkwater stations, storage facilities) have condition based on age and expected useful life. Lifecycle needs forecasts are based on age and expected useful life estimates combined with expert opinion, which may vary from actuals. Accuracy is rated moderately low, as forecasts and condition assessments of pumping station/reservoir external reports have a disclaimer of accuracy of +/- 25% (Class D estimates) or (+/-50% or Class 5 estimates).



Sanitary Data Reliability and Accuracy

Data reliability is rated as moderate to high. Sewermain Inventory has been verified through GIS. Valuation is based on external expert opinion based on recent tender prices which factors width of sewermain and depth which the sewermain is installed, and restoration costs. Condition and investment forecasts for Collection assets (~80% of replacement value) are based on engineering analysis. Pumping station condition has been assessed with external expert and replacement with corroboration of engineering analysis. Treatment assets have begun formal assessment of replacement value and condition, but considered at a higher level of detail. However forecasts are based on age and expected useful life estimates, which may vary from actuals. Accuracy is rated as moderate, as forecasts for Treatment Assets (~20% of replacement value) are based on expected useful life, and sewermain forecasts not completely integrated with engineering estimates.

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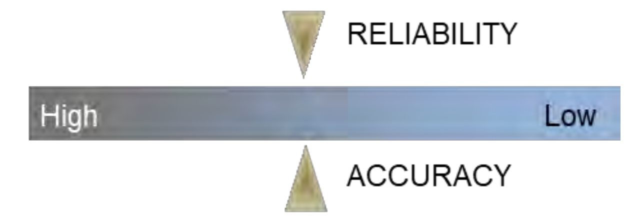
Stormwater Data Reliability and Accuracy

Data reliability is rated as moderate. Inventory has been compiled via various existing sources including GIS and internal Stormwater Service Area data. Valuation of sewermain is based on external expert opinion which factors recent tender prices which factors width of sewermain and depth which the sewermain is installed, and restoration costs. Stormwater Management condition, investment forecast, and replacement value is split between TCA data (Stormwater Management Facilities), engineering estimates (Green Stormwater Management Facilities, oil/grit separators, and majority of Open Conveyance) and a combination of external expert opinion and engineering analysis (dykes). Condition and investment forecasts for Storm Sewers (approximately 89% of replacement value) are based on regular limited condition assessments. Open Conveyance municipal drains have not completed formal assessment. However condition and investment forecasts are based on age and expected useful life estimates from engineering analysis and external opinion, which may vary from actuals. Accuracy is rated as moderate to low, as sewermain forecasts not completely integrated with engineering estimates and Management assets not formalized to the same level as sewermains.

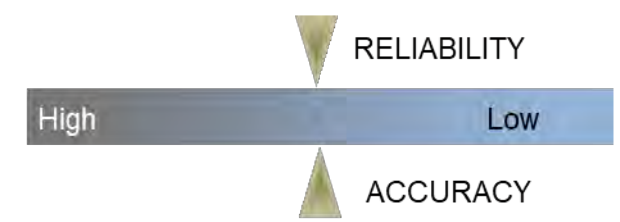


Roads and Structures Data Reliability and Accuracy

Data reliability is rated as moderately high to high. Inventory and Pavement condition have been verified through RoadMatrix (Roadways), GIS (Sidewalks), and engineering reports (Bridges & Structures). Data is not available on road base, curb and gutter or consider moderate (boulevard). Valuation is based on RoadMatrix for Roadways, TCA information for Sidewalks, and engineering reports for Bridges and Structures. Investment forecasts for Roadways (~68% of replacement value), and Bridges & Structures (~20% of replacement value) are based on engineering reports. Investment forecasts for Sidewalks (~12% of replacement value) are based on condition and expected useful life estimates. Accuracy is rated as moderate to high, as most forecasts are supported by engineering estimates.

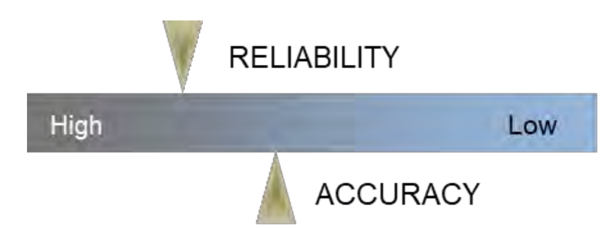
Traffic Data Reliability and Accuracy

Data reliability is rated as moderate. Inventory has been derived from Traffic service area tracking information and confirmed using GIS. Valuation is based on service area information. Condition ratings for Signals (~43% of replacement value) based on expert opinion. Condition ratings for lighting (~56% of replacement value) based on TCA age and expected useful life. Condition ratings for Signs (~1% of replacement value) are based on reflectivity testing results. Investment forecasts are based on age and expected useful life estimates. Accuracy is rated as moderate to low, as forecasts are based on theoretical expected useful lives and are not supported by solid engineering estimates.



Parking Data Reliability and Accuracy

Data reliability is rated as moderate to high. Inventory has been collected from service inventories and confirmed by City staff. Valuation is based on known replacement costs. Investment forecasts are based on condition and Expected Useful Life of the assets. Accuracy is rated as moderate to high, as most forecasts are supported by unit rates and medium-term replacement plans. Collaboration and planning with Transportation occurs when investment in surface lots and repaving is required.



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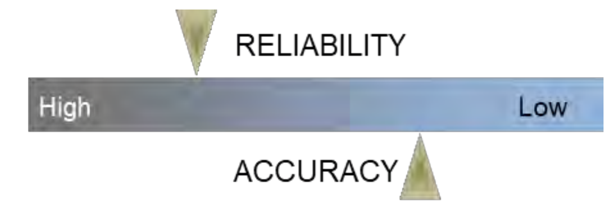
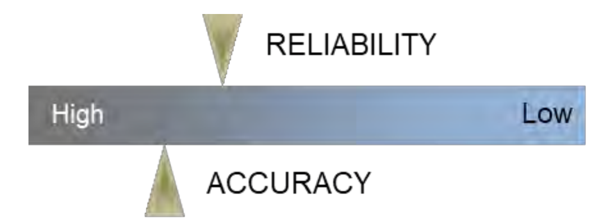
Solid Waste Data Reliability and Accuracy

Data reliability is rated as moderate to high - Inventory has been verified through TCA, internal Solid Waste inventory records, and where applicable, GIS data, Facilities VFA software, and annual disclosure reports from Solid Waste (W12A Annual Report). Valuation for Diversion and Disposal assets is based on the combination of external costing estimates (Altus for W12A facilities) and internal service area information. Material recovery facility equipment condition and investment forecasts based on external opinion. W12A condition and investment forecasts are based on Facility VFA data. Condition and investment forecasts for all other assets are based on expert opinion, which may vary from actuals. Accuracy is rated as moderate to low as forecasts are based on internal capital projections, and the resource recovery facility costing data is considered preliminary. In general condition ratings are not supported by engineering studies.



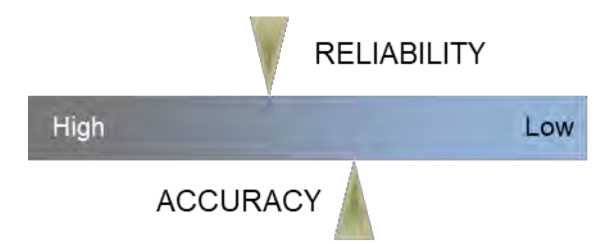
Recreation Data Reliability and Accuracy

Data reliability is rated as moderate. Building inventory and condition has been verified through Facilities VFA system. However other equipment information is held in internal Recreation service area records. Valuation for all Parks Facilities assets is based on Altus external source replacement values adjusted to London prices, or for spraypads internal expert opinion. Condition and investment forecasts for all Structures (~95% of replacement value) are based on Facility Condition Index scores from VFA, which are determined during regular condition assessments. Remaining assets have not been formally assessed however condition and forecasts are based on expected useful life estimates, which may vary from actuals. Quality ratings systems have been prepared by Recreation but have been only formally assessed several times since implementation. Accuracy is rated as low to moderate; as forecasts for non-facilities type assets are based on TCA values only.



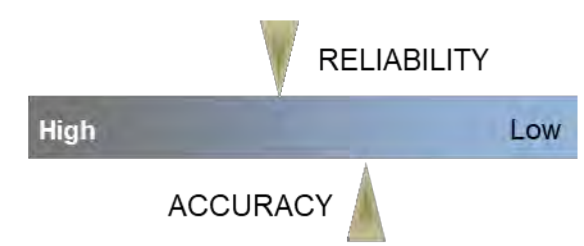
Parks Data Reliability and Accuracy

Data reliability is rated as medium to low. Although inventory has been verified through GIS (for linear assets and structures), and Facilities VFA information for Park Facilities, records are not kept of all parks equipment. Valuation is based on internal expert opinion estimated replacement costs, Facilities VFA data and corroboration with Altus standard unit costs in London area, and TCA information. Parks has developed a quality rating system, however it is not performed periodically and systematically. Assets are monitored through routine maintenance like mowing. Condition and investment forecasts for structures and linear assets therefore based on expert opinion, age, and expected useful life. Accuracy therefore is rated as moderate to low, as results are not supported by regular and systematic formal estimates.



Urban Forestry Data Reliability and Accuracy

Data reliability is rated as moderate. Woodland Inventory in GIS has tracked size (in hectares) of Woodlands and the number of trees can be estimated using industry standards from a 2008 UFORE (Urban Forest Effects) analysis. Third party studies in conjunction with internal opinion assessment have been relied upon for Woodland valuations, but data is not recent. Valuation for Street Trees is estimated by using a dollar value per tree using recent tendered costs. An estimate of Street tree condition was performed in a study in 2002 and was subsequently updated based on average rate of tree degradation based on age or illness. Condition and investment forecasts are therefore based on estimates and expert opinion. Accuracy is therefore rated as moderate to low as forecasts are not supported by recent data, detailed studies and estimates. Updated information is expected to be available approximately fall of 2019.



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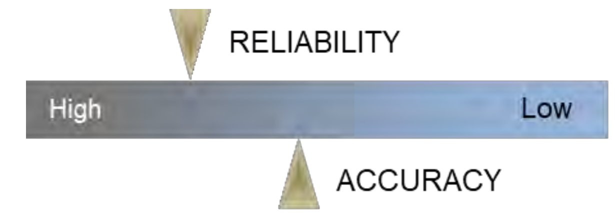
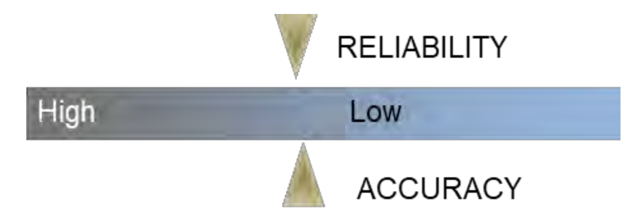
Fire Data Reliability and Accuracy

Data reliability is rated as moderate to high. Emergency and Non-Emergency Vehicles have been verified with Fire internal listings. Equipment inventory has been verified through TCA information. Stations and Facilities inventory has been acquired through Facilities VFA database. Valuation is based on internal assessment opinion, TCA information and Facilities VFA, Altus standard costs for London area facilities. Condition and investment forecasts for Stations (~60% of replacement value) are based on regular station condition assessment. Vehicle and Equipment assets have not been formally assessed however; condition and forecasts are based on age and expected useful life estimates, which may vary from actuals. Accuracy is rated as moderate, as forecasts for vehicles and equipment (~40% of replacement value) are split between internal assessment of vehicle costs, and equipment based on TCA values only, and are not supported by engineering estimates.



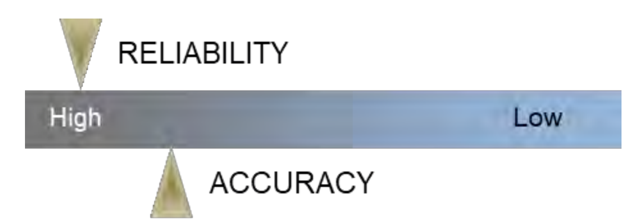
Long Term Care Data Reliability and Accuracy

With respect to the facility, data reliability is rated as high while with respect to contents reliability is moderate. Long Term Care completed equipment inventory listing for the asset management plan, which is the first time for asset management reporting purposes. Valuation is based on a combination of Facilities VFA and internal assessment opinion. Facility condition and investment forecasts for the facility are based on regular condition assessment. Accuracy is rated as moderate to high, as forecasts are based on regular assessments of the facility. With respect to Dearness equipment, reliability and accuracy are moderate as inventories are not regularly tracked in a formalized and systematic manner for asset management reporting. As a result, this assessment has been averaged at moderate for both to balance the building against the contents.



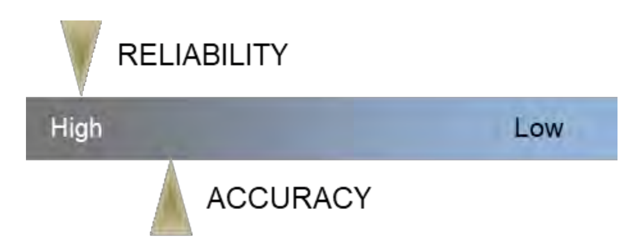
Facilities Data Reliability and Accuracy

Data reliability is rated as high. Valuation is based on Facilities VFA information and corroborated with Altus standard costs for London area facilities. Condition and investment forecasts for all Corporate and Cultural facilities are based on regular condition assessment. Accuracy is rated as moderate to high, as forecasts are supported by regular condition assessment of the facilities.



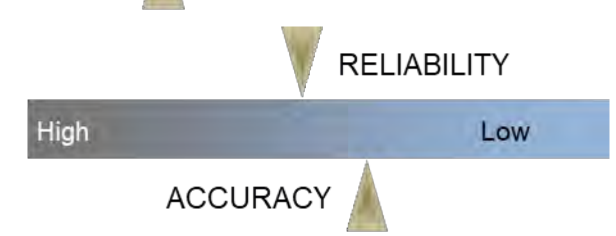
Fleet Data Reliability and Accuracy

Data reliability is rated as high. Valuation is estimated internally based on market rates. Condition and investment forecasts for are based on age and expected useful life estimates of the vehicles and equipment provided by the Service Area. Accuracy is rated as moderate to high, as forecasts are supported by assessments of the vehicles and equipment age and condition made internally.



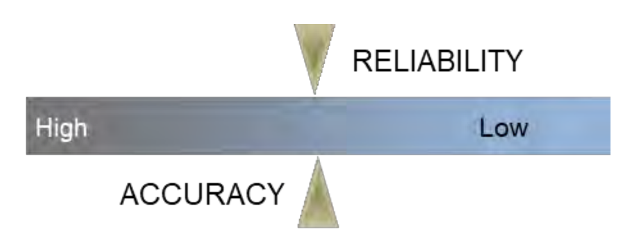
ITS Data Reliability and Accuracy

Data reliability and accuracy is rated as moderate. Detailed Inventory exists for computer hardware information that is approximately three years of age or less. As older inventory is replaced, eventually detailed information will exist for all hardware. Valuation, condition and investment forecasts for all technology assets are based on expert opinion.



Corporate Security & Emergency Management

This is the first time Corporate Security & Emergency Management is being assessed as a standalone service. Data reliability and accuracy is rated as moderate. Valuation, condition and investment forecasts for all technology assets are based on expert opinion. Corporate Security & Emergency Management is in process of assessing needs with assistance with external expert.



Appendix B – Asset Lifecycle Management Activities and Associated Risks

Section 22: Appendix B

B – 1 ASSET LIFECYCLE MANAGEMENT ACTIVITIES AND ASSOCIATED RISKS

Table B – 1 General Actions and Risks Associated With Asset Lifecycle Activities

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Generic Asset Management Practices or Planned Actions**	**Generic Risks Associated with Asset Management Practices or Planned Actions**
Non-Infrastructure Solutions Actions or policies that can lower costs or extend useful lives	• Development controls and approvals. • Financial and Planning strategies to control costs. • Developing computerized maintenance management system. • Updating and applying design standards. • Ongoing search for additional funding. • Operational improvements. • Improvements to employee capabilities, communications, training, etc. • Public involvement practices including awareness training, posters and website. • Changes to Levels of Service (LOS). • Developing Corporate Asset Management program.	• Lack of a realization of the benefit from the activity (i.e. the life is not extended or the cost of managing an asset increases rather than decreases). • Lowers the costs of existing operations and may provide additional capacity but does not extend the service life of assets. • Plans/Reports/Recommendations. • Asset management plans or proposed network solutions not followed. • Inadequate Funding. • Poor Quality asset information. • Planning Assumptions incorrect. • Regulatory requirements, standards, criteria change or do not exist. • Economic fluctuations, inflation, downturns, revenue and use reduces/increases. • Occurrence of Climate Change/Adverse Weather/Unforeseen events and emergencies, resulting in funds being diverted to assets that were not originally planned. • Growth projections not as planned. • Service Provision Changes.
Maintenance Activities Including regularly scheduled inspection and maintenance, or more significant repair and activities associated with unexpected events.	• Maintenance also triggered by the public 'inspection' through phone and web interface available for public reports/complaints. • Scheduled preventative maintenance programs for the majority of assets. • Scheduled inspection programs for key assets.	• Completing planned maintenance activities while managing the need to execute reactive maintenance activities. • Incorrectly planned maintenance activities can lead to premature asset failure. • Enough resources available to complete a series of unplanned, urgent work requests that are submitted in close succession. • Overscheduling preventative maintenance can lead to excessive maintenance and additional costs with no actual benefits.

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B – 1 ASSET LIFECYCLE MANAGEMENT ACTIVITIES AND ASSOCIATED RISKS

Table B – 1 (Continued) General Actions and Risks Associated With Asset Lifecycle Activities

Activities *Activities that will enable the assets to provide the current levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost*	**Generic Asset Management Practices or Planned Actions**	**Generic Risks Associated with Asset Management Practices or Planned Actions**
Renewal/Rehab Activities Significant repairs designed to extend the life of the asset.	• Adopt the latest technology that maintains the current level of service.	• Incorrect assumptions regarding improved expected useful life after rehabilitation.
Replacement/Construction Activities Activities that are expected to occur once an asset has reached the end of its useful life and renewal/rehab is no longer an option.	• Adopt the latest technology that maintains the current level of service.	• Cost over-runs during large, complex design and construction projects.
Disposal Activities Activities associated with disposing of an asset once it has reached the end of its useful life, or is otherwise no longer needed by the municipality.	• Dispose of assets under the applicable regulation and environmental standards.	• Disposal incorrectly performed or cost overruns resulting from increase disposal requirements compared to initial estimates.
Service Improvement Activities Planned activities to improve an asset's capacity, quality, and system reliability.	• Adopt the latest technology that enhances the current level of service.	• Service improvement is either not required or incorrectly assessed.
Growth Activities Planned activities required to extend services to previously unserved areas – or expand services to meet growth demands.	• Undertake Environmental Assessments. • Assumption of subdivisions, commercial and industrial extensions, local improvements, etc.	• Incorrect growth assessments may result in overabundance of assets. • Risk of insufficient funding to maintain new asset. • Incorrect asset size will cost more money and may cause operational challenges (too large asset), or may result in the need to prematurely expand the asset (too small asset).

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